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Interventions for Improving Children's Language in Early-Childhood-Education-and-Care Institutional Settings in Germany

A Systematic Review

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Competing Interests

The authors have no competing interests to declare that are relevant to the content of this manuscript.

Preface

In 2001, the results of the first PISA study jolted the German education system into action: the performance of students in basic school-related skills was much worse than previously assumed in an international comparison. Analysis of the causes identified, among other issues, educational deficits in early-years education, where an increasing number of children whose first language was not German were not adequately prepared for the language used in the educational institutions. Consequently, many federal states in Germany called for the early diagnosis of language development in preschool children. Measures to promote language development, particularly German, were developed and implemented in extensive initiatives.

Education policymakers had hoped that these measures would have a rapid effect. However, when this did not become apparent immediately, the debate on early language support was often based on socio-political convictions rather than evidence-based findings. One consequence was the abandonment of mandatory early diagnosis of language development, combined with decision makers' growing conviction that targeted, compensatory language-development support for children with such deficits had no effect and was therefore unnecessary. The only promising approach to early language support was considered to be language immersion in early-childhood-education-and-care institutions and language education integrated into the daily work of educational professionals in the elementary sector.

This systematic review, the results of which are documented in this volume, aimed to evaluate the empirical evidence on educational strategies and implementation for the support and promotion of the German language in early childhood (ages 3 to school enrolment) in institutional settings. The project took significantly longer than originally anticipated. This is mainly because the field under investigation is even more dynamic and diverse than generally assumed. Our work origi-

nally arose from the Leibniz Institute for Research and Information in Education (DIPF)'s and a group of interested researchers' desire to gain initial experience with the systematic-review instrument. We were able to draw on far more, and more diverse, initiatives than we had initially thought.

We would like to take this opportunity to thank the Mercator Foundation for its willingness to provide financial support for this exploratory project. We would also like to express our special thanks to Dr. Janice Tripney, EPPI-Centre London, who supported us throughout all of the work as our methods mentor and from whom we learned a great deal, as well as to the members of our expert advisory board, who supported us in various phases of the project with their diverse expertise relevant to the field of investigation: Prof. Dr. Michael Becker-Mrotzek, Prof. Dr. Hans-Günther Roßbach, Prof. Dr. Monika Rothweiler, Prof. Dr. Hermann Schöler, Prof. Dr. Petra Schulz, and Prof. Dr. C. Katharina Spieß. Last but not least, we would like to thank DIPF staff members Dr. Minja Dubowy, Dr. Renate Martini, Dr. Ingrid Plath, and Dr. Gwen Schulte as well as Michelle Boxler, DJI, for their support in various phases of the project.

We hope that this book will not be primarily read as a final report, but rather that it will contribute to launching new efforts to establish a better, evidence-based foundation for language support in early childhood education and care in German-speaking countries, involving all groups of stakeholders working in and making decisions about the field.

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Background

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1.1 Policy and Practice

Language competencies are among the most important prerequisites for individual success in education, later participation in the labour market and life in general. In Germany for example, children with delays in language development have a significantly higher risk of experiencing poorer educational and vocational progress than might be expected given their general cognitive skills. This also applies to children with an immigrant background whose first language is not the language of instruction. These children suffer from severe disadvantages related to the lack of

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competence in the language of instruction. Consequently, impeded participation in society is expected owing to delays in the cognitive, emotional and social development of the children concerned (see Authoring Group Educational Reporting, 2014, for an overview, 2022 for recent summaries).

Policy-makers in Germany have recognised that society needs to foster language competencies even in very young children, a need that has gained urgency following the arrival and likely stay of large groups of refugees from non-German speaking countries. There is a growing awareness and research evidence that early language skills are key to overcoming gaps in all school curriculum areas: linguistic activities (e.g., learning to read), non-verbal computational subjects (e.g., mathematics), and content-based curricula (e.g., social studies and natural sciences). Consequently, the societal and political pressure on educational settings in the early years to reduce language deficits and to foster language development in children has increased substantially in recent decades. Research in linguistics and developmental psychology (Bhatia & Ritchie, 2012; Heppt, 2016; Fox et al., 2019) has shown that children with different types of language acquisition may need support in vocabulary (some bilingual children or second language learners), higher order grammatical phenomena (second language learners), and what is labelled "Bildungssprache", or academic language (monolingual and bilingual children as well as second language learners).

The demands have to be met by the German Early Childhood Education and Care (ECEC) system that has a long tradition and involves many different stakeholders. Planning and realization of ECEC by different stakeholders rely on different bodies of research literature and early childhood policies. Each tradition or school has developed its own strategies to approach challenges and demands, claiming (but not always delivering scientific evidence) that their own approach is the most effective and most appropriate (a programme's efficiency is hardly ever studied or discussed). To address this issue, this systematic review intends to collect and critically analyse the existing research literature.

The remainder of this section summarizes the current situation in German ECEC institutional settings. We then give an overview of the research on language acquisition in monolingual and bilingual children (Sect. 1.2), and sketch the rationale for focusing on language interventions in this systematic review (Sect. 1.3). The study's eligibility criteria and the coding scheme are developed against this background.

1.1.1 The German ECEC System: History and Organisation

Like many ECEC systems worldwide, the roots of German ECEC can be traced to Friedrich Fröbel. Unlike nineteenth century child care settings, for example in England, whose sole purpose was to keep small children in a safe place while parents and older siblings went to work, Fröbel emphasized the educational mission of early childhood care centres and therefore explicitly added educational goals to the predominant purpose of care. Contrary to some modern realizations of early childhood education, Fröbel's interpretation of education in early childhood was not equated to teaching, formalized instruction or other highly structured courses or lectures. He explicitly defined instruction as the preferred method for school-aged children's learning, while the preferred learning method for children in early childhood was play. Consequently, he encouraged children to engage in free play, guided play and frequent interactions with peers and adults. Many of his suggestions for more structured activities aimed at fostering early numeracy in creative and constructive play (Kuger & Roßbach, 2010).

Even given Fröbel's fundamental, highly influential and from todays' point of view very modern ideas of ECEC, current German ECEC programmes mainly refer to two other sources of inspiration in their conceptual frameworks: programmes by Montessori, Waldorf or other early twentieth-century reform pedagogics, and the so-called situation-based programmes that expanded their influence starting in the 1980s. The programmes all perceive children as self-determined learners who actively create their skills and knowledge in interactions with their material and social environment (Bronfenbrenner & Morris, 2006). Such frameworks refer to developmental psychology theories of Piaget (1963) and Vygotsky (1978). Although they are not frequently cited, learning and education theories by Dewey (1985) and Pramling Samuelsson and Asplund Carlsson (2008) have also implicitly influenced many programmes.

In practice, this has resulted in the majority of settings implementing a mainstream programme with individual nuances which consisted of an open, play-based curriculum with high proportions of child-initiated free play that rely on a co-constructive view of learning incidents. Some intermittent structured activities (offered by staff members) emphasize stimulation of social, motor and communicative skills; very little attention is given to early academic (i.e., literacy and numeracy) competencies. Learning and play activities initiated by staff members are drawn from children's real-life experiences, refer to seasonal cultural festivities, or are derived from year-round, cross-disciplinary topics (e.g., "life in our seas and oceans", "the rain forest").

To illustrate the stereotypical (and admittedly simplified) mindset of providers and child carers from a few years ago, early years learning and education was understood to be a co-constructive play-based, incidental process. Any form of structured instruction that might entail "teaching" was not acceptable, was suspected of suppressing child-inherent motivation and/or learning, and thus ultimately assumed to delay natural, child-initiated developmental processes. Professionals in the field preferred to be called educators or carers but not teachers. Extensive interventions were acceptable and implemented only if a child was threatened or affected by disability or in cases of severe developmental delays. This mindset was mirrored in public administration. Traditionally, ECEC settings in Germany were subordinate to social welfare administration; a growing involvement of ministries of education can be observed only in some federal states.

1.1.2 Recent Changes and Challenges in the German ECEC System

Based on such a common understanding in the vast majority of settings, the German ECEC system has undergone major changes and great diversification in the last three decades. The following paragraphs summarize some of the more important changes and respective causes. A first major impact can be traced to an increase of empirical educational research in Germany in the early 1990s that addressed effects of everyday ECEC and more targeted stimulation (including intervention studies) on early childhood development. Second, not less important in this respect was a great publicity for the results of international school assessments in the late 1990s and early 2000s disclosing less satisfying results than what Germany had hoped for—and differential outcomes and unequal opportunities for a number of student groups. Research results from both strands of work led to comprehensive debates about the German education system and many initiatives for improvement were triggered. Among the many reforms in the German educational system initiated since then, two highly influential movements for a realization of ECEC are the introduction of curricular guidelines and a call for more professional teaching staff in ECEC settings, resulting in a rising share of academically educated staff and a revision of teacher training curricula. For this reason and in accordance with international terminology, all carers, educators and academically educated staff in ECEC are referred to as "teachers" in this study. Accordingly, the entity to organize children in an ECEC setting is called a "classroom" instead of the more usual German term "group".

Up to the early 2000s, there was no common standard curriculum for German ECEC. Individual providers or settings were free to implement whatever curriculum they preferred. Most settings emphasized the importance of supporting children's socio-emotional development without defining particular developmental (sub-) domains or educational strategies. Since the turn of the century, all 16 federal states have released more or less binding curricular guidelines. Although they vary highly in detail and length, there is significant overlap in content (Diskowski, 2008). They all emphasise the ECEC task of fostering both children's cognitive and socio-emotional development. Most guidelines explicitly address pre-academic skills in their list of relevant developmental domains. Some federal states have introduced language assessments prior to school enrolment but standardized screenings or assessments are still an exception. Preschool teachers are left to document child observations using a method of their choice (sometimes guided by rating sheets or checklists). More structured formats of evaluation have been implemented in individual states only (e.g., Berlin).

Many ECEC teachers in Germany have a traditional 3-year vocational training degree. Some federal states require at least one, others two, fully certified teachers per classroom of about 20–25 children. The initiatives to improve German ECEC and to increase ECEC learning output have also led to a call for more professional staff in ECEC settings. A higher quality of teaching and education allegedly required more qualified staff. Therefore, many teacher-training curricula for vocational training were revised. In addition, many universities of applied science established bachelor programmes for early childhood education resulting in 76 BA training courses and 14 MA programmes by 2022 (Authoring Group Barometer of Professionals, 2023). The first graduates entered the workforce a few years ago (in 2022, 6.0% of ECEC staff had a college or university degree), and results are being monitored by research and practice.

In parallel to these reform movements, there are other important changes in German society that have also impacted ECEC. This text can only briefly cover a few important developments. First, parental employment behaviour has changed greatly in recent years. A far greater share of mothers returns to work soon after giving birth, plus their children attend ECEC earlier and for longer hours. While in 2004, there were ECEC places available for about 9% of all under 3-year olds (Henry-Huthmacher, 2005), with demand exceeding availability, this ratio increased to 35.5% of all children aged under 3 years attending some kind of non-parental care for at least part of the day in 2022 (BMFSFJ, 2023). The ratio of children in full-day care (defined as children attending at least 7 h per day) has also increased in the last years: for children aged below 3 years from 47.7% in 2006 to 52.7% in 2022 and for children aged 3–6 years from 25.3% in 2006 to 52.4% in

2022. Another major societal change is the proportion of children with immigrant background in ECEC settings. This is due to an increase in the overall number of people with immigrant background in Germany, the proportion is particularly high in children aged 3–5 years (rising from 28% in 2005 to 40% in 2022), and a change in ECEC attendance for these children (78% in 2004, 84% in 2009, 90% in 2015, 81% in 2019, 80% in 2022). As a consequence, the proportion of children with a non-German mother tongue in ECEC settings has increased from 23% in 2003 to 31% in 2022 varying widely between institutions (Authoring Group Educational Reporting, 2024).

To sum up, ECEC in Germany today educates and cares for more children, for longer hours, and a greater proportion of children with little exposure to the German language than ever before. This change in circumstances happens simultaneously to changes in society's expectations regarding the ECEC goals and a changing work force.

1.2 Research Background

Before addressing issues surrounding language interventions in German ECEC institutional settings (see Sect. 1.3), two areas of literature are mentioned which are of particular importance in this section. We first address research on unimpaired language acquisition in early childhood (Sect. 1.2.1) and then the most frequent causes and consequences of delayed language development in Germany (Sect. 1.2.2).

Albeit a highly complex challenge, language acquisition or learning (the terms are used interchangeably throughout this report) is mastered by most children without problem and without any formal instruction. Indeed, their learning material—the language that surrounds them—is helpful but also of low quality in many ways: it is incomplete, it is wrongful, it is redundant, it is contradictory. Language acquisition theories differ regarding the question of in how far nature and nurture can explain child language acquisition. They agree that rich language input is necessary to foster language development, especially for language phenomena that are idiosyncratic and need to be learned on an item-by-item basis like the lexicon. A good example might be the following: to be able to understand and to use the word "Löwenzahn", this word needs to be used at least once to signify a dandelion. Otherwise, applying other vocabulary and word formation knowledge, a "lion's tooth" (the literal translation of both word components) would be the best approximation. Accordingly, in the context of this study, we take language acquisition to be a mostly implicit complex learning process that relies on input (though not

necessarily complete input in all areas) and leads to the capacity to comprehend and produce language in order to communicate.

1.2.1 Unimpaired Language Acquisition

Children's language development begins with the acquisition of knowledge about the sound system of a specific language. This learning process is characterised by a specialisation of children's ability to perceive different sound categories. Initially, infants can detect phonetic differences in various languages. At the age of about 12 months, children do not react to phonetic differences that do not play a role in their first language, but their sensitivity for phonetic differences of their first language is preserved. During their first year of life children also learn to distinguish words from the continuous flow of speech.

The discovery of regularities in the distribution pattern of sounds supports learning of words (Graf Estes et al., 2007). The challenge in learning the meaning of words is to tackle the problem of reference, that is, to find the correspondence of word and meaning. For example, the word *bunny* could refer to the whole object or only to parts of the object (e.g., its nose). Surprisingly, children start to associate very familiar words with their reference quite early. For example, when children aged 6 months hear "Mom" or "Dad", they look toward the appropriate person (Tincoff & Jusczyk, 1999). By the age of 12–18 months, children understand between 50 and 200 words. The scope of the receptive vocabulary increases rapidly so that around the age of 6 years 9000–14,000 words are comprehended (Clark, 1993).

1.2.1.1 The First 18 Months

Before children produce their first words, they begin to babble. Usually, they produce syllables that consist of a consonant and a succeeding vowel (e.g., "ba") which they string together ("bababa"). Aged between 10 and 15 months, children begin to produce words which often do not sound much like adult words, but they bear some phonetic resemblance to them and, more importantly, they are consistently produced in association with a particular meaning. During the second half of the second year a huge and rapid expansion in vocabulary can be observed in most children. Aged two, children usually have an active vocabulary of 200–300 words. At the age of six, the actively produced vocabulary spans about 3000–5000 words. However, in early stages of language development, children use a variety of simplification strategies (Gerken, 1994). For example, they skip parts of words (e.g., banana to "nana") or replace sounds which are hard to pronounce with easier ones

(e.g., crocodile "gogil"). In addition to nouns children use social-pragmatic expressions like *hello*, *no* and *ouch*, adjectives such as *hot* and the referential *there* are used quite early (Kauschke, 2000). Precursors of verbs such as *auf* for *aufmachen (open for open up!)* and verbs such as *paint* are already observed in the second year (Schulz, 2007) as well as the adverbs *also* and *not* which play an important role in the acquisition of sentence structures. At first, children use the words of their active vocabulary as single words. This phase of single word usage is called the holophrastic phase because the child typically expresses a whole idea with a single word.

1.2.1.2 The Next Milestones

Aged between 18 and 24 months, children enhance their speech repertoire by making two-word utterances like *Ball spielen* (*play ball)*, *Mama Tasse (Mama cup)* or *mehr Kuchen* (*more cake)* with no pauses between the words and no falling intonation at the end (so-called telegraphic style, Brown & Fraser, 1963). When verbs are used, they are not conjugated as required in the German language. By 2–3 years, the first verb conjugations are found and occur in the second position of the sentence. Frequently, over-regularizations are observed—for example, children use regular morphology in cases when the language requires irregular morphology.

By the age of 30 months, most children start to construct sentences containing more words. Typically, first subordinate clauses are found at this age. A few months later, conjunctions such as *because* and *if*, as well as interrogative pronouns like *why* and *who* occur. First passive structures such as *I want to be carried* are found at the age of 3–4 years. In terms of the inflectional morphology of nouns, the acquisition focuses mainly on the case and plural system. Monolingual German children acquire the grammatical gender of the noun without problems. This is not the case in forming the plural. Children at the age of 4 years often form the plural incorrectly, which can even be observed at the age of seven.

Apart from learning to understand and to produce language, children acquire knowledge about how language is used in social situations. This involves learning to use language for different purposes (e.g. to welcome people, to request something); to adapt language to the needs of the listener or the situation (e.g. talking differently to babies and adults, speaking up when it is necessary); and to follow the often "unspoken" rules of conversation and storytelling (e.g. taking turns in conversations, standing at an appropriate distance from the speaker). These rules of conversation vary across cultures but also within cultures as well as within families.

1.2.1.3 Steps in Using Language to Communicate

By the age of about 18 months, children wave to say hello or goodbye or even say the word "bye". Moreover, they ask for things using gestures, sounds or words and protest by shaking their head. Two-year-old children usually use words or short phrases for welcoming ("hello") or protesting ("no"). They try to get attention by using phrases like "What's that?" and begin to engage in verbal turn-taking. When they are 42 months old, children are able to step into another person's shoes in role-play and to engage in more elaborate interactions. They begin to recognise the needs of other people and will speak differently to babies and adults. Moreover, children in this age group are able to engage in simple story telling. Aged between 4 and 5 years, children begin to use language to discuss emotions and feelings more regularly and they can describe sequences of events. Six-year-old children are typically able to tell a story with a central character and a logical sequence of events. They start to utter threats and insults, they may praise others, and make promises.

In the context of acquiring knowledge about how language is used in social situations, children have to learn to use the right linguistic register in the right setting. A register is a form of language used for a particular purpose or in a particular social setting. In school, the relevant linguistic register is sometimes discussed as "Bildungssprache" (i.e., "academic language"). This kind of language is often contrasted with conversational language and is hardly ever described on an empirical basis. It is often associated with discipline-specific terminology, a grammatically correct text, an adult-like pragmatic (e.g., turn taking) but also with successfully navigating school expectations and cultural norms.

The pattern described above is typical for children growing up in monolingual language environments (i.e., for children who acquire only one language for everyday usage in all real-life situations). In principle, similar processes and patterns can be observed for children in multi-lingual environments where the mother and the father both speak a language other than the predominant language of the country they are living in (e.g., a child in Germany with a Greek-speaking mother and a Polish-speaking father). Three forms of dual language acquisition can be distinguished: bilingual first language acquisition, early sequential language acquisition and successive language acquisition.

1.2.1.4 Bilingual First Language Acquisition

Bilingual first language acquisition occurs when a child is raised bilingually from birth, or when the second language is introduced before the age of two. For the case of bilingual first language acquisition, there is strong evidence that both languages are acquired across the same stages as happens in monolinguals. However, bilingual

children even if exposed to both languages from birth, are typically more proficient in one, namely the predominant language (Paradis & Nicoladis, 2007).

Bilingual children basically pass the same essential developmental stages of language acquisition in early childhood as monolingual children—early language acquisition is robust whether children acquire one, two, or more languages (Grosjean, 2020). In multilingual states, countries or regions, children grow up bilingually without any evidence that this causes serious disadvantages. Language development shows temporal variation in monolingual and multilingual children: As Byers-Heinlein (2014) illustrated, despite using identical procedures and stimuli, the same experiments sometimes test different competencies not only in different populations but also in the same population. While bilingual speakers tend to have smaller vocabularies in each of their languages compared to monolingual speakers of each language, there seem to be no developmental disadvantages associated with bilingualism—rather a cognitive metalinguistic advantage (Bialystock, 2001).

1.2.1.5 Early Sequential Second Language Learning

Early sequential second language learning occurs when children learn their first language in the family and have their first systematic contact with the second language at the age of three or four (Meisel, 2004; Tracy, 2008). Some researchers draw that line even earlier, at the age of two. This is the most common case of language acquisition in immigrant children in Germany. Most of these children acquire the heritage language(s) of their parents at home and the acquisition of German, the second language, starts as soon as they enter ECEC. Of course, children hear the second language occasionally (in playgrounds, supermarkets, and so on) but this language contact is not as persistent and systematic as in ECEC. Variation in first and second language competencies (e.g., vocabulary and other early competencies that may facilitate the acquisition of reading skills) is mainly due to the families' educational background, as it is in monolingual children. At the age of ECEC entry, the acquisition of a second language is possible, generally without problems, and follows roughly the same stages as monolingual or bilingual first language acquisition. Because of already acquired language competencies some parts of the second language are acquired even faster than in first language learners. For example, it can be expected that second language learners of German will acquire the German sentence structure within 18 months, while first language learners take up to 3 years (cf. Grimm & Schulz, 2014; Rothweiler, 2007; Rothweiler & Ruberg, 2011). Moreover, sometimes typical steps found in monolingual language learners are skipped; for example, second language learners of German typically do not start speaking in one-word-utterances as they already know how to combine

two or more words. After 3 years of extensive language contact (at school entry, if the child entered ECEC at age three), the central developmental challenges in the area of morpho-syntax (i.e., prepositions, modal and auxiliary verbs) will be mastered (Grimm & Schulz, 2014).

1.2.1.6 Child Second Language Learners

Most of the immigrant children living in Germany were born in the country and start to have regular contact to the German language at the age of three when they enter ECEC centres. Typically, they are immigrants of the second or third generation. There is also a second group of foreign-born children who immigrate to Germany with their families (first generation immigrants) and who, therefore, acquire German with a pronounced delay compared to their first language—child second-language learners. The background of those children varies widely. Depending on the individual (language learning aptitude) and family (quantity and quality of second-language input) conditions, the acquisition of German is fast or slow and varies in its overall success. Transfer of first language structures to the second language as well as the possibility of fossilization are more important here than in child second language acquisition. The acquisition progress in child second language learners resembles that of adult second language learners (cf. Meisel, 2004).

In order to evaluate possible strategies and assumed mechanisms of language interventions in ECEC, it is important to understand the reasons for irregular language development and which components of language development can be delayed for what reasons. The following subsection discusses the most frequent causes and consequences of delayed or irregular language development in Germany.

1.2.2 Causes and Consequences of Irregular or Delayed Language Acquisition

In *monolingual language acquisition,* there are two main causes of language problems. One is specific language impairment which is diagnosed when a child's language does not develop normally and the difficulties cannot be accounted for by generally slow development, cognitive deficits or other specific physiological problems like hearing loss. This applies to 6–8% of all children (Leonard, 2014). The other is the case if children do not acquire the type of language that schools are using, the so-called "Bildungssprache" or academic language. Even though children may be capable of using their language in everyday settings at home, during play time, or at a bakery, they might still struggle in a school setting if they have

not yet mastered certain terms and concepts, or learned how to express themselves and their ideas in expected ways. Hence, some aspects of the construct "Bildungssprache" can be described in terms of linguistic registers (the kind of language needed in a specific context) and some aspects as scripts pertaining to which kind of behaviour is appropriate in a certain context (stay seated and listen quietly as opposed to answering simultaneously and nervously jumping around while the teacher is speaking). Typically, monolingually raised children learn both in their family setting. The home learning environment plays an important role in providing adequate learning stimulation (Anders et al., 2012). Yet, children from families with particular backgrounds such as low socio-economic status and a non-academic background experience poorer home learning environments (Kluczniok et al., 2013) and thus can have problems in developing their "Bildungssprache"-related linguistic registers (vocabulary as well as grammar and pragmatics, which are closer to written than oral language use). The same holds true for all other types of language acquisition.

In bilingual first language acquisition, no problems are expected for either of the languages. Sometimes bilingual children show delays regarding the production of first utterances; however, they catch up rather quickly, still starting to talk within the normal age range of 8–15 months (Meisel, 2004). Bilingualism itself does not cause language delay (Paradis et al., 2011). Significant delays might either indicate a language disorder rather than phenomena of the normal bilingual language development or are owed to an unbalanced development with one language being predominant. Code-switching and mixing, however, are part of the language practices of all bilinguals and do not mark low competencies in one of the languages or pathologic language development. Bilingual children tend to have a smaller vocabulary in each language than monolingual children in their only language, although the total (bilingual) vocabulary is typically larger than a monolingual one (Oller & Eilers, 2002).

Early sequential second language learners are slower than monolingual and bilingual language learners in some areas of language development (e.g., vocabulary and grammatical details). Compared to monolingual German speakers, the vocabulary of second language learners of German is significantly smaller at the beginning of primary school (Rothweiler & Ruberg, 2011). With respect to grammar (e.g., the mastery of why-questions and negation, which are—no matter the type of language acquisition—acquired rather late), disadvantages for early second-language learners can be found at the time of school entry (at 6 years of age). Researchers suggest that the total amount of second language contact and, hence, the total learning opportunity account for this problem (cf. Grimm & Schulz, 2014). The first language of some second language learners plays an important role

for specific language acquisition delays. For Turkish speaking children, for example, the largest group of early sequential second-language learners in Germany, the correct use of the "Artikel" (definite or indefinite article) in German is one area which very often is a problem even in primary school, probably due to the fact that the Turkish language has no grammatical equivalent to the German "Artikel" (Rothweiler, 2016). However, for children who learn the second language before the age of three, the influence of the first language is minimal or absent altogether.

1.3 Intervention Issues

1.3.1 Two Mechanisms of Intervention

The outlined historical roots and recent changes in the German ECEC system have led to extended debates on how to approach current challenges, particularly in early language support. In other settings, there are further measures in place to support children's language acquisition, e.g., in family literacy programmes, in voluntary ECEC for under-3-year-olds, or play groups. In the context of language support in ECEC, discussions frequently touch upon three fundamental positions:

1. Who should receive language support (targeted—for whom?—vs. universal approaches)?
2. What is the best or most appropriate "dosage" or amount of intervention?
3. What educational strategies are appropriate for children prior to school entry (instruction and training vs. play)?

1. The debate about which children should be included in language support measures has different origins. Research provides evidence of differential language outcomes very early on (Weinert et al., 2010) as well as the importance of language for children's education and overall success in life. As indicated above, children with an immigrant background, i.e., those with a non-German mother tongue, who have increased their ECEC attendance in recent years, are not the only group requiring particular language support. Thus, many stakeholders have advocated extensive language support for children with language difficulties or delays in general and suggest a rather lenient cut-off for inclusion. Others oppose such suggestions, citing research on labelling processes and negative consequences of segregation and grouping practices, and suggest implementing a universal support system. One major obstacle in this debate concerns funding

considerations: high quality, intensive language intervention is often best provided by well-trained specialists and ideally delivered in small-group or one-to-one sessions. This involves high investments that should be allocated wisely. Moreover, the German education system is struggling with the appropriateness of different definitions of equity: should the education system deliver equal support for all children or equal opportunities that might result in more or less support for just some children?

2. The question of "dosage" refers to the intensity and the extent of language support, i.e., the duration of support in days or weeks of the school year, the amount of time spent on language support per regular day in ECEC, and finally how explicitly language is the topic in any intervention activity. Nickel (2014) ranked and labelled available approaches of language support as "language education", "language stimulation", and "language therapy" and thus integrated the intensity of the programme with other aspects of structuredness and severity of children's language problems. In everyday ECEC, most stakeholders would agree that the dosage of intervention should fit the degree of a child's language problems, age, and cognitive development. But there is no consensus about how to match a certain degree of a child's language problems with a certain intensity of language support. In other words, there is no consensus about appropriateness of intervention in non-clinical settings. For clinical settings, consensus exists: children with specific language impairment in monolingual and in bilingual contexts need language therapy. Therapy is situated in one-to-one contexts, and a speech therapist is involved.
3. There is a broad consensus that ECEC in Germany should not include school-type phases of instruction (e.g., children sitting at tables and facing learning material for longer periods of time). But beyond this superficial consensus, stakeholders differ in the question of what degree of structuredness, purposeful and deliberate learning situations are adequate for children prior to school entry. There are arguments about restricting children's free play, interfering with their intrinsic learning motivation, and imposing particular learning domains.

Because of the many involved professions and research disciplines in ECEC, many approaches exist in the field. Most implemented programmes, curricula, or trainings combine different educational strategies and mechanisms and can be adapted to a variety of settings, circumstances and group settings. However, imprecise vocabulary use and little elaboration in this discussion sometimes have invoked heated arguments and this impedes a full understanding of the complexity and heterogeneity of available good-practice examples. Thus, the discussion is often cut short to comparing two extreme positions: first, the claim that ECEC should

implement targeted, highly structured trainings to compensate for narrowly defined language development delays (**additive approach**); and second, the position that language stimulation in a regular, language enriched ECEC environment is sufficient to support all children's healthy language development (**integrated approach**).

Additive approach. Additive approaches have a variety of formats, e.g. general language programmes, specific curricula, narrowly defined measures of support, and targeted interventions (see all three categories of support according to Nickel, 2014). They all intend to enrich everyday language stimulation, "add" to the regular language support provided in ECEC and ultimately compensate (for previously observed) deficits in language development. In the strictest sense, additive programmes can identify language deficiencies, single out relevant small groups of children at assigned timeslots over a period of several weeks or months, and train particular language skills in standardized instructional settings. Such additive approaches are grounded in the observation that even in the case of well-established language learning incentives, each year a substantial number of children in early childcare institutions fail to acquire the necessary level of educationally relevant language competencies and thus considerably lag behind at the time of school enrolment (Authoring Group Educational Reporting, 2016, p. 66). More lenient approaches implement activities to explicitly enrich language, e.g., adding vocabulary, rhyming games or repeating sentences in a certain grammatical construct, in everyday play situations. Additive approaches focus on teacher-centred learning activities and are favoured mostly by school pedagogues, special education pedagogues, and language intervention specialists as well as those responsible for school educational policies.

Integrated approach. This draws on the idiosyncrasy and specificity of regular language acquisition and the historic roots of German ECEC described above. In its purest sense, this approach assumes that the pedagogical staff and a language-rich classroom environment in ECEC provides sufficient language support in enriched everyday ECEC situations, thus creating a generally playful environment that is conducive to facilitating language

development. Children are assumed to acquire all necessary language competencies, such as a sufficiently large vocabulary and grammatical skills, implicitly in various verbal exchanges with their pedagogical staff and peers. Language acquisition consequently happens in a casual and playful way while engaging in different child-centred play activities in the classroom. Thus, people assume that children display a high ability in transferring their newly acquired skills to other areas of their life. Instruction or targeted support (at least for small groups) is not necessary according to this approach. Metalinguistic capabilities and adequacy of academic language ("Bildungssprache") are often not considered at all. Those in favour of integrated language education in everyday settings can be found mostly among early childhood teachers, social pedagogues and persons in charge of social policies.

Both positions have their shortcomings and in reality, one hardly expects any pure examples that fully ignore aspects of the other kind of approach.

To complicate matters further, there are strong arguments against both approaches. Preconditions for the additive approach are sufficient diagnostic competence to identify children in need of language support, the availability of and a decision to implement a certain intervention, as well as resources and capabilities to adequately implement the intervention. Preconditions for the integrated approach are sufficient awareness, resources, capabilities, and willingness to create a language-rich play environment in everyday ECEC as well as diagnostic competence to identify those children in a classroom who are most in need of a language rich environment. However, many of these preconditions are not sufficiently cared for in German ECEC settings, for a number of reasons.

Firstly, most federal states have required teachers to record individual child development in logs or profiles for several decades. However, there are few common standards and hardly any tracking of this demand. Many of the German ECEC institutions are receiving public funds—the majority is run by private, not-for-profit providers (like churches or welfare associations; Authoring Group Educational Reporting, 2024). Moreover, even if institutions decide to implement this mandatory documentation, the field provides a host of poorly or un-evaluated instruments for the task.

Secondly, teachers in ECEC do not receive systematic training in language diagnostics and limited training in regular language development and potential threats or problems. It is thus doubtful whether capabilities are sufficient in all

settings to properly observe, document and identify children's language development and possible delays. Regular teachers' limited capabilities to identify language delays are accompanied by little expertise in how to design or choose and implement a ready-to-use intervention programme, and there are few (albeit a rising number of) language specialists in ECEC. Given the large number and wide variety of relevant tasks in everyday ECEC, it is even questionable whether regular teachers in ECEC should be responsible for this additional challenge. With a rising number of tasks in administration, documentation, inclusion of children with special needs, and children with other developmental challenges, there are doubts that ECEC settings possess sufficient staff to prepare and provide high quality language education and support (independent of its format and implementation). Indeed, recent studies have displayed a disappointing picture of the quality of interactions fostering children's language. The most recent but more than 10 years old German-wide study (NUBBEK) found mediocre levels of quality at a maximum (Tietze et al., 2013) and there is little stability in quality measures over time (Anders et al., 2016; Kuger et al., 2016).

Finally, in order to provide enriched language environments in the target language German, it does not suffice for the teachers to implement language-enriched activities. One underlying principle of the integrated approach is that German should be the main or predominant language in the classroom so that non-German speakers are exposed to the language wherever they turn, cannot avoid it, and are thus "immersed" by German language input. Today, this cannot be guaranteed in most classrooms in Germany, because attendance is segregated along socio-economic as well as cultural and language differences. Thus, many children with German as a second language or language delays will mainly meet other children in a similar situation, and have limited contact with children who speak German at an age-appropriate monolingual level (Becker & Biedinger, 2016; Lehrl et al., 2014; Leu, 2007; Schober et al., 2016).

1.3.2 Key Aspects of Language Support Programmes to Be Considered in a Systematic Review

In conclusion, in order to facilitate reporting of meaningful results to the different stakeholders in the German ECEC system, the following aspects of language support programmes should be considered in a systematic review:

- **Broadness of target group**: At either end of the range, language education focuses on all the children in a setting (universal approach) or it specifically addresses certain groups of children (target-group oriented opportunities).
- **Definition of target group**: Discussions about targeted language support need to define critical groups that should receive such support. Suggestions range from all children with minor language delays, from vulnerable family backgrounds, or with a non-German mother tongue, to only children with severe, narrowly defined and diagnosed language delays.
- **Integratedness in everyday ECEC routines**: Relevant differences also exist regarding the scope of integrating such measures into the children's daily ECEC routines, ranging from the implementation of general curricula that are integrated in the annual routine of the institution to isolated individual measures that add to routine operations.
- **Type of programme**: Interventions could, for example, include training of phonological awareness, rhyming, vocabulary training, training of grammatical constructions, musical or sensory-motor training.
- **Broadness in targeted language component(s)**: Language education concentrates on general, global support of children's language development or on the promotion of specific (sub-) domains.
- **Targeted language**: Similar to discussions in other countries such as Norway, there is a debate on whether language education should concentrate solely on the language of (future) instruction (in this case, German) or whether children with an immigrant background should also receive language support in their mother tongue.

1.4 Aims and Rationale for Review

In past decades, education policy invested large amounts of financial and other resources to implement a range of additive programmes in different federal states of Germany. In cases where the effects of early language intervention endeavours on children were evaluated and published, findings were mostly disappointing with regard to the effect sizes revealed. As a result, the integrated approach was conceptually endorsed by social ministries and maintaining bodies. But is this position really justified especially in Germany? Does it promise success in coping with the challenges faced by early language educationalists in guiding as many children as possible to the necessary level of language competence even before entering compulsory education, thereby giving all children a fair chance to succeed in school?

Reasonable doubts have been raised by a number of sources (e.g., Hasselhorn & Sallat, 2014; Kuger et al., 2012).

There is a lack of cumulative knowledge regarding which language intervention approaches will (or can) deliver, which effects, and which individual and institutional conditions are most relevant for programme implementation and effectiveness. A synthesis of results is likely to be challenging because different aspects of this debate prevail in different research disciplines. While language developmental specialists primarily focus on additive language intervention approaches in narrowly defined language sub-domains (such as phonological awareness, for example), early childhood pedagogues and language instruction experts tend to look at different aspects of beneficial (institutional) constellations. Psychologists show a preference for investigating the relevance of individual preconditions that allow interventions to be successful. Regarding achievable outcomes, broader perspectives from sociology and economics also come into play, e.g., regarding the efficiency of interventions or programmes.

A preliminary scoping search suggested that two further practical problems may increase the difficulties encountered when comparing results and in providing well-founded policy recommendations. The currently observable lack of knowledge may be due to a lack of information about successfully tried and tested language intervention and about education measures that are widely dispersed. In many cases, they are not followed up and well documented, with few publications, if any, in a large variety of publication formats, mainly grey reports such as online documents or in municipality archives. No general accountability structure seems to exist and very little documentation is available about what is happening in the settings regarding language education and to what effect. Another group of settings that deviates from mainstream ECEC are settings that solely educate and care for children with marked special needs (e.g., sensory impairments, extensive physical disabilities). Germany has increased efforts to include these children in regular ECEC only in recent years.

Following a search of several databases, a preliminary inspection of the scope of the international literature revealed a number of systematic reviews and meta-analyses on similar topics. Our review differs from the previous research in the following important respects:

– **Population:** Reviews on the effects of language interventions for children have not yet addressed all children attending an ECEC setting, but have focused on older children (Andrews et al., 2004a, 2004b; Cirrin & Gillam, 2008; Law & Plunkett, 2009) or younger children (Geddes et al., 2010). Recently, some reviews have been presented for selected populations: There are reviews of stud-

ies on language interventions for children with clinically relevant disorders of speech and language (Cirrin & Gillam, 2008) and for children with autism spectrum disorder (Tachibana et al., 2012; Spreckley & Boyd, 2009). Reviews have also examined the effects of interventions for improving language skills of immigrant children (Bertschi-Kaufmann et al., 2006) and children from socioeconomically disadvantaged families with lower socioeconomic status (Darrow, 2009). To close the existing research gap, our target population will be all children attending mainstream institutional ECEC settings and thus our review will have a broader scope than so far existing reviews for that age group.

- **Interventions**: Previous studies targeted outcome measures like teacher professional knowledge, beliefs, and actions that are associated with successful literacy stimulation (Hall & Harding, 2003) and the impact of in-service professional development programmes for pre-school teachers (Egert, 2015). Egert and Hopf (2016) give a narrative review of language support in child day-care facilities in Germany which is limited to (quasi-) experimental intervention studies from 2000 to 2013 and explicitly excludes interventions to promote phonological awareness, an important group of training programmes in Germany. Rather than solely studying in-service professional development programmes that might (or might not) eventually result in indirect effects on children's learning, the current review studies all types of interventions directly targeting children's language skills.
- **Intervention settings**: Several reviews have focused on ways to improve children's language skills in non-institutional environments. For example, effects of reading books in parent-child settings have been studied (e.g., Bus et al., 1995; Greene, 1998; Mol et al., 2008, 2009; Mol & Bus, 2011; Reese et al., 2010). In contrast to these reviews, our objective is to focus on interventions that aim at improving children's language in institutional ECEC settings because a growing proportion of children are attending ECEC settings in Germany and they typically spend more time there per day than ever before.
- **Method:** A recent review focused on efforts to improve children's language in German-speaking countries (Schneider et al., 2013) comprises a narrative overview of selected programmes without providing any information about search and selection criteria. Our review takes a more systematic approach for a comprehensive overview of interventions for improving children's language in institutional ECEC settings.
- **Outcome measures**: reviews differ with respect to the outcome measures of interest. Some focus on global support of children's development, considering the acquisition of language skills as a sub-category (Chambers et al., 2010; Tanner et al., 2015), while others examine very specific approaches to improv-

ing children's language, such as vocabulary trainings, and thus measure a narrow range of learning outcomes (Marulis & Neuman, 2010). Likewise, the effect of language comprehension training on standardized tests is being studied, see a recent systematic review (Rogde et al., 2019). In contrast to the existing reviews, we aim to take a broader approach and include all outcome measures of children's individual language knowledge and use.

We aim to scrutinize the evidence base in this area in depth to identify sustainable arguments with regard to what are the most promising approaches for improving children's language in ECEC institutional settings in Germany. In addition, the limitations of evidence gathered are addressed. We focus exclusively on studies aiming to improve German-language competencies. The country of study is irrelevant, however.

1.5 Definitional and Conceptual Issues

The following section provides a number of definitions for critical concepts or terminology referred to in this study. Further definitions and operationalisations are given throughout the text. The central umbrella terms are language acquisition/language learning and language intervention—terms thus presented first.

- **Acquisition/language learning:** The development of a child's language abilities across all domains and subdomains of language such as vocabulary, grammatical and meta-linguistic skills.
- **Language intervention**: Any intentional, planned behaviour and measures implemented to improve children's language learning and skills.
- **Approaches to language improvement—Additive approach**: Language education, support, and stimulation are implemented with extra effort and additional provisions to enrich everyday language experiences in early childhood education and care (ECEC). There is a wide range of formats.
- **Approaches to language improvement—Integrated approach**: Language education is presented in a generally rich and stimulating everyday ECEC play environment (children with severe, pathologic and narrowly defined language impairments are referred to language therapy specialists outside of the ECEC system).
- **Curriculum**: Includes all aspects of educating and caring for children. May include the learning content, the educational activities and processes, social settings for learning, didactic approaches and learning material.

- **Early Childhood Education and Care (ECEC) Institutional Settings**: Organizations whose main purpose is to provide education and care for children prior to school entry in a formalized environment. Typically, in German ECEC settings, one or several experienced adult(s) educate and care for one or several group(s) of children aged 3–6 or 0–6 years.
- **Early Childhood Education and Care (ECEC) Programme**: A setting's comprehensive approach to educating and caring for children. This includes the curriculum, staff, teachers' and providers' general and educational opinions and beliefs, the schedule, regular and extra-curricular activities, classroom composition and the social setting of educative incidents, parental involvement and cooperation with external partners as well as quality improvement measures.
- **Immigrant background/migrant background**: Children with a non-German mother tongue or several primary non-German languages. They have either immigrated to Germany themselves or were born in Germany but have only experienced non-German language environments during their first stages of language acquisition.
- **Poor home language environment**: A family language environment that does not suffice to acquire the necessary extent of language capabilities. A poor language environment results in or puts children at risk for delayed or poor language skills that prevent them from fully participating in educational activities.
- **Socio-economic status (SES)**: The social standing or class of an individual or group in society. The socio-economic status is commonly conceptualized in terms of education, income and occupation variables (American Psychological Association, 2012).
- **Teacher**: As described above (Sects. 1.1 and 1.2), the teacher is defined as an educator in kindergarten or day-care, a day-carer ("pädagogische Fachkraft") who is identified as any certified staff member qualified to take responsibility for an ECEC educational setting. This may be a staff member holding a vocational or academic degree. Trainees, interns and volunteers are not included in this definition.

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Objectives

2

Our objectives are twofold. We first want to investigate which interventions are documented. We will consider interventions targeted at children, carers/teachers and parents, in turn. Furthermore, we would like to gauge how effective these interventions are.

Existence of interventions—description of interventions intended to foster German-language development:

RQ1: Which interventions exist for improving children's language skills (first language or German) in ECEC institutional settings in Germany and how can they be characterized?

Effectiveness of language interventions—a synthesis of study outcomes:

RQ2: Which interventions are effective in improving children's German-language competencies, under which conditions, and for what groups of children?

Chapter 4 addresses these research questions and describes the general characteristics of the interventions as documented through the systematic search, e.g., the target groups of the intervention, the languages targeted, the types of intervention, which levels the outcomes of the intervention address. Furthermore, Chap. 4 delineates the information base when we look specifically for intervention effects on children.

Study characteristics of those interventions that contribute to Research Question 1 are listed in Chap. 5. First, we summarize the interventions' approaches to language support, the language(s) targeted by the intervention, its degree of prestructuredness and the intervention provider across all target groups (children, teachers, parents). Chapter 5 also includes further information on the empirical realizations found in the literature, such as sampling strategies, sample sizes, the level of outcome measures and data analysis methods. Chapter 6 addresses

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Research Question 2 and summarizes the findings of those cases that report at least one child outcome and show at least medium overall weight of evidence (see Sect. 3.5 for a definition). An overview of these cases is provided in terms of their approach to language support, selection criteria of the participant sample, data collection methods, target of the outcome measure, and time point of outcome measurement. This overview is followed by three subsections describing in more detail the interventions with different target groups of children, teachers and parents.

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Review Method

3

Contents

3.1 Type of Review

We performed a two-stage review following the approaches advocated by the EPPI Centre: systematically mapping, followed by synthesis. First, we developed a descriptive map of interventions that were designed with the goal of improving German-language skills of children aged 3 years to school entry and are used in ECEC institutions (RQ1). To address this research question, we focus on interventions.

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Based on the subset of interventions that have been evaluated and a change or stability measured in children's German-language skills, we synthesized relevant outcome data in order to gauge their effectiveness (RQ2). Hence, this research question focuses on impact evaluation studies that assess the changes that can be attributed to a particular intervention. All study selection, quality appraisal and content coding activities were performed in the EPPI Reviewer 4 software tool for research synthesis (Thomas et al., 2010).

3.2 Criteria for Inclusion or Exclusion of Studies in the Review

To be included in the systematic review, documentations, reports, and studies had to meet the following criteria of eligibility: Criteria A to D address research question RQ1, criteria A to F deal with research question RQ2.

Criterion A—Type of text genre and publication year The review focuses on interventions documented in Germany from the late 1980s onwards, as well as in either of the two German national states that existed between 1949 and 1990,—and which differed widely in their approach to early childhood education and care. Documentation may be a formally reported study (e.g., published article in a research journal, working paper, technical report, or doctoral thesis) or a less formal reporting mechanism (e.g., unpublished project description, didactic/methodological reference, guidance manual or practitioner handbook).

Criterion B—Intervention Interventions that we included have the explicit aim of improving children's German language abilities. Eligible interventions may involve diverse approaches to language support, addressing various aspects, for example, grammar (e.g., sentence structure, subject-verb-agreement, case, plural, inflexion, negation), phonetics or vocabulary as well as musical and sensory-motor training. Holistic interventions, in contrast, address general abilities that might be related to language and communication are also within the scope of this review. They may focus on oral competencies, for example, fostering communication skills or increasing the enjoyment in talking. They may also focus on dealing with written text (e.g., when stories are read aloud to children). Interventions supporting German or the children's first language are both eligible, provided the ultimate goal of the intervention is—by detour of improving first language skill—to foster German-language abilities. The latter seems counter-intuitive but can be traced back to Cummins' (e.g., 2001) interdependence hypothesis—he assumes that the

competencies an individual can acquire in a second language also depend on the competencies acquired in the first language. Although highly debated, and to date at least in parts empirically rejected, this research has inspired language interventions and research. Interventions that aim to improve children's language skills via further education or training of teachers were eligible for inclusion. However, interventions that promote the acquisition of a language other than the language spoken at the child's home or the national language of instruction (German) were excluded.

Criterion C—Settings The focus of this review is restricted to German-language improvement in education systems of countries in which German is among the predominant languages. For example, in Germany alone, 16 different education systems exist, as education is the responsibility of each of the federal states (Bundesländer). To be included, interventions were conducted in, or initiated by, institutional ECEC settings, i.e., professional organizations whose main purpose is to provide education and care for children prior to school entry in a formalized environment. ECEC is mainly the responsibility of the social welfare administrators and has only recently become interesting to education policy-makers. Most ECEC centres for young children in Germany are government-financed but managed by non-governmental organizations like churches or non-profit welfare organizations. Studies evaluating family-based interventions or those that are implemented in another non-institutional environment like childminder homes were not eligible.

Criterion D—Population Children between the age of approximately 3 years and school entry (typically at age 6 or 7) who attend ECEC institutional settings in German-speaking countries (Germany, Austria, Switzerland) constitute the target population. Literature focusing on populations from non-German speaking countries was excluded. Studies set in mainstream ECEC institutional settings, but which measure outcomes solely for specific demographic groups, such as boys only, immigrant children, or those from disadvantaged backgrounds, were included. However, studies which focus exclusively on children with sensory impairments or clinically relevant disorders, including autism-spectrum disorders (ICD-10/DSM VI), were not eligible for inclusion. Children with sensory impairments and autism-spectrum disorders typically attended separate ECEC settings in Germany until a few years ago and they additionally receive special therapeutic support, which is markedly different to integrated and additive speech and language education in German ECEC settings. Thus, conclusions for mainstream policy-making cannot be drawn on the basis of such studies.

Criterion E—Outcomes (only for RQ2) To address RQ2, the synthesis of study findings will focus exclusively on studies with outcome measures relating to the German language. Studies measure at least one relevant primary outcome as obtained from the children themselves (e.g., through use of a validated tool) or as assessed by other persons in the institutional setting (i.e., subjective measures involving assessor judgement).

Primary outcomes include all measures of children's individual language competencies:

- **Language engagement:** the child's amount of language use in the institutional setting;
- **Phonological:** related to sounds and intonation of words;
- **Semantic:** related to the meaning of words or sentences;
- **Morpho-syntactic:** involving both a morphological change and syntactic agreement between noun and verb; grammatical agreement rules requiring words in a sentence to appear in an inflectional form that matches the gender and number of a subject;
- **Syntactic:** referring to a grammatical aspect concerning formal rules and procedures for producing sequences of elements; how words are combined to phrases and sentences;
- **Pragmatic:** referring to actual use of language; verbal and non-verbal rules that decide our social interactions; how we adjust our speech to our audience and use language for the goal of communication;
- **Lexical:** related to grapheme and phonological features of words; relating to words or the vocabulary of a language as distinguished from its grammar and construction.

Where reported, information on all secondary child or setting related outcomes (such as problem-solving abilities, non-cognitive outcomes, cost benefit ratios, and other adverse and unintended outcomes) was collated. This serves to gain a better understanding of the theories of change underpinning the interventions, and giving an overview of variables that are investigated together with the primary outcome measures of children's individual language knowledge and use. As these outcomes do not directly address the review questions, however, the data were not synthesised.

Criterion F—Study design—Comparison (only for RQ2) RQ2 aims at estimating the effects of interventions, therefore only studies using experimental, robust quasi-experimental or pseudo-experimental designs with a control group and reli-

able and valid outcome measures (including a full description of the measures and their scoring) were eligible for inclusion.

(a) Designs using a random or quasi-random method of group assignment in which one of the following applies:
   - Units (individuals or clusters of individuals) are randomly assigned to treatment and control groups using a fully random procedure, such as computerised random number generation;
   - A quasi-random procedure presumed to produce comparable groups was used, for example allocation by date of birth or next person to enter a room (i.e., the method of allocation falls short of full randomization);
   - Regression discontinuity designs in which participants are assigned to intervention or control groups solely on the basis of a cut-off score on a pre-programme measure.

(b) Designs employing non-random methods of assignment, in which one of the following is true:
   - The investigator controls group exposure and assigns participants using a non-random procedure (e.g., alphabetically by surname);
   - The investigator constructs the comparison group after the intervention begins (e.g., by exploiting existing survey data);
   - The study is a natural experiment in which units exposed to the treatment and control conditions are determined by nature (e.g., change in policy or divergence in practice between regions) or by other factors outside the investigator's control;
   - Assignment to conditions (treatment versus comparison) is by means of self-selection by participants or by administrator selection (e.g., by welfare officials).

Studies employing non-random methods of assignment need appropriate techniques that take selection bias and confounding at the design and/or analysis stage into account. In the context of this review, these include statistical matching (e.g., propensity score matching), difference-in-differences estimation, interrupted time series analysis, regression discontinuity analysis, instrumental variables regression, and certain forms of multivariate regression analysis such as the Heckman sample selection (two-step) model. If a study uses matching and/or covariate adjustment it may be done individually or by groupings (clusters) of individuals, and it may be based on participant characteristics observed before or after the start of the intervention. If no matching or statistical adjustments are employed, then pre-treatment information on equivalence must be available and groups shown to be comparable.

Finally, control or comparison conditions in eligible studies refer to the population receiving no treatment, treatment as usual, an alternative treatment, or pipeline treatment.

3.3 Methods of Identifying Studies

3.3.1 Overview

A Scientific Advisory Board of experts in early childhood language intervention was appointed for the systematic review (see Sect. 3.7 below). In a kick-off workshop, the Scientific Advisory Board and the team of authors jointly identified a set of potentially relevant search terms. These terms characterise different context components (institution, age range, child outcome, content of report) and were refined and finalised following a first query for thematic overviews in English-language publication indexes. Search terms are determined in English and German.

Together with the information experts in the authoring team, the domain experts identified three types of sources to be considered for the queries:

- Academic and project databases: PsycInfo; PsycArticles; Psyndex; Education Research Complete; ERIC; FIS-Bildung Literaturdatenbank [FIS Education Literature Database]; German National Library; GEPRIS (DFG) and SOFIS.
- Contact with experts: Ministries, societies, associations, foundations and German cities with a population of more than 100,000 inhabitants (the municipalities being responsible for the provision of early childhood care facilities in the country).[1] A series of emails and letters were sent to gather relevant information.
- Internet search: Two web-based search engines were used, Google and Google Scholar.

All searches were performed by the information scientists in the authoring team (called the search experts). The publications retrieved from the searches outlined above were initially entered into Citavi, a reference management system. A group is defined in Citavi for each index and each source respectively, to which all the respective matches are allocated. Once the searches were complete, a check for duplicates was run in Citavi to identify publications that were found by more than

[1] See http://de.statista.com/statistik/daten/studie/1353/umfrage/einwohnerzahlen-der-grossstaedte-deutschlands/

one search. These publications were allocated to both (or several) groups. It is thus possible to ascertain whether publications that were, for instance, found according to feedback from mail surveys were also found by querying the indexes or the internet. This allows for an estimation of the effectiveness of the search for this systematic review based on the different sources/indexes.

Following removal of duplicates, the list of search results was imported into the EPPI Reviewer database for further processing. Retrieval and selection of information was documented to permit replication by other researchers. Information includes the search strings as well as search dates for each database.

3.3.2 Academic and Project Databases

The search for publications has two related aims: to obtain a high degree of recall (i.e., successfully identify a high proportion of the total number of relevant reports) and to achieve as much precision as possible (i.e., a low proportion of documents that are not relevant to the query). The search aspired to an appropriate balance of recall and precision. If not specified otherwise, academic database searches were run in February 2017. The bulk of further literature searches (project databases, German national library, internet searches, for descriptions see below) was conducted in February to March 2017. Furthermore, during the full-text screening of documents, potentially pertinent references not already part of our corpus were searched and also included in the screening process.

3.3.2.1 Search in International Academic Research Databases

The team of authors and the Scientific Advisory Board agreed on the following search matrix. Based on this matrix, the database thesauri were used to define the search terms. In these databases, the thesauri terms are all in the English language. Therefore, only English search terms were used (Table 3.1):

As indexing in different databases follows different criteria, the initial idea of using discovery systems (like EBSCOhost, ExLibres, PubPsych) for a global search was abandoned; such global systems would only permit searches for the lowest common denominator of existing terms. Discovery systems comprise several indexes in a single search interface, allowing for the simultaneous search in several databases. If, however, the databases use different vocabularies (as is the case in this investigation), the degree of completeness drops to an unacceptably low level for matches in discovery systems. Therefore, a separate search was run for each database.

Table 3.1 Search matrix (English)

Content of report	Child outcome	Age range	Institution
Training	Language	Early	Elementary
Educ	Phon	Child	Preschool
Support	Grammar		Pre-school
Intervention	Morph		Kindergarten
Learn	Semantic		
	Syntax		
	Word		
	Litera		
	Sentence		

Based on the search matrix and the database-specific thesauri, the search experts identified potentially relevant descriptors for each database. As the focus of this systematic review is on the German language, in the final step, the search query was combined with a free-text search for the term "german*".

The following English-language databases were searched:

PsycInfo: PsycInfo is a bibliographic index provided by the American Psychological Association (APA) that contains more than 4 million references of mostly English language journal articles, monographs, book chapters, doctoral theses, book reviews, research reports, case studies etc., which are of interest for psychology. Roughly 2500 journals are listed.

PsycArticles: PsycArticles is a full text index, run by the American Psychological Association (APA), recording approximately 200,000 articles from more than 135 English language journals. The database references articles from all areas of psychology, including basic research.

Psyndex: PSYNDEX records all psychological publications in the German-speaking area since the early 1980s. The index comprises more than 250,000 journal articles, monographs and edited works, individual contributions from edited works, doctoral theses, and institutional publications from the areas of psychology and related disciplines. Each month, around 900 new references are added.

Education Research Complete: Education Research Complete is the most comprehensive full-text index for all areas of pedagogy in the English language area. Over 2100 journals are indexed, of which more than 1300 are available as full texts. Moreover, the database contains full-text versions of more than 550 books and many conference proceedings.

ERIC: ERIC is a bibliographic index of more than 1.6 million mostly English-language records, e.g., journal articles, books, conference proceedings and technical reports from all areas of educational research; more than 1000 journals are indexed in ERIC. In addition, ERIC indexes 350,000 full texts, many of which can be classified as grey literature.

Appendix A.1 gives the search terms that were used for each of the different databases. Search in the PsycArticle index was based on the same syntax as used in PsycInfo because both indexes are based on the same Thesaurus (PsycInfo Thesaurus).

3.3.2.2 Search in German Language Indexes

The search matrix that the Scientific Advisory Board and the authoring team's information experts defined for querying German-language indexes is given below, in analogy to the terms used for querying the indexes of the international databases (Table 3.2).

Analogous to the procedure for the international databases, the matrix terms served as a basis for defining the search terms using the controlled vocabulary of the relevant databases. The following German-language databases were searched:

FIS Bildung Literaturdatenbank [FIS Education Literature Database]: The FIS Bildung Literaturdatenbank contains nearly 900,000 references to publications and is the most comprehensive education index in the German-speaking area. Records refer to books, contributions to collective editions and journal articles. The FIS Bildung Literaturdatenbank presents an in-depth indexing of most records in comparison to library catalogues in general, including the cata-

Table 3.2 Search matrix (German)

Content of report	Child outcome	Age range	Institution
Training	Sprach	Kind	Elementar
Bildung	Phono	Früh	Vorschul
Förder	Grammati		Kinderga
Intervention	Morph		Kindertages
	Semant		
	Synta		
	Literal		
	Lexi		
	Wortschatz		
	Wortbildung		
	Satz		

logue of the German National Library. However, it is important to note that other than international academic research databases, FIS does not contain a hierarchically-structured thesaurus of its contents but rather a list of controlled keywords, which were matched to the search matrix.

German National Library: The German National Library catalogue indexes all German and German-language publications from 1913 onward. Searches in this catalogue are restricted to isolated terms, which can be combined within the search fields. Rules for indexing publications are outlined in the subject authority file (e.g., http://d-nb.info/gnd/4316406-7). In the area of indexing keywords, all keywords that are linked to language were checked for relevance. This inspection revealed that the term Sprachförderung (language intervention) is only used in connection with special educational measures targeting children with a language disorder or impairment. The subject authority norm file determines the use of "Spracherziehung" (language education) when referring to language intervention measures targeting children without evident language disorders or impairments.

The term Kindertagesstätte (child daycare centre) is used as a generic term that also represents a number of term combinations: Kind/Tagesstätte; Kinderbetreuung/Tagesstätte; Kindertagesheim; Kindertageseinrichtung; Kita; Tagesbetreuung/Kindertagesstätte; Tageseinrichtung; Tagesheim; Kindertagesstätten (Child/daycare centre; child minding/daycare centre; child daycare home; child daycare institution; Kita; daycare/child daycare centre; daycare institution; day home; child daycare centres). The term circumscribes the institutional setting targeted by this review.

Since the German National Library has the mandate to reference all reports published in Germany, the authoring team refrained from searching further library networks in Germany. However, two national academic indexes of research projects are of interest and these are detailed next.

GEPRIS: GEPRIS (German Project Information System) is the project funding index of the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG); it provides information on past and present projects funded by the DFG. Complex searches cannot be run in this database.

SOFIS: The index of social science research projects: GESIS—Leibniz-Institute for the Social Sciences is the largest German infrastructure institute for the social sciences. It is responsible for the central index of social science research activities in German-speaking countries. SOFIS offers current information concerning 56,475 projects (as of February 7, 2017).

For both GEPRIS and SOFIS, the search terms (Sprachförderung OR Spracherziehung) AND (Kindertagesstätte OR Kindergarten) were used to re-

trieve a list of relevant projects. Starting from these, follow-up searches were run for test materials, project reports, and other documentations including contacting the project leaders.

3.3.3 Contact with Experts

The search was not only restricted to studies and analyses in a scientific context. To draw a sufficiently complete picture of language interventions targeting children in early childhood settings in Germany, conventional searches in publication and project databases were supplemented by a direct appeal to scientific institutions, foundations, professional societies and associations as well as ministries dealing with early childhood education and care (Appendix A.3). Publications from government and federal state funding programmes were scrutinized. The local authorities of German cities with more than 100,000 inhabitants were also contacted. We were particularly interested in interventions that were ongoing in early 2017 or had been running for at least 4 weeks in early childhood day-care institutions during the last couple of years. Letters and e-mails were sent out in the period 4–14 July, 2016. Follow-up queries were conducted from late July to December, 2016.

3.3.4 Internet Search

A complementary Google-based search was conducted. Google was selected as the preferred internet search engine because it possesses the largest on-line information database. At this point, however, it should be noted that search queries that are run on Google are not replicable. Unlike queries in indexes, they have a high personalization effect. To confront this issue, the internet search was repeated by means of the search engine StartPage which enables an anonymous search via Google. Other similar services (e.g., DuckDuckGo) were not used because their databases are considerably smaller than Google. The search queries were also submitted to Google Scholar because this search engine has been shown to deliver results that differ from those of a general Google search. The first 10 pages of matching records (i.e., the first 100 search results) retrieved by Google and Google Scholar on February 15, 2017, were considered for inclusion in the review. The search terms used are given in Appendix A.2.

As is the case with the search results of GEPRIS, SOFIS and the (e-)mail survey, the information experts followed up the results of the internet search if only a

reference to, but not the full text itself, was initially found on the website. All internet searches were run via the Firefox Browser.

3.3.5 Study Selection

Using the eligibility criteria set out in Sect. 3.2, the search results were screened to determine which studies are relevant to this systematic review. The screening criteria were piloted by the members of the authoring team on a set of studies preselected for their variety in study design and intervention approach. This was undertaken to help ensure consistency between team members in the application of the criteria. Any uncertainties and discrepancies in coding were resolved by discussion in the authoring team (pilot-testing of applying the criteria in the screening process).

Following pilot testing of the criteria and the screening process, the search results were screened for eligibility by members of the authoring team in a two-step procedure. After import in the Systematic Review tool EPPI Reviewer 4 (Thomas et al., 2010), all documents were first screened on title and abstract. Documents without an abstract, like websites, for example, were accepted at this step and passed directly through to the next screening stage, Screening on Full Text.

Screening on Title and Abstract Four coders (the content experts of the authoring team of this report) examined the documents and decided whether the document is relevant to at least one research question of the review. All documents matching the following criteria successfully passed this step:

- Implementation of measures to promote the mother tongue or the German language;
- Objective to promote proficiency in the German language;
- Institutional setting: kindergarten or other daycare facility;
- Documentation from 1949 in East and West Germany, from 1990 in the Federal Republic of Germany;
- Age of children between 3 years and school entry;
- No purely clinical sample.

If any one of the above criteria was not met, the document was excluded at this point. In total, 90% of the documents were processed in single-screening mode by one of the four coders, 10% of the documents were submitted to a double-blind coding by two coders for a reliability estimate of the assessment. It turned out that

more than 5% of the documents were assessed differently in the double-blind screening step. Therefore, all documents that had been assessed as non-relevant (from single-screening or double-screening) were again screened by a fifth coder, who had not been involved in screening so far. Only if both coders agreed on exclusion, the document was excluded from the study in this screening step. In cases of doubt, the documents were submitted to the next step, Screening on Full Text.

Following this procedure, 1169 documents were identified as not relevant to the research questions, while 1397 documents were submitted to Screening on Full Text (see Fig. 3.1).

Screening on Full Text If not already available, the full texts for the documents submitted to this step were procured via the Frankfurt Research Library, the University Library Johann Christian Senckenberg of the Goethe University Frankfurt, the German National Library as well as via inter-library loans and the Specialised Information Service for Educational Science and Research.

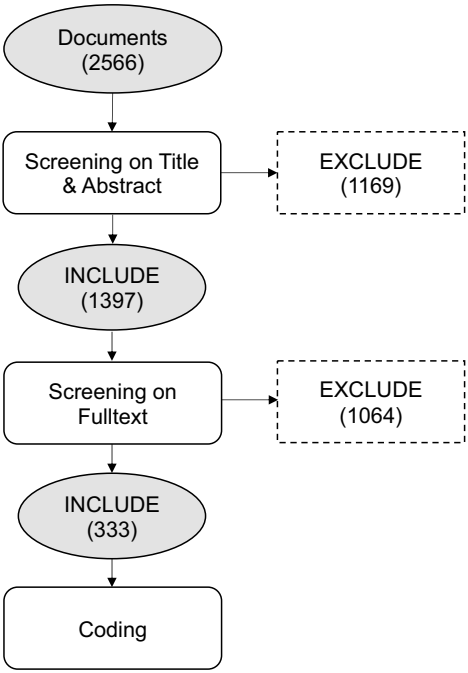

Fig. 3.1 Result of the screening process

The full texts for 85 documents were not obtainable. In some instances, the search had yielded only rudimentary bibliographic information, on the basis of which no effective follow-up search was possible. In other instances, texts could not be accessed by inter-library loan within a reasonable period of time from entering the request. In result, 1312 documents could be inspected in this screening step.

The criteria for Screening on Full Text were the same as in Screening on Title and Abstract. All full texts were screened in a double-blind procedure. If the two coders disagreed on the inclusion of the document in a study, a third coder, previously not involved in this screening step made a final decision. Following this procedure, 333 documents were included in the present study (see Fig. 3.1). References of these documents are listed in Appendix A.5.

3.4 Data Collection Methods

Following eligibility screening, the included studies were coded with respect to the study aims and rationale, the sample or samples used, the interventions provided, the study design and methods, and the results and conclusions of the study as given by the authors. In addition to specifying the information (in the authors' words, as far as possible), the reviewers recorded whether the information was explicitly stated, implicitly given and deduced by the reviewer, or unclear. General and administrative information on the included studies were also recorded.

Two domain experts in the authoring team pilot-tested the data extraction coding sheet. They worked independently on a purposive sample of eligible studies which was selected for their variety of intervention characteristics and evaluation designs and methods. The coding tool was iteratively refined until a very high level of consistency in the application of codes was reached between the team members.

Due to the unexpectedly large number of studies entering the coding stage, all eligible studies were coded by one of the four domain experts on the authoring team. Any uncertainties and discrepancies in coding were resolved by discussion in the full group of coders.

The development of the coding scheme was guided by the EPPI-Centre review guidelines for extracting data and quality assessing primary studies in educational research (EPPI-Centre, 2003, Version 0.9.7). The coding tool, consisting of 30 items, is detailed in Appendix A.4. It is divided into seven sections.

- **Section A: Meta-information**, including document type publication year, and cross-reference to related studies

- **Section D: Programme or intervention description**, specifying the geographical spread and the target group of the programme/intervention, its approach to language support, the language targeted, the duration of the programme/intervention as well as the length and frequency of sessions, its pre-structuredness, and who provides the intervention.
- **Section E: Methods—study design and groups**, including the type of design, the number of groups and type of control group, if applicable.
- **Section I: Realised study sample**, detailing the sample selection of participants as well as their numbers.
- **Section J: Methods—data collection of outcomes**, describing which outcome measures were reported. For outcome measures on the child level, it also details the methods by which data were collected, the target of the outcome measure, which instruments were used in data collection, and at what point in time relative to the intervention data were collected.
- **Section K: Data analysis**, stating the type of analysis employed, and the overall and sub-group analyses that have been performed.
- **Section L: Results and conclusions**, recording the results and conclusions as reported by the study's authors. This includes descriptive measures of central tendency (e.g., median, mean) and variability (e.g., range, percentiles/quartiles, standard deviation) as well as inferential statistics, if available.

3.5 Assessing Quality of Studies and Weight of Evidence for the Review Questions

Following Gough (2007) and the example of the application in Aboal et al. (2012), all included studies were assessed for quality and relevance using a 'weight of evidence' (WoE) appraisal tool. Each empirical study was assessed in terms of three dimensions: the trustworthiness of the reported findings in answering the research questions (WoE A); the appropriateness of the research design for answering the review question (WoE B); and the relevance of the study focus to the current review (WoE C).

WoE A aims to reflect how well the study was executed. Adapting a short quality assessment tool by Tripney et al. (2010), the items M3 to M6 in section M of the coding tool were used to assess the allocation of participants to groups, and the quality of the outcome measures employed. Each study was coded for overall trustworthiness (WoE A) as follows (Tripney et al., 2010, Table 2.5):

- High = met all the desirable criteria specified in the mentioned items M3 to M6 ('YES' ratings in all 4 items, i.e., score of 4 pts).
- Medium/High = score of 5
- Medium = met some of the desirable criteria specified in the mentioned items (score of 6).
- Low/Medium = score of 7.
- Low = met only few desirable criteria (scored 8).

WoE B: Focuses on the appropriateness of the research design for answering the review question. Studies were coded for WoE B using item 13 in Section E as well as items M1 and M2 in Section M of the coding tool (see Tripney et al., 2010, p. 13; Appendix 7, p. 68, which follows the Maryland Scientific Methods Scale MSMS).

The appropriateness of the research design and analysis (WoE B) was judged:

- High = If the study is a group study with random allocation to groups, and post-test or pre-post-test, and both items M1 and M2 are answered "YES"
- Medium/High = If the study is a group study with random allocation to groups, and post-test or pre-post-test, and not both items M1 and M2 are answered "YES" or
- Medium/High = If the study is a group study with non-random allocation to groups, pre-post-test and groups well-matched, and both items M1 and M2 are answered "YES"
- Medium = If the study is a group study with non-random allocation to groups, pre-post-test and groups well-matched, and not both items M1 and M2 are answered "YES" or
- Medium = Unmatched comparison group pre-post-test design
- Low/Medium = Single-group pre-post design or comparison group post-test only design
- Low = Single group post-test only

WoE C considers the relevance of the study focus to the current systematic review and whether the focus of the study is adequate for addressing the systematic review question. In this review, all studies with an outcome measure on child level were fixed at "High".

The overall weight of weight of evidence was determined by the lowest score across WoE A WoE B, and WoE C.

3.6 Data Synthesis Methods

An initial informal scoping exercise suggested that included studies may not be sufficiently similar for statistical meta-analysis to be appropriate. This was confirmed in carrying out the review. This review therefore adopted a narrative approach to research synthesis (Snilstveit et al., 2012). Narrative synthesis can be used in different ways, but its defining characteristic is that it relies primarily on words and text to summarise and explain the findings of the synthesis (Popay et al., 2006). The narrative synthesis involved:

- drawing on the review question and conceptual framework of the review to identify relevant thematic groups, by target group (children, parents or teachers) (see specifications in Sect. 3.2);
- assigning each study to the correct thematic group (using detailed assessment of the characteristics of the included studies); and
- analysing and synthesising the findings of the studies in each thematic group separately in a narrative fashion, as far as the differences in study design permit.

3.7 Quality Assurance Process

Due to the unexpectedly large number of included texts, single coding was carried out by one of the four coders in the authoring team. In cases in which the coder did not feel confident in their coding decision, all members of the authoring team were consulted and a consensus was reached.

All steps in generating the review were supervised by a knowledgeable expert in the methodology, Dr Janice Tripney of the EPPI-Centre, London. Furthermore, the work of the authoring team was reviewed by a group of experts from different academic disciplines. The members of the Scientific Advisory Board were:

- Prof Dr Michael Becker-Mrotzek (Mercator-Institute for Literacy and Language Education), German language and didactics/subject-matter education;
- Prof Dr Hans-Günther Roßbach (Leibniz-Institute for Educational Trajectories LIfBi), early childhood education;
- Prof Dr Monika Rothweiler (Bremen University), inclusion and special needs education with a focus on speech, for the early stages of the review process;
- Prof Dr Hermann Schöler (Heidelberg University of Education), early and elementary education;

– Prof Dr Petra Schulz (Goethe University Frankfurt), psycholinguistics and subject matter education;
– Prof Dr C. Katharina Spieß (German Institute for Economic Research DIW Berlin), economics, for the early stages of the review process.

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About the Sources

4

Contents

What did we find out regarding the type of the interventions used to improve children's language skills (Research Question 1), and the knowledge about the effectiveness of these interventions on the child level (Research Question 2)? Before presenting the results regarding these two questions in Chaps. 5 and 6, the search results and characteristics of the included studies and other sources of information are described.

4.1 Search Results

The searches as specified in Chap. 3 of this report (see also in Appendices A.1–A.3) yielded 2666 results. Figure 4.1 gives the number of documents for each source, including 100 duplicate items. After eliminating these, 2566 documents entered the screening process.

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K. Zimmer et al., *Interventions for Improving Children's Language in Early-Childhood-Education-and-Care Institutional Settings in Germany*, Edition ZfE 21, https://doi.org/10.1007/978-3-658-48818-5_4

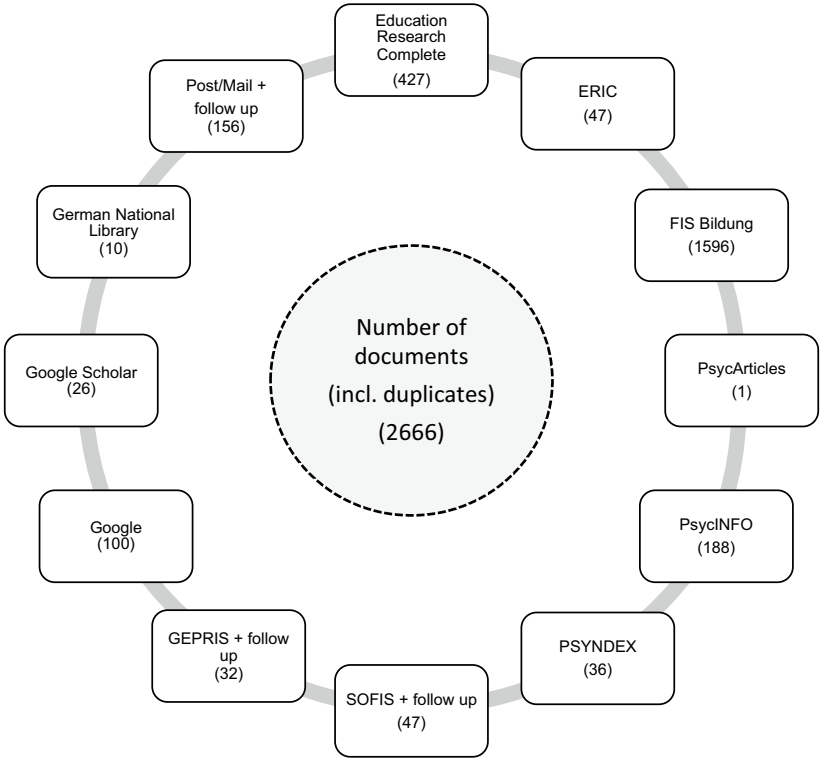

Fig. 4.1 Search results for each source

4.2 Effectiveness of the Search

The total number of documents found in each of the sources is listed in Table 4.1 as well as the number of relevant documents which passed the two-stage screening process and were identified as pertinent to the systematic review (number of hits entering coding, see third column). Most notably, 300 of 333 (about 90%) of the documents entering the coding stage are unique, i.e., they were found exclusively in a single source (right-most column in Table 4.1), affirming that the very time-consuming and broad search strategy adopted in this systematic review was highly effective. Only a small number of documents were found in multiple sources, some of them in three or four. It may also be noted that the sources considered as rather

Table 4.1 Number of hits per source

Source	Number of hits[a] (January/ February 2017)	Number of these, entering coding[a]	Number of these, found only in this document source	
			Number	Proportion [%]
Education Research Complete	427	5	0	
ERIC	47	0	0	
FIS Bildung	1596	180	150	9.4
PsycArticles	1	1	0	
PsycINFO	188	18	4	2.1
PSYNDEX	36	24	13	36.1
SOFIS + follow up	47	1	1	2.1
GEPRIS + follow up	32	5	1	3.1
Google	100	16	15	15.0
Google Scholar	26	6	1	3.8
German National Library (after prior inspection)	10	6	1	10.0
Post/E-Mail + follow up	156	126	114	73.1
Total	2666	388	300[b]	

[a] Includes duplicates, i.e., documents found in more than one document source
[b] Added to these are 33 documents that were found in more than one source and are included at the coding stage

unusual in academia make a disproportionately high contribution, with the highest proportion of relevant documents—73.1%—being recorded for the feedback on the postal or e-mail requests and the associated follow-up inquiries.

4.3 General Characteristics of the Interventions

Searching and screening as described above rely on documents as text sources. The research questions, however, are addressed by looking at specific empirical studies, i.e., cases that are described in these texts. Different aspects of a given empirical study can be documented in one or more document(s). Similarly, one document may report on several empirical data collections of a given intervention or on multiple interventions. Figure 4.2 illustrates this fact, presenting all cases and documents related to the intervention programme “Heidelberger Training”.

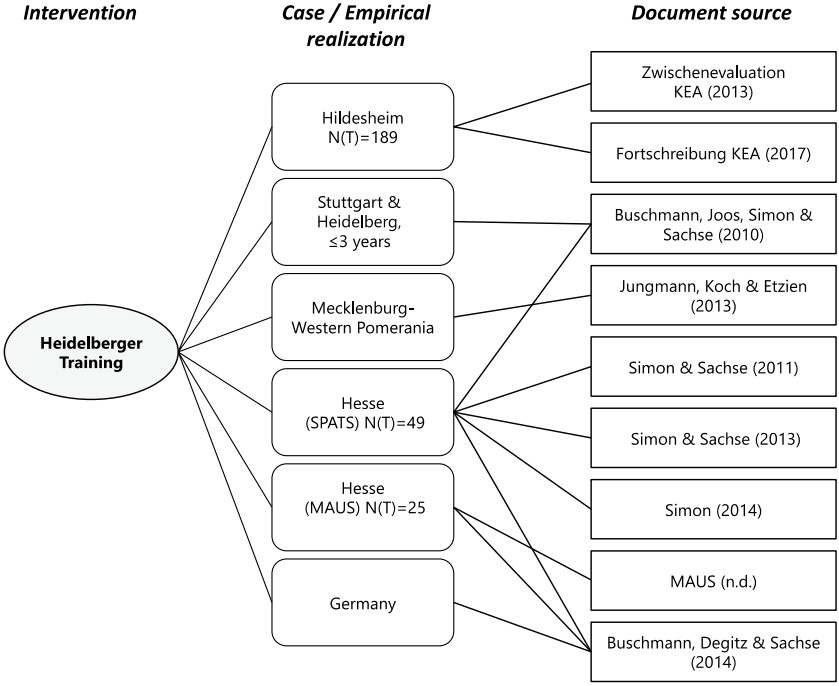

Fig. 4.2 Exemplary presentation showing all cases and documents related to the intervention programme "Heidelberger Training"

Overall, nine documents on the "Heidelberger Training" entered the coding stage. These report on six cases, one in the town of Hildesheim (Lower Saxony), one in Stuttgart and Heidelberg (both towns in Baden-Wuerttemberg), two in the federal state of Hesse and one in the federal state of Mecklenburg-Western Pomerania. One case is implemented on the German national level.

All 333 documents were inspected carefully prior to entering the coding stage, with the goal of ensuring that each empirical data set entered the coding stage exactly once. When several documents drawing on the same data were found, a main text with the most detailed empirical information was identified. The other texts provided auxiliary information and one case thus consists of all empirical information (from main and auxiliary texts) available for the data set. After reorganising the document sources in this way, it turned out that the 333 documents entering the coding stage refer to 327 different empirical realisations, called cases in the following.

In the next step, all cases were coded using the coding scheme specified in Appendix A.4. All 327 cases thus coded contribute towards Research Question 1 (RQ1).

4.3.1 What Interventions Are Documented? Database of 327 Cases

In all, 327 cases were found that address Research Question 1 on interventions with the goal of fostering children's German language skills (RQ1). In the following paragraphs, we give a general description of publication years and spread of interventions as well as their target group or groups. For the interventions targeting children, the main type of intervention (additive vs. integrated) is given, as well. These results are summarized in Table 4.2.

Publication year The review included relevant interventions documented in the period from 1949 to February 2017. Figure 4.3 (dark columns) illustrates the search results. The earliest case to be included in this review dates from 1980, the median publication year is 2008. The topic has increasingly gained momentum since the early 2000's, peaking in 2006 with a collation of "Integrationsprogramme" by the

Table 4.2 General characteristics of the documented interventions (327 cases)

Characteristics	*n*	% of cases
Geographical spread described in the intervention		
Local	214	65.4
Of which part of a national programme	136	41.6
Regional	76	23.2
Of which part of a national programme	40	12.2
National	21	6.4
Not specified	16	4.9
Target group of programme/intervention (multiple responses possible)		
Children	255	78.0
Carers/Teachers	99	30.3
Parents	56	17.1
Other	3	0.9
Type of intervention for children (self-report of 255 cases)		
Additive	24	9.4
Integrated	53	20.8
Self-report: Both components	15	5.9
Self-report: Neither component	163	63.9

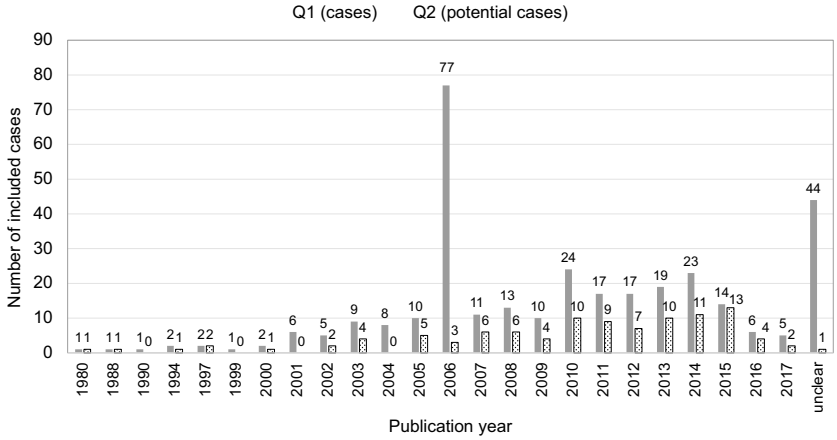

Fig. 4.3 Publication year of included cases (main document source)

Standing Conference of the Ministers of Education and Cultural Affairs KMK (Federal Office for Migration and Refugees, 2006a, 2006b, 2006c), i.e., interventions targeted at the inclusion of immigrants and low-SES children and families. Many of these interventions address language support in an institutionalized setting for children aged between 3 and 6 years, and are thus eligible for inclusion in this systematic review.

In 44 of 327 cases, no information is available as to when the intervention was documented. These cases all stem from unpublished materials ("graue Literatur").

Geographical spread The geographical spread of interventions is unclear in 16 of the 327 cases. For 20 cases, information is available on interventions on the national German level only. One case each reports an intervention to foster children's German language skills run in Austria, in Switzerland and in the Swiss-German border region. The remaining 288 cases give information on local (municipal) or regional (Bundesland or wider geographical region) interventions. Figure 4.4 illustrates these, showing a relatively high number of local and regional interventions in some Bundesländer, most notably Hesse, Baden-Württemberg and North-Rhine Westphalia. In other Bundesländer, including Saarland and Saxonia, we found no or few interventions.

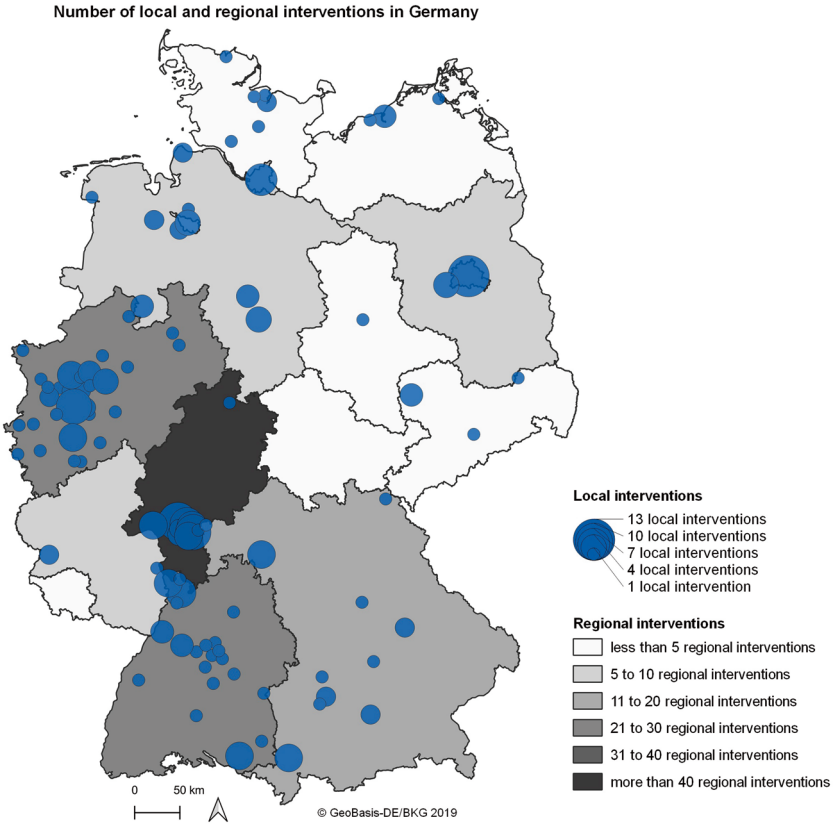

Fig. 4.4 Geographical spread of interventions (327 cases; multiple responses are possible)

Target group of intervention Table 4.2 (lower left) shows that in more than three quarters of the cases, children are targeted by the intervention (78%); 30% of interventions address care-giving/teaching staff and 17% focus on parents/guardians (multiple classification of cases possible). In addition, one case each addresses heads of day-care centres (e.g., Neuß & Dumpies, 2014), future trainers of caregiving staff (e.g., Neugebauer, 2010) and parent-coaching volunteers trained to inform and advise parents so that they can actively participate in their children's education (e.g., the "frühstart" project, http://www.projekt-fruehstart.de).

Table 4.3 Reported outcome measures and study design, by target group

Characteristics	Target group of intervention							
	Children (255 cases)		Care-giving/ teaching staff (99 cases)		Parents (56 cases)		Other (3 cases)	
	n	%	*n*	%	*n*	%	*n*	%
Level of outcome measure (multiple responses possible)								
Child	81	31.8	30	30.3	10	17.9	1	
Care-giving/teaching staff	10	3.9	28	28.3	4	7.1	1	
Parents	8	3.1	8	8.1	5	8.9	1	
Other	2	0.8	2	2.0	0	0	0	
Not specified/no outcome measure	167	65.5	56	56.6	45	80.4	2	
Type of study design								
Single-subject or case study	1	0.4	0	0	0	0		
One group or group study with no test or post-test only	45	17.6	35	35.4	14	25.0	2	
Group study with pre-post test	57	22.4	18	18.2	3	5.4		
Not specified	152	59.6	46	46.4	39	69.6	1	

Table 4.3 details the study design and reported outcome measures by each of these target groups. Interestingly, for each of the target groups, most cases do not specify an outcome measure, ranging from 56 of 99 interventions targeting staff to 45 of 56 interventions (80%) addressing parents/guardians. Similarly, the study design is not specified for in between 46% (staff) and 70% (parents/guardians) of respective cases, limiting the possibility to apply these interventions in the future given similar settings.

If outcomes are reported, they are most frequently measured on the child level. This does not only hold if children are the target group of the intervention but also for all other target groups.

Main type of intervention The descriptions for all interventions which included children as the target group (255 cases) were scrutinized for explicit statements regarding an integrated vs. additive implementation of the training. For this task, the definitions of the additive vs. integrated approach (see Sect. 1.3.1) were used. The following terms were considered as synonymous to the term “additiv” (additive), thus indicating an additive approach: “zusätzlich”, “ergänzend”, “außerhalb”, “erweiternd” (additional, beside or on-top, ancillary, extend or extended). The terms indicating an integrated approach, “alltagsintegriert”, were: “integriert”, “eingebettet”, “Alltag/alltäglich”, “gewöhnlich” (integrated, embedded, daily

routine, common/daily, commonplace). Table 4.2 (lower right side) gives the results of this classification based on explicit self-reports: Less than a third of interventions could be unambiguously classified as either additive or integrated, while almost two-thirds described the intervention in terms that denote the use of both additive and integrated components. This result suggests a widespread pragmatic implementation strategy and raises the question of how practically relevant the distinction between additive and integrated approaches actually is in implementation settings.

4.3.2 What Is Documented About Intervention Effects in Children? Data Base of 31 Cases

Roughly a third of the cases in this systematic review (102 out of 327) measure at least one outcome on child level and thus potentially contribute towards Research Question 2 (RQ2—effectiveness of interventions on the child level). The quality of conclusions regarding the effectiveness of interventions is influenced by the quality of the available evidence. Hence, the weight of evidence of each of the 102 cases is assessed by combining the three aspects of WoE A, B and C (see Sect. 3.5). The overall weight of evidence (WoE) is the minimum of these three aspects. Cases with at least medium overall weight of evidence will be considered when addressing RQ2.

- **WoE C**: For all cases that report at least one outcome on child level, the **relevance** of the study focus to the current review (WoE C) is considered high.
- **WoE B—Appropriateness of the research design** with regard to the effect on child level: Medium WoE B refers to a design with an intervention group and at least one unmatched comparison group, as well as tests pre- and post-intervention. Single-group designs and comparison group designs with only post-intervention testing are not included in further analyses.
- **WoE A—Trustworthiness of the reported findings** with regard to the effect on child level: Medium WoE A is reached if at least two of the following four issues are adequately addressed:
  - Prevention of knowledge of the allocation to groups (blinding of participants, intervention providers, assessors);
  - Incomplete outcome data (e.g., attrition, exclusion);
  - Equal treatment of groups (e.g., data collection measures, overall setting);
  - Reliable outcome measure.

The overall weight of evidence is medium or higher for 31 of the 102 cases. It seems that the constraining factor is how well the study was executed (WoE A, based on coding items M.3 to M.6): medium WoE A and WoE B or better is achieved by 31%, and 69% of cases, respectively. For 45% of cases, the overall weight of evidence is low or very low, and again, WoE A is the main limiting factor (44 vs. 19% of cases for WoE A and WoE B, respectively). Table 4.4 illustrates the overall WoE for the three main target groups of the intervention, i.e., children, teachers and parents.

Table 4.5 gives an overview of the general characteristics of the interventions which investigate an effect on child level and have at least medium weight of evidence.

The cases were published between 1988 and 2017 (median 2011.5). The great majority of cases (23 of 31) targets children, teachers and parents are the target group of 7, and 1 intervention, respectively. One case by Rückert et al. (2010) addresses both children and parents as target groups of the intervention, all other cases going into RQ2 focus on one specific target group.

As illustrated in Table 4.6, less than a third of the interventions targeting children describe the language intervention as additive or integrated. In all, over two thirds of the cases are implemented on the local level, a fifth have a regional outreach.

In all, 31 of 327, i.e., a proportion of 9% of cases contributing to RQ1 also contribute to Research Question 2. When comparing Tables 4.2 and 4.4, it becomes clear that 9% of cases from RQ1 with children as a target group of the intervention also go into RQ2. For the target group of teachers, the proportion is similarly high (7%), while the proportion of cases addressing parents has fallen especially low, from 56 to one case.

Table 4.7 sums up the information base, i.e., the number of cases for each research question and target group. The following two chapters will then summarize the results of investigating Research Questions 1 and 2, respectively.

Table 4.4 Weight of evidence for cases which report at least one outcome on child level, by target group of intervention (102 different cases; multiple responses possible)

	Overall weight of evidence					
Target group	<Low	Low	Low/medium	Medium	Medium/high	High
Children	9	28	21	22	2	0
Teachers	6	10	7	5	2	0
Parents	5	3	1	1	0	0

Note: One case with target group head administration and low weight of evidence is not shown in the table

Table 4.5 General characteristics of the interventions addressing RQ2

Characteristics	*n*	% of cases
Geographical spread described in the intervention		
Local	21	70
Of which part of a national programme	3	
Regional	6	20
Of which part of a national programme	1	
National	2	7
Not specified	1	3
Target group of programme/intervention (multiple responses possible)		
Children	23	77
Teachers	7	23
Parents	1	<1

Table 4.6 Additive or integrated intervention: Self-report of 23 cases with target group children

Type of intervention	*n*	% of cases
Additive	5	22
Integrated	2	9
Self-report: Both components	1	4
Self-report: Neither component	15	65

Table 4.7 Overview of information base for Research Questions 1 and 2

Target group of programme/intervention (multiple responses possible)	*n* (RQ1)	*n* (RQ2)
Children	255	23
Teachers	99	7
Parents	56	1
Other	3	0
Total number of different cases	*327*	*31*

Based on a total of 327 different studies, the following Chap. 5 will characterize interventions for improving children's language skills (first language or German) in ECEC institutional settings in Germany (RQ1). A subset of 31 different cases will inform on the effects the interventions have on the children's German-language skills (RQ2); these will be presented and discussed in Chap. 6.

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Map of Interventions (Research Question 1)

5

Contents

This review sought to identify interventions that have been used to foster children's language skills (first language or German) in ECEC institutional settings in Germany. In all, 327 cases were identified that can contribute to answering research question 1. This chapter describes their main characteristics.

Even though the ultimate goal of all interventions considered for RQ1 was to foster children's language competencies, the direct target group of the intervention varies across cases and very often goes beyond a single target group.

Table 5.1. includes all univariate and bivariate combinations of target groups. All in all, 255 cases targeted only children as the main level of language support, 99 targeted only care-giving staff, 56 targeted only parents and 3 interventions were directed at other target groups only. Children and care-giving staff were targeted in 41 cases and children and parents in 39 cases. In 24 cases, the intervention was directed at care-giving staff and parents. Children making up the target group in the majority of cases is not surprising. But the high number of cases that targeted other groups as well, confirms that language support can be—and in fact is—delivered by a range of different interaction partners, not only in early childcare settings. The sum of cases with target group children and other target groups (337) exceeds the total number of cases, because in several cases, the intervention(s) was directed

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Table 5.1 Share of cases directing the intervention at certain target groups

Target group of programme/intervention	Children	Teachers	Parents	Other
Children (n = 255)	–	41	39	2
Teachers (n = 99)	41	–	24	2
Parents (n = 56)	39	24	–	1
Other (n = 3)	2	2	1	–

Note. Number and share of cases directing the intervention at certain target groups. The coding scheme allowed multiple codes if the intervention was directed at more than one target group

at more than two target groups (i.e., 19 cases targeted children, care-giving staff and parents, one case targeted children, care-giving staff and another target group, and one case even targeted children, teachers, parents and another group).

Overall, eight characteristics can be used to further describe these 327 cases, four of them detailing the nature of the intervention programme provided (listed in Table 5.2) and another four that describe the nature of the empirical realization (in most cases a "study"; listed in Table 5.3). Because there are marked differences between interventions targeting children, teachers, parents and others, results below are reported in separate sections for each target group "children" (Sect. 5.1), "teachers" (Sect. 5.2) and "parents" (Sect. 5.3). Only three cases addressed a different target group. These cases approached their goal by providing a holistic oral type of support of German language and in one case also the children's mother tongue. Although below Tables 5.2 and 5.3 includes some further information, these cases are not further discussed in the text.

One remarkable result across the three target groups is the high share of cases that were coded as "other" approaches to language support (29–42% of all cases). A closer examination of these cases leads to the conclusion that no additional code should be included in the coding scheme. Reports included a great variety of vague descriptions, ranging from "language diagnostics and general language education", "individualized language stimulation", "knowledge about language development and adaptive diagnostics", "parent education", "teaching academic science language", to "modelling high quality language use" and beyond.

5.1 Interventions Targeting Children

Within those studies focusing children, studies with a holistic and oral linguistic approach were most frequent, followed by studies focusing on the metalinguistic ability of phonological awareness (see Table 5.1, Approach to language support).

Table 5.2 Characteristics of the interventions found in the 327 studies depicted for the different target groups

	Children		Teachers		Parents		Other	
Characteristics	*n*	%	*n*	%	*n*	%	*n*	%
*Approach to language support**								
Phonological awareness	44	17	6	6	4	7	0	0
Phonetics	11	4	5	5	2	4	0	0
Grammar	29	11	11	11	14	25	0	0
Vocabulary	30	12	19	19	20	36	0	0
Musical training	14	5	3	3	0	0	0	0
Sensory-motor training	25	10	19	19	5	9	0	0
Holistic: Oral	77	30	50	51	32	57	2	67
Holistic: Written	30	12	9	9	13	23	0	0
Other	106	42	39	39	16	29	1	33
*Language targeted**								
German	208	82	87	88	47	84	3	100
Mother tongue	19	7	16	16	20	36	1	33
Other	52	20	11	11	9	16	0	0
Intervention is pre-structured								
No	15	6	9	9	4	7	1	33
Yes, by intervention provider	96	38	50	51	27	48	1	33
Yes, by other	14	5	7	7	1	2	0	0
Not stated/unclear	130	51	33	33	24	43	1	33
*Providers of intervention**								
External trainer	62	24	39	39	32	57	0	0
Day-care giver	134	53	25	25	14	25	1	33
Programme/intervention developer	11	4	16	16	2	4	1	33
Other	25	10	11	11	3	5	2	67
Not stated/unclear	54	21	21	21	10	18	0	0

Note. For each target group and intervention characteristic absolute and relative frequencies are included in two columns each. Categories marked with an asterisk * accepted multiple codes

Programmes aiming to promote linguistic skills in the narrower sense were rather rare: 12% (30) of cases focused on vocabulary acquisition and another 29 cases each particularly supported children's grammar (11%) or concentrated on a holistic approach to written language (30 cases, 12%). A majority of studies, however, could not be specified to either of the given approaches to language support, as the information was not available in the publications.

Table 5.3 Characteristics of the studies with regard to sample selection and number of participants, outcome measures, and data analysis methods

	Children		Teachers		Parents		Other	
Characteristics	*n*	%	*n*	%	*n*	%	*n*	%
*Sample selection of participants**								
None	5	2	5	5	1	2	1	33
Last year of kindergarten	28	11	1	1	1	2	0	0
Psychometrically validated diagnostic (test-) instrument(s)	2	1	2	2	0	0	0	0
Screening or checklist	11	4	2	2	0	0	0	0
Teacher observation and documentation	5	2	3	3	0	0	0	0
Immigrant background	19	7	8	8	10	18	0	0
Random sample	2	1	2	2	0	0	0	0
Other	16	6	21	21	2	4	0	0
Not stated/unclear	25	10	14	14	3	5	1	33
Number of participants	77	30	41	41	10	18	2	67
Not stated/unclear	26	10	12	12	7	13	0	0.0
*Outcome measured on ...**								
No outcome measure	14	5	9	9	5	9	1	33
Child level	81	32	30	30	10	18	1	33
Teacher level	10	4	28	28	4	7	1	33
Parent level	8	3	8	8	5	9	1	33
Other	2	1	2	2	0	0	0	0.0
*Data analysis methods**								
Qualitative: Narrative	50	20	41	41	23	41	2	67
Qualitative: Quantitative descriptive	11	4	6	6	3	6	0	0
Quantitative: Descriptive	44	17	21	21	3	6	0	0
Quantitative: Inferential	54	21	19	19	3	6	0	0

Note. For each target group and intervention characteristic absolute and relative frequencies are included in two columns each. Categories marked with an asterisk * accepted multiple codes

The language targeted within the interventions targeting children was mostly German (82%). The data is somewhat undecided with regard to the structuredness of the applied programmes: In not quite half of the cases, the applied approach was pre-structured by the intervention provider (38%) and in the other half of the studies (51%), the available reporting was not conclusive enough on whether the intervention was pre-structured or not. Providers of the information where in more than half of the studies day-care givers (53%). In 25% of the studies though, external trainers provided the intervention. Again, for a substantial number of cases (21%) the provider could not be determined.

Compared to interventions targeting the teachers and parents, cases that targeted children more often primarily supported phonological awareness and less often used a holistic approach to oral language support. These cases were less likely to report on a study that installed an external provider of the intervention and far more likely to be delivered by the teachers.

In 11% of the studies, children in their last year of ECEC (Kindergarten) were selected for the intervention. Even though this figure seems low, it is the most frequent code (mode). Another important selection criterion was children's cultural background (19 cases). But in many studies no information on sampling criteria was available. Perhaps governance considerations informed selection decisions in some cases, since the children more obviously seemed in need of language support—being close to school enrolment or are otherwise rather easily identifiable. In one third of cases (81 resp. 32%), the outcomes for interventions targeting children were measured on child level. Data at teacher (10 cases) or at parent level (8 cases) was measured about as often as no outcome assessment (14 cases) was included in the study at all. About equal shares cases applied narrative qualitative methods of data analyses as well as descriptive and inferential quantitative methods.

Again, compared to cases focusing on teachers or parents, the cases targeting children more frequently sampled children in their last year of ECEC and were less likely to include an outcome measure at parent level. Also, studies were less likely to apply narrative qualitative data analyses.

5.2 Interventions Targeting Teachers

Given the 99 cases focusing on teachers, more than half of the studies applied a holistic and oral linguistic approach (60%). This is an even higher rate than within those cases focusing on children. Phonological awareness was far less important in cases of this type (6%, see Table 5.1, Approach to language support). Another rather frequent approach was vocabulary trainings (19 cases). And again, 39% of the studies could not be determined to provide one of the approaches to language support included in the coding scheme. As with cases focusing on children, the language typically targeted within the interventions targeting care-giving staff was German (88%) and more than half of these cases applied an intervention that was pre-structured by the provider (50 cases). In one third of the studies (33%), no information or only unclear information was available about whether the intervention was pre-structured. Providers of the information where mostly external trainers (39 cases) or day-care givers (25 cases). However, in 16 cases the intervention devel-

oper themselves provided the intervention, which is a higher rate than in the two other sets of cases.

Cases that focused on the teachers seemed to overall pursue a somewhat different strategy, as can be seen in several study characteristics: In the majority of cases, the study sample was selected by drawing settings or teachers in settings rather than children. Since the coding scheme for this report was developed in view of a research question on interventions' effectiveness for children's language development, coding choices often did not include relevant codes for these types of studies. Consequently, about equally many cases reported outcome measures at child level as well as at teacher level, including this group of study participants in their own right. Also, data analyses most often applied narrative qualitative methods—about double the share of cases than in the set of cases focusing on children. Quantitative descriptive or even inferential methods were applied in one out of four studies, and thus at a comparable level to those studies focusing on children.

5.3 Interventions Targeting Parents

Within the studies focusing on parents, studies applying a holistic and oral linguistic approach were most frequent, just as it had been for the target group of teachers. However, the second most common approach was vocabulary training (20 cases) followed by grammar trainings (14 cases) and holistic approaches to written language (13 cases; see Table 5.1, Approach to language support). Here, programmes targeting on the one hand parents of ECEC children who had recently immigrated to Germany, and on the other hand those with low competencies in German where highly represented. Compared to cases targeting children, approaches fostering metalinguistic skills were less frequent.

As in all cases included to study research question 1, the language targeted within the set of cases focusing on parents most often was German (47 cases 84%). However, one third of the studies (36%) targeted the non-German mother tongues of families, too: thus, were programmes, which aimed at (multilingual) language promotion. In not quite half of the studies (24), no information was available as to whether the intervention was pre-structured; compared to 27 cases where the intervention was pre-structured by the intervention provider. This result mimics that of the other two sets of cases reported above. Providers of the intervention were, in more than half of the studies, external trainers (32), exceeding the share of external trainers in cases focusing on children and teachers. In a quarter of the studies, teachers provided the intervention.

In most cases (10) the included parent samples were selected by their cultural background, i.e., parents and/or their children had an immigrant background. Even

compared to the other two sets of cases this is a high rate of cases recurring to this sampling strategy. Data from studies focusing on parents were particularly incomplete, e.g., only for 10 of these studies, information about the number of participants was available. Data were analysed mostly (23) with narrative qualitative methods—this percentage is twice as high as in those studies focusing on children mainly. Quantitative descriptive and inferential methods were comparatively rare.

All in all, the 327 cases contributing to research question 1 can generally be divided into three unequally large groups depending on the main target group in the centre of attention. Depending on target group, study cases seem to pursue slightly different research goals intending to support children's language acquisition more of less directly and thus including one, two or another (additional) target group. Although for frequent approaches to language support the overall setup of the interventions as well as study characteristics are similar across groups to a certain degree, above description also included certain specifics to each set of cases, marking the groups' distinctness. In view of these fundamental differences, it seems hardly advisable, if not impossible, to apply meta-analytical methods to summarise results.

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Effectiveness of the Interventions (Research Question 2)

6

Contents

This review aims to identify studies that provide information about the effectiveness of interventions used to foster children's language skills (first language or German) in ECEC institutional settings in Germany. Since the quality of conclusions regarding the effectiveness of interventions is influenced by the quality of the available studies, only those cases which report at least one child outcome (see criteria for inclusion described in Sect. 3.2) and show at least medium overall weight of evidence (WoE) are assessed in this chapter.

The overall weight of evidence was judged to be medium or higher for 31 of 103 cases. This chapter synthesizes the findings from these 31 cases, which include 23

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cases with children as the target group, seven cases with teachers as the target group, and one case with parents as the target group.

Based on these cases, we addressed the following three main questions:

1. *Which interventions are effective in improving children's German-language competencies?*
2. *On which conditions are they effective?*
3. *For which groups of children are they most effective?*

Before drawing conclusions on these questions (see below, Sect. 6.4), an overview is given of the 31 cases contributing to Research Question 2 regarding their approach to language support, sample selection criteria of participants, data collection methods, target of the outcome measure, and time point of outcome measurement. This overview is followed by three subsections describing the cases of interventions targeting children (Sect. 6.1), teachers (Sect. 6.2), and parents (Sect. 6.3). Finally, conclusions from these findings are drawn in Sect. 6.4.

A comparison of the 31 cases contributing to Research Question 2 in terms of their approach to language support shows that phonological awareness was most common in cases with children as the target group, whereas holistic oral approaches were most common in cases with teachers as the target group (see Fig. 6.1). In the one case addressing parents, language support also addressed phonological awareness.

In the vast majority of cases, German was the targeted language. While the sample selection of participants in cases targeting children mainly concentrated on children in the last year of kindergarten, the most frequent category for cases targeting teachers was "other" (see Fig. 6.2). This category included, for example, local proximity or the need for requests to participate. In the one case of parents were addressed, it is unclear how the sample of participants was selected.

As shown in Fig. 6.3, tests were the most frequent method to collect data for cases addressing children as well as for cases addressing teachers. In the one case with parents as the target group (not included in the figure), tests were also used to collect data.

For those cases where children were addressed, the target of the outcome measure was most frequently at the phonological level, and the category "other" was the second most frequent (for specification, see below, Table 6.1). In contrast, for cases addressing teachers, the target of the outcome measure was most frequently

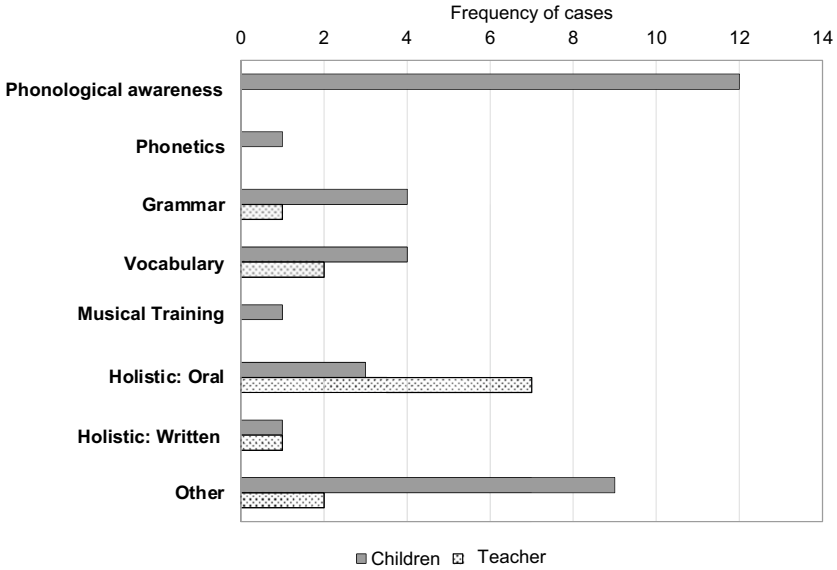

Fig. 6.1 Cases with target group children and cases with target group teachers: Approach to language support (multiple responses possible)

at the lexical level (see Fig. 6.4). In the one case addressing parents, the target of the outcome measure was also at the phonological level. In addition, this one case was also assigned to the category "other", as attention and phonological working memory were measured.

As illustrated in Fig. 6.5, the outcome measurement was most frequently obtained before and less frequently after the intervention for cases addressing children as well as for cases addressing teachers. In the one case with parents as the target group, the outcome measurement was obtained before and after the intervention.

In the following subsections, the 31 cases contributing to Research Question 2 are described in more detail. The first subsection contains interventions targeting children, the second interventions targeting teachers, and the third intervention targeting parents. Only the effect sizes stated in the studies are reported.

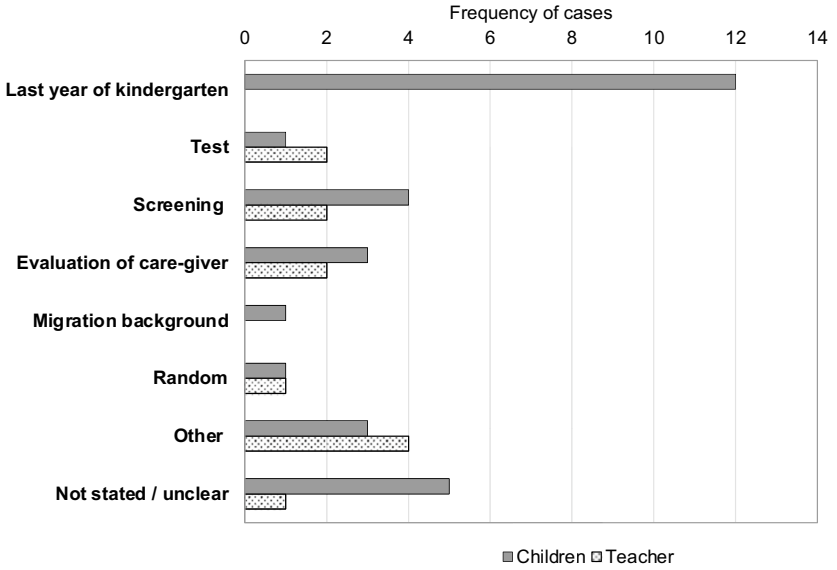

Fig. 6.2 Cases with target group children and cases with target group teachers: Sample selection of participants (multiple responses possible)

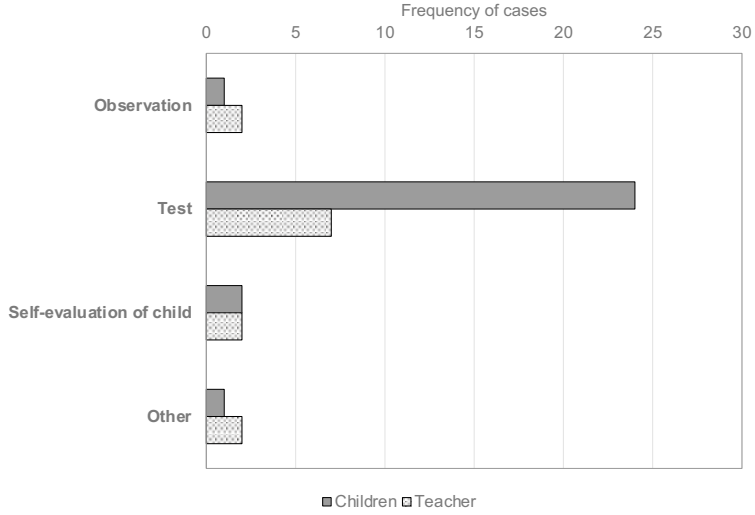

Fig. 6.3 Cases with target group children and cases with target group teachers: Data collection methods (multiple responses possible)

Table 6.1 Approach to language support of studies addressing Research Question 2, with at least one outcome on child level

	Specific coding categories							Category *Other* specified			
Study	Phonological awareness	Phonetics	Grammar	Vocabulary	Musical training	Holistic: Oral	Holistic: Written	Dialogic reading	Letter-sound association	Logographic sign system	Inductive reasoning training
Franzkowiak (2008)	X									X	
Fried (1988)		X				X					
Groth et al. (2017)			X	X		X					
Hartung (2015)[a]	X							X			
Hintz (2012)[a]									X		
Keilmann and Wintermeyer (2008)	X										
Kempert et al. (2015)	X				X				X		
Kuger et al. (2013)				X			X			X	
Marx (2006)								X			X
Noack and Brändel (2007)	X										
Pröscholdt et al. (2013)[a]	X		X								
Röhr-Sendlmeier and Krag (2007)	X								X		
Roos et al. (2010)[a,b]			X	X							
Rückert et al. (2010)[c]	X										
Schneider et al. (2000)	X								X		

(*continued*)

Table 6.1 (continued)

	Specific coding categories							Category *Other* specified			
Study	Phonological awareness	Phonetics	Grammar	Vocabulary	Musical training	Holistic: Oral	Holistic: Written	Dialogic reading	Letter-sound association	Logographic sign system	Inductive reasoning training
Schneider et al. (1997, study I)	X										
Schneider et al. (1997, study II)	X										
Schöppe et al. (2013)	X								X		
Schröder and Schründer-Lenzen (2012)			X	X		X					

[a] The studies marked with an asterisk are included in this systematic review each as two separate cases
[b] This study is also described in the section *Target group of intervention: Teachers*
[c] This study is also described in the section *Target group of intervention: Parents*

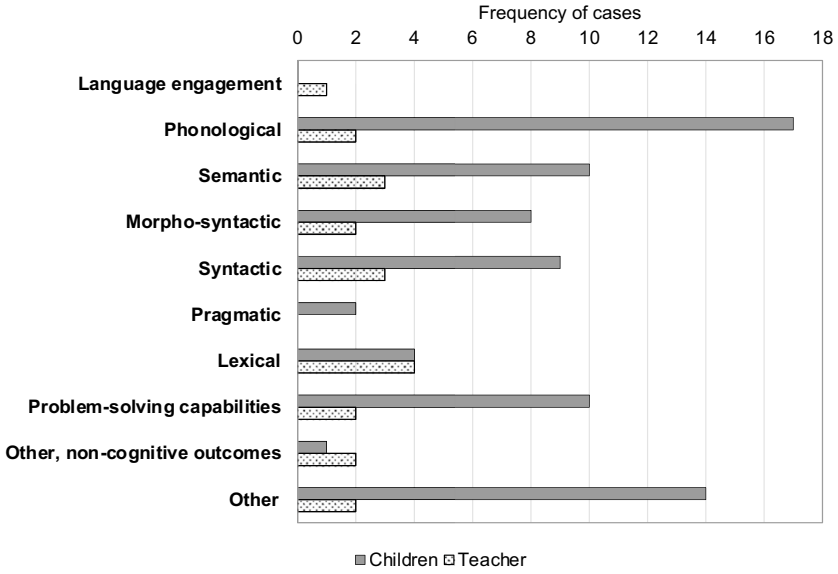

Fig. 6.4 Cases with target group children and cases with target group teachers: Target of the outcome measure (multiple responses possible)

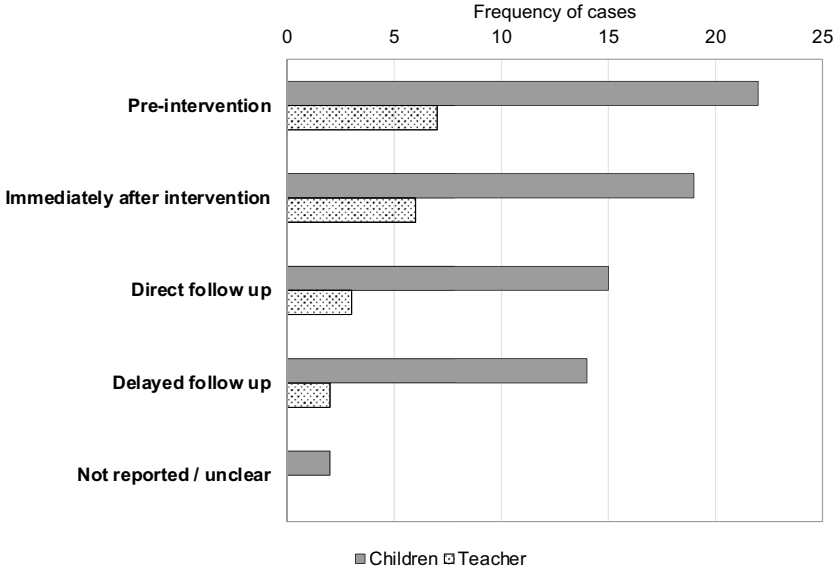

Fig. 6.5 Cases with target group children and cases with target group teachers: Time point of outcome measurement (multiple responses possible)

6.1 Interventions Targeting Children

First of all, differences between the cases providing information on an outcome on child level (step 3; 82 cases) and the sub-set of cases with a weight of evidence at least medium (step 4; 23 cases) are described.

Regarding the *approach to language support,* the number of cases markedly decreases from step 3 to 4 for those cases which were categorized as "holistic oral" (decrease by 13 cases) and "holistic written" (decrease by 5 cases). Differences on a descriptive level are also found with regard to the l*anguage targeted*. In step 4, only one case remained targeting the mother tongue as well as German, while in step 3 there were 8 cases. Cases targeting other languages are no longer found in step 4 (4 cases found in step 3). In cases at step 4 of the analysis, the intervention was provided by external trainers, teachers or intervention developers. No case was categorized as unclear while in step 3, this applied to seven cases.

Since the study design was essential for determining the weight of evidence, there are clear differences between cases included in steps 3 and 4, at this point. Specifically, studies with one group are no longer found in step 4 (22 cases were found in step 3). In step 4, the most common number of experimental groups was three (11 out of 23 cases), whereas in step 3, two groups were most frequently stated (29 out of 82 cases). Differences between steps 3 and 4 are also found regarding the *data collection methods* on child level. In step 4, all cases used tests to capture the children's skills. In step 3, this applied to about three quarters of the cases while in 20 cases, observations were used. In step 4 only 1 case used an observational method. Nearly all cases (22 of 23 cases) included in the last step used published tests. In the cases included in step 3, this applied to 62 cases out of 83. Test instruments were newly developed for the study to a similar degree in both steps, whereas the test instrument was not stated or unclear only in cases included in step 3 (13 cases).

As regards the *target of the outcome measure*, the main difference between step 3 and 4 concerns cases addressing language engagement, dropping seven cases in step 3 to none in step 4. The *time point of outcome measurement* revealed differences regarding the number of cases including a delayed follow-up (in step 4: 15 out of 23 cases, in step 3: 26 out of 82 cases). Finally, the *data analysis method* differed between step 3 und 4. All cases included in step 4 reported quantitative-inferential statistics, in step 3 this applied to 53 cases out of 82 cases. In step 4, however, no case was categorized as qualitative-narrative.

In the following subsections, the 23 cases that target children as the main level for language support in the classroom and proved to be at least of medium weight of evidence are described in more detail based on their approach to language support.

Approach to language support The metalinguistic ability of phonological awareness was the language approach most frequently chosen, while programmes aiming to promote linguistic skills in the narrower sense were rare (see Table 6.1). The second most frequent category "other" included training of letter-sound association skills, dialogic reading, learning a logographic sign system, and training of inductive reasoning skills (see Table 6.1).

Table 6.1 shows the 19 studies on which the 23 cases are based (see Chap. 4, Fig. 4.2, for the differentiation between studies and cases), which were directed at children and proved to be of at least medium weight of evidence. It is clear that in most studies not only one but several language approaches were examined, for example when a training programme was studied that included different language approaches (e.g., Groth et al., 2017 examining the effect of a holistic oral approach including grammar and vocabulary skills) or when the effectiveness of training programmes with different language approaches was compared (e.g., Pröscholdt et al., 2013 comparing the effects of a phonological awareness programme and a programme for improving language skills). The latter applied to four studies. These - cases (see Table 6.1).

In the following subsections, the 19 studies listed in Table 6.1 are described in more detail, according to the approach to language support. The first subsection contains studies in which phonological awareness was trained followed by studies focusing on phonological awareness and letter-sound association. This is followed by two subsections describing studies with more than one language approach. Finally, a study focusing on inductive reasoning and dialogic reading as well as studies dealing with educational quality processes are described.

6.1.1 Phonological Awareness

In most cases focusing on phonological awareness, the programme "*Hören lauschen lernen*" (Küspert & Schneider, 2008) or a modified version was used. The programme is designed for pre-school children in their final kindergarten year before school enrolment and focuses on both the ability to analyse and manipulate larger sound units, such as words and syllables—labelled as phonological awareness in the broader sense—as well as the ability to analyse and manipulate small sound units (phonemes)—referred to as phonological awareness in the narrower sense (Skowronek & Marx, 1989). "*Hören, Lauschen, Lernen*" is carried out by teachers in small groups of approximately six children and includes daily support sessions of 10–15 min over a period of 20 weeks. The following six consecutive content areas are treated in a playful way: (1) listening, (2) identification of rhymes,

(3) analyse and synthesize sentences and words, (4) syllable segmentation and analysis, (5) name the initial phoneme of words, (6) phoneme analysis and synthesis (sounds in the word).

Schneider et al. (1997**, study I)** analysed the effects of "*Hören, Lauschen, Lernen*" on the basis of a sample of $n = 371$ children (experiment with non-random allocation to groups; training group $n = 205$, control group $n = 166$) attending 11 different kindergarten classes in a rural area in Franconia. The study consisted of five measurement points (pre-post, follow-up, delayed follow-up, long-term). Measures of phonological awareness, phonological memory, rapid naming, letter knowledge, early reading, and nonverbal intelligence were applied in kindergarten (pre-test and post-test). At the beginning of year 1, a battery of metalinguistic skills focusing on phonological awareness in the narrower sense were assessed. Measures of reading skills and spelling skills were checked at the end of years 1 and 2 (long-term). In primary school, the sample was divided into three groups: consistently trained, inconsistently trained, and control. *Results*: The training group showed significantly higher improvement in kindergarten regarding measures of phonological awareness skills (e.g., phoneme identification task $d = 0.82$; phoneme analysis task $d = 0.88$). Long-term training effects on phonological awareness (beginning of the first year) could hardly be shown. The consistently trained children outperformed the two other groups in the first year regarding reading and spelling. No differences were found at the end of the second year.

Schneider et al. (1997**, study II)** analysed the effects of "*Hören, Lauschen, Lernen*" on the basis of a sample of $n = 346$ children (experiment with non-random allocation to groups; training group $n = 191$, control group $n = 155$). The study consisted of six measurement points (pre-post, follow-up, two delayed follow-ups, long-term). Measures of phonological awareness, phonological memory, rapid naming, letter knowledge, early reading, articulation speed, and vocabulary were tested in kindergarten (pre-test and post-test). At the beginning of year 1, a battery of metalinguistic skills focusing on phonological awareness in the narrower sense was assessed. Measures of reading skills and spelling skills were assessed at the end of year 1 and 2 (long-term). Decoding abilities were assessed at the beginning of year 2. *Results*: The training group showed significantly higher improvement in kindergarten regarding measures of phonological awareness skills (e.g., phoneme identification task $d = 1.34$; phoneme analysis task $d = 1.00$). No training effects were found for further (control) variables (e.g., vocabulary). Training effects were also found in the metalinguistic abilities assessed at the beginning of year 1 (e.g., phoneme identification task $d = 1.21$; phoneme analysis task $d = 0.79$). Moreover, the trained children outperformed the control group in years 1 and 2 regarding reading and spelling.

In a further analysis of the same dataset (**Schneider et al.**, 1998, 1999), the children were divided into three subgroups (children at risk, average abilities, above average) based on their metalinguistic abilities assessed at the first time point. The results revealed that trained children at risk outperformed untrained children at risk regarding metalinguistic abilities at the post test and regarding spelling abilities in years 1 and 2. Moreover, the comparisons of children at risk with initially average and above average children revealed that training gains were similar for all of these groups.

In the study by **Noack and Brändel** (2007) the effects of "*Hören, Lauschen, Lernen*" were analysed for a sample of $n = 124$ children (experiment with non-random allocation to groups, training group $n = 90$). The study contained two measurement points during kindergarten (5 months between pre- and post-test). Measures of phonological awareness were assessed. *Results*: The analysis of phonological awareness skills revealed that the phonologically supported children showed significantly more improvement than the control group. Training effects among children with initial low scores were comparable to those observed in the overall training group.

The study from **Keilmann and Wintermeyer** (2008) investigated the specific effects of a specialised phonological awareness training in comparison to an alternative, more general perception training on spelling and writing skills for children in the last year of kindergarten (preschool children) with a special focus on children with hearing disabilities. 109 children received the 6-month specialised training and 22 children simultaneously received the alternative training. Fifteen months before entering primary school, the children were examined for problems with their nose, ears and throat as well as for their nonverbal intelligence. During the last 6 months before entering the school, both groups received their respective training from their instructed kindergarten teachers. At the end of the first grade, 131 children were tested in their reading and writing abilities. Four subgroups (children with ear and hearing problems, children with speech and language impairments, children with reduced memory span for nonwords, children with visual perception deficits) were compared with a group of children without any of these problems. *Results:* Concerning writing abilities, no significant difference between both training modes was found. Looking at children with a history of hearing disabilities, children in the specialised training group benefited most concerning their reading abilities, in comparison to the control group.

In the doctoral thesis of **Franzkowiak** (2008), the effects of two approaches dealing with different systems of written symbols (training groups 1 and 2) and of a shortened version of "*Hören, Lauschen, Lernen*" (training group 3) were analysed. The study spans five measurement points, two during kindergarten and three

in the children's first year of school. Measures of phonological awareness and of early writing were assessed in kindergarten and measures of reading and spelling skills were assessed in school. *Results*: The analysis of phonological awareness skills in a sub-sample of $n = 90$ children (experiment with non-random allocation to groups; training group 1 $n = 29$, training group 2 $n = 34$, training group 3 $n = 27$) revealed that the phonologically supported children (training group 3) showed significantly more improvement than the other two training groups ($d = 0.94$). At the last measurement point, no significant advantages for the training groups in terms of reading and spelling skills were found, as a combined group, with a control group ($n = 38$).

Rückert et al. (2010) analysed the effects of a pre-school training programme aimed at promoting phonological awareness in children. The effects of the "*Hören-Lauschen-Lernen*" programme were compared with the effects of parent training to promote the phonological awareness of children at home and a combination of both approaches. The participating children were distributed among the three groups as follows: $n = 14$ for the parents-training group, $n = 24$ for the "*Hören-Lauschen-Lernen*"-group and $n = 14$ for the combination group. Trainings were scheduled daily, but for the parents' trainings the implementation at home varied. Child measures were taken pre- and post-training. Measures of phonological awareness and general language abilities were assessed. *Results:* all three groups showed significant and comparable growth of phonological awareness.

In the doctoral thesis of **Hartung** (2015), the effects of dialogic reading (training group 1) and of a shortened version of "*Hören, Lauschen, Lernen*" (training group 2) were analysed in a group of $n = 174$ children at riskof language impairment (experiment with non-random allocation to groups; training group 1 $n = 59$, training group 2 $n = 58$, control group $n = 57$). Before and after the intervention period (3 months) and 3 months later, the vocabulary, grammar knowledge, language comprehension, and phonological awareness of the children were recorded. *Results*: Pre-post comparisons revealed that children participating in "*Hören, Lauschen, Lernen*" showed significantly more improvement in phonological awareness than children in the dialogic reading group ($d = 0.84$) and children in the control group ($d = 0.62$). Children in the dialogic reading group showed significantly better speech comprehension than children participating in "*Hören, Lauschen, Lernen*" ($d = 0.25$) and children in the control group ($d = 0.26$). No group differences were observed 3 months after the intervention period.

In summary, the studies described in this section show that the application of versions of the programme "*Hören, Lauschen, Lernen*" leads to a short-term improvement in children's phonological awareness. Although some of these studies were carried out by the programme developers themselves, there are also studies

wherein the programme developers were not involved. Short-term training gains seem to be independent of children's initial level of phonological awareness. Long-term training effects on phonological awareness were rarely shown. In some studies, however, long-term transfer effects in the areas of reading and spelling could be demonstrated. The studies described do not allow any clear conclusions to be drawn as to whether the training of the meta-linguistic ability of phonological awareness leads to transfer effects on oral language skills. This can be explained in particular by the fact that oral language skills were seldomly assessed by studies primarily focusing on the prevention of reading and spelling difficulties.

In some studies, training of phonological awareness was combined with training of letter-sound associations. In addition, studies were conducted to test only the effectiveness of the training of letter-sound associations. These studies are described in more detail in the following subsection.

6.1.2 Phonological Awareness and Letter-Sound Association

Schneider et al. (2000) analysed the effects of phonological awareness training for children at risk regarding the acquisition of reading and spelling and furthermore investigated if an intervention programme combining phonological awareness and letter-sound associations is more effective than a purely phonological one. In a sample of 726 kindergarten children, 208 children were considered as being at risk. 138 at-risk children and 115 randomly selected children not at-risk (control group) were available for data analysis. Given $n = 138$ children, three training groups were chosen: only phonological awareness $n = 54$, phonological awareness and letter-sound associations $n = 48$, only letter-sound associations $n = 36$. The study covered five measurement points (pre- and post-test in kindergarten), where indicators for phonological awareness and memory, information processing speed, vocabulary, letter knowledge and early reading skills were assessed between the first two measurement points within a period of 5 months, the training programmes were administered by the instructed kindergarten teachers. The control group did not receive any additional training beyond the regular kindergarten programme. At the beginning of year 1, a metalinguistic transfer test was run. At the end of year 1, a nonverbal IQ test as well as reading and spelling tests were carried out. At the fifth measurement point, at the end of year 2 reading and spelling tests were conducted. *Results:* The phonological awareness group showed the significantly highest phonological awareness skills at post-test in kindergarten. Long-term training effects were more pronounced for spelling than for reading. The phonological awareness

and letter-sound associations group performed at about the same level as the control group on the spelling tests but performed significantly lower than the control group on the reading measures.

Further analyses of the same dataset by **Roth and Schneider** (2002) revealed long-term effects at the end of year 3: Children at risk who received a combined training performed at about the same level as the "normal controls".

Schöppe et al. (2013) analysed the effects of a pre-school training programme aimed at promoting phonological awareness and letter knowledge in German native speakers and immigrant children. A total of 572 children aged between 5 and 6 years participated in the study. Three groups were built according to the children's linguistic background: (1) German as mother tongue (2) German and one other language as mother tongue (3) Another language as mother tongue. The study comprised two measurement points (pre- and post-test), where language competencies, focused on phonological awareness in a broader sense, in the narrower sense and letter knowledge, were assessed. In between the two measurement points, within a period of 20 weeks, the training programme was administered. Children in the training group received a training which combined the training for phonological awareness "*Hören, lauschen, lernen*" with the letter sound training "*Hören, lauschen, lernen 2*" (Plume & Schneider, 2004). Children in the control group did not receive any additional training in phonological awareness apart from their regular kindergarten programme. *Results:* With regard to the effects of a combined training of phonological awareness and letter knowledge, the findings show that the training group has a significant performance advantage in the areas of phonological awareness in a broader sense ($d = 0.46$), phonological awareness in the narrower sense ($d = 0.90$) and letter knowledge ($d = 0.54$) in comparison to the control group. The analysis also showed that no dependence between the mother tongue and the learning effects can be detected, as both bilingual children and children with another mother tongue showed significant improvement in phonological awareness in a broader sense ($d = 0.49$ and $d = 0.56$, respectively) and phonological awareness in the narrower sense ($d = 0.50$ and $d = 1.34$, respectively) as well as letter knowledge ($d = 0.58$ and $d = 0.75$, respectively) in spite of fewer competencies in phonological awareness, grammar, vocabulary and morphology at the beginning of the study.

Further analyses of the same dataset showed significant effects of the combined programme on phonological development and on pre-school grapheme-phoneme-knowledge, but no transfer effects on any other language competencies. Significant effects of the training, held in German, for non-native German-speaking children, who showed fewer language competencies at the beginning of the study, exist (see **Schöppe et al.**, 2012).

Based on the same dataset, the analyses published by **Jäger et al.** (2012) revealed that, (1) comparisons of children with initially low, average, and advanced levels in phonological awareness revealed greater training gains for the risk group, and children at risk almost catch up with the other groups over time. Furthermore, after training, children at risk showed similar levels in phonological awareness compared to a randomly selected control group. (2) In the risk group, first language learners and second language learners showed comparable training gains. Furthermore, trained monolingual and bilingual children at risk showed a better metalinguistic performance than their untrained counterparts. The results provide clear evidence for positive training effects in children with German as a second language.

By further analyses of this dataset, **Blatter et al.** (2013) showed that the combined training programme for immigrant children has significant short-term effects for all three tested fields—phonological awareness in the broader sense and phonological awareness in the narrower sense as well as letter knowledge. Compared to German native speakers, the short-term training effect for non-native German speaking children is higher. The same study also revealed that the training has significant long-term effects for non-native German speakers regarding their spelling, reading speed and reading comprehension competencies—for German native speaking children, no long-term effects could be found.

In the doctoral thesis of **Hintz** (2012) the effects of two approaches dealing with letter-sound associations were analysed. Letter-sound associations were either trained via direct instruction using material from the "*IntraActPlus*" concept (Jansen et al., 2007; training group 1) or using the programme "*Hören lauschen lernen 2*" (training group 2). Before and after the intervention period (10 weeks), phonological awareness in the narrower sense and the letter-sound knowledge of $n = 120$ children (experiment with non-random allocation to groups; training group 1 $n = 40$, training group 2 $n = 43$, control group $n = 37$) were recorded. Children's letter sound knowledge was additionally assessed 5 weeks after the intervention. *Results*: While there were no significant group differences regarding children's phonological awareness in the narrower sense, the children in training group 1 and training group 2 showed significantly better letter-sound knowledge than the children in the control group both directly after the intervention phase ($d = 1.20$ and $d = 0.71$, respectively) and 5 weeks after the intervention phase ($d = 1.04$ and $d = 0.83$, respectively).

In the study by **Röhr-Sendlmeier and Krag** (2007)**,** the so-called "*Heifer-Methode*" (Heifer, 2004) was evaluated. The programme aims at supporting phonological awareness and letter knowledge of children in the last year of kindergarten. This is done by combing a phoneme with a specific word starting with this phoneme

and the colour matching the word (e.g., /n/ with nuts and the colour brown). The programme focusses on syllable segmentation and analysis as well as phoneme analysis and synthesis (sounds in the word) in a playful way. Phonemes are replaced bit by bit by letters, which are analysed visually (e.g., for similarities). The programme is carried out by teachers in small groups and includes weekly support sessions of 45–60 min. The "*Heifer-Methode*" was analysed drawing on a sample of n = 78 children (experiment with non-random allocation to groups; training group n = 39; groups comparable regarding cognitive abilities and social background). Data were collected at four measurement points (pre-post, follow-up, delayed follow-up) covering a period of 14 months. Measures of phonological awareness in the broader and the narrower sense were assessed as well as letter-sound knowledge. *Results*: Significant training effects could be found regarding phonological awareness in the narrower sense as well as letter knowledge.

The available studies support the short-term effectiveness of phonological awareness programmes as already described. No clear conclusions can be drawn on the question of whether fostering letter-sound association skills does have a significant impact on children's phonological awareness in the narrower sense. Moreover, also a clear conclusion regarding transfer effects on linguistic skills evoked by fostering phonological awareness and/or letter-sound association skills can hardly be drawn.

In one study, training of phonological awareness was combined with training of letter-sound associations as well as with a music training. **Kempert et al.** (2015) analysed the effects of a music training followed by a training of phonological awareness and letter-sound association on language development on the basis of a sample of n = 401 children (experiment with non-random allocation to groups). The study covered four measurement points (pre-post, follow-up, delayed follow-up) across a period of 45 months. One training group (n = 122) received a music training in the penultimate kindergarten year (regular kindergarten time for the other children). After the post-test and follow-up, the music group and a second group received a training of phonological awareness and letter sound association (n = 110; control group n = 169). Measures of phonological awareness in the broader sense and in the narrower sense as well as language abilities (phonological working memory, repeating sentences, filling gaps in sentences and plural formation) were assessed. *Results*: Analysis taking baseline abilities of phonological awareness into account, showed no significant music training effect on phonological awareness (third measurement point). Significant effects could be found for the training of phonological awareness and letter-sound association on phonological awareness. The results of this study confirm that short-term fostering of phonological awareness is possible, but apparently music training is insignificant here. Further evidence is needed to substantiate this finding.

Other studies have examined the impact of broader programmes that include more than one language approach. These studies are described in the following two subsections. The first subsection refers to studies that examined the effects of the programmes "*Deutsch für den Schulstart*" and "*Kon-Lab"* and the second subsection looks at studies that examined the effects of programmes for the training of German as a second language.

6.1.3 Programmes Including More Than One Language Approach: "Deutsch für den Schulstart" and "Kon-Lab"

The programme "*Kon-Lab"* (Penner, 2003) was used in two studies (Pröscholdt et al., 2013; Roos et al., 2010). The programme aims at improving language skills of children with an immigrant background based on 40 modules spanning 40 weeks for three levels of language development. On the first level, children learn to deduce words and to understand and apply the rules of language rhythm by plural and composite words. The second level focuses on grammar and children are introduced to the basic rules of sentence construction. Sentences are spoken and repeated in a ritual with the children. The third module focuses on language comprehension by applying the acquired knowledge in concrete conversations, for example by asking questions or talking about quantity relations.

In the study by **Pröscholdt et al.** (2013) the effects of the combination of the programmes "*Kon-Lab"*, "*Hören, lauschen, lernen*" (HLL 1), and "*Hören, lauschen, lernen 2*" (HLL 2) were analysed for a sample of $n = 439$ kindergarten children with an immigrant background. Two training groups and one control group were allocated per kindergarten. Training group 1 (Kon-Lab and HLL 1 + 2 sucessively) $n = 138$; training group 2 (Kon-Lab and HLL 1 + 2 merged) $n = 147$; control group (only HLL 1 + 2; significantly fewer children with immigrant background) $n = 154$. Data were collected at three points in time. At the first time-point, phonological awareness in the broader sense was assessed. Additionally, questionnaires for the parents and pedagogical staff were handed out in order to generate knowledge about immigration and language background. At the second (after 11 months) and the third (after another 6 months) time-points, tests for phonological awareness in the broader and the narrower sense as well as letter knowledge were administered. *Results:* Although all three groups show significant improvement, the "Kon-Lab" training programme in addition to HLL 1 + 2 did not have an effect on phonological awareness, letter knowledge and language skills regardless of the immigrant background, no matter if the Kon-Lab and HLL 1 + 2 were merged or applied successively.

The programme "*Deutsch für den Schulstart*" (**Kaltenbacher & Klages**, 2008) targets children whose language skills in the last year of kindergarten are not sufficient to successfully cope with school demands. This applies in particular to children from immigrant backgrounds and to children from educationally disadvantaged families who receive only a limited and thus insufficient language input. The language programme is designed for children aged between 5 and 6 years. It comprises a total of 180 h of support which are given during the last kindergarten year. In kindergarten, the daily 1-h support should take place in small groups of up to six children**.** The curriculum contains five parts: Three parts specifically aim to improve linguistic skills (vocabulary, grammar and text), while two parts aim to train phonological awareness and basic mathematical skills. The language programme contains 400 games which cover all five parts.

In the study by **Roos et al.** (2010) the effects of the "*Kon-Lab*" and the "*Deutsch für den Schulstart*" programmes were analysed based on a quasi-experiment with a pre-test as well as a post-test in the last year of kindergarten and assessments in year 1 and 2. The two training groups of $n = 111$ (Kon-lab) and $n = 57$ (Deutsch für den Schulstart) children at risk of language impairment was compared to three other groups: children at risk of language impairment trained with another specific programme ($n = 41$) or without specific support ($n = 82$), and children without risk of language impairment ($n = 199$). Measures of language comprehension, grammar, semantic, and phonological working memory were assessed in kindergarten, reading and spelling skills were assessed at school. *Results*: No significant training effects were found in any of the groups with risk of language impairment in kindergarten. Moreover, the differences between trained children at risk and children without risk of language impairment remained. With regard to school achievement, no effects could be detected.

In summary, the studies described in this subsection could not substantiate any effects of the programmes "*Deutsch für den Schulstart"* and "*Kon-Lab*".

6.1.4 Programmes with More Than One Language Approach: Training German as a Second Language

Schröder and Schründer-Lenzen (2012) analysed the effects of a targeted optimisation of the process quality of activities to train German as a second language, which were implemented on the basis of officially prescribed materials and recommendations. The optimization addressed language training by an external trainer in separate rooms and in small groups with up to six children. The study realised four measurement points, two during kindergarten and two in the children's first year of

school. Pragmatic-communicative and semantic-lexical competencies were assessed at the beginning and end of the last kindergarten year and in the middle of the children's first school year. At the end of the children's first school year, measures of reading, spelling and non-verbal intelligence were recorded. *Results*: The analysis of pragmatic-communicative and semantic-lexical competencies in a sample of $n = 106$ children (experiment with non-random allocation to groups; training group $n = 48$, control group $n = 58$) showed that the proportion of children with language support needs was significantly lower in the training group both at the end of the last kindergarten year ($d = 0.75$) and in the middle of the first school year ($d = 1.13$) than in the control group. At the last measurement point, another control group ($n = 35$) of children who had been in the same class with the children of the other two groups since school enrolment was included. The children in the training group showed significantly better reading and spelling performance than the children in the control groups, whereas no significant differences in performance were observed between the children in the two control groups.

In the study by **Groth et al.** (2017)**,** effects of an additive approach of training German as a second language ("KIKUS", see Garlin, 2008) were evaluated studying a sample of $n = 72$ children (experiment with non-random allocation to groups; training group $n = 36$, control group $n = 36$). Before and after the intervention period (7 months) and 7 months later, language production and comprehension as well as the encoding of semantic relations, morphological rule formation, and phonological memory of the children were recorded. *Results*: Significant differences between intervention and control group could not be found on language production and comprehension scores. With regard to phonological working memory, the children in the intervention group showed a significantly higher increase in performance over the three measurement points compared to the control group.

Taken together, the studies described in this subsection do not allow for any clear conclusions on the effectiveness of approaches to train German as a second language.

Another study investigated the effects of inductive reasoning and dialogic reading training. This study is described in the following subsection.

6.1.5 Inductive Reasoning and Dialogic Reading Training

In the study by **Marx** (2006), effects of an inductive reasoning training (training group 1) and of a dialogic reading programme (training group 2) were analysed given a sample of $n = 18$ children (experiment with non-random allocation to groups; training group 1 $n = 6$, training group 2 $n = 6$, control group $n = 6$). Before

and after the intervention period (6 weeks) and 12 weeks later, syntactic, morphological and semantic competencies as well as nonverbal intelligence of the children were recorded. *Results*: While there were no significant differences between the two training groups in terms of syntactic, morphological and semantic competencies, the children in training group 1 and training group 2 showed significantly better morphological ($d = 1.32$ and $d = 0.73$, respectively) and syntactic competencies ($d = 1.08$ and $d = 1.08$, respectively) than the children in the control group directly after the intervention. Twelve weeks after the intervention phase, the children in training group 1 and training group 2 showed significantly better morphological ($d = 1.63$ and $d = 1.39$, respectively) and semantic competencies ($d = 2.18$ and $d = 2.88$, respectively) than the children in the control group.

The results of this study suggest that both an inductive reasoning training and a dialogic reading programme lead to improvements in children's linguistic competencies. Further evidence is needed to substantiate this finding.

Two studies did not examine the effects of a specific language support programme, but rather the effects of educational quality processes in preschool settings. A short description of these studies is given below.

6.1.6 Educational Process Quality

The study by **Kuger et al.** (2013) investigated the educational quality of processes in pre-school settings on the classroom level as well as on the individual child level. It also addressed their longitudinal relations as well as the outcome on later literacy skills. Based on the BiKS-3–10 study, data from a subsample of $n = 45$ preschool children were analysed from the beginning of preschool until the end of the second year. The study covered four annual measurement points. Within the first 3 years, two different quality assessments were conducted through live rating observations. Three months prior to each, quality observations of the children's language development were assessed. At the end of the second school year (last measurement point), reading comprehension was tested. *Results:* Both levels of measurement were found to predict reading literacy in primary school independently of each other but even better when the two measures were combined.

In the study by **Fried** (1988)**,** the effects of a phoneme training were analysed based on a sample of $n = 91$ children (experiment with non-random allocation to groups). The study comprised three measurement points (pre, follow-up, delayed follow-up). One training group ($n = 31$) received the phoneme training, a second training group ($n = 31$) the same training and additionally a parent coaching (regular kindergarten time for the third group $n = 29$). The ability to form phonemes was

assessed at child level. Moreover, the engagement and the teacher input of the $n = 17$ preschool teachers were assessed. *Results*: Children taught by preschool teachers with high engagement and input improved significantly more than children taught by preschool teachers with low engagement and input.

To sum up, the results of these studies suggest that the educational quality of processes in preschool settings has an impact on children's reading literacy in primary school. Further evidence is necessary to substantiate this finding.

The following section provides further information on the 23 cases that target children as the main level of language support and that proved to be at least of medium weight of evidence.

The 23 cases were mainly locally implemented interventions (15 cases). They all intended to improve children's German language skills, and one case additionally addressed the children's non-German mother tongue. In addition to targeting the children, one case targeted parents. Interventions were typically pre-structured and implemented by the programme developer (16 cases). Only two cases used an unstructured intervention, and in 5 cases the interventions were pre-structured by someone other than the implementing team. The intervention was either provided by teachers (12 cases), external trainers (7 cases), or the programme developers (4 cases).

The duration of interventions ranged from a few weeks to several years. A heterogeneous picture also emerges with regard to length of intervention, which spanned between 5 and 10 minutes and one hour. The frequency of interventions ranged from daily to once a week.

All cases applied an experimental design with 5 cases allocating subjects randomly and 18 cases sorting them into experimental groups in a non-random fashion. In 7 cases, two experimental groups were compared, in 11 cases three different groups and in 4 cases four or more different groups. In most cases children in the treatment group were compared with a comparison group (19 cases), in three cases, a waiting group was included, and in 11 cases, another type of control group. With one exception, cases included an assessment prior to the intervention. 18 cases included a post-test immediately after the intervention, 15 cases performed a direct follow-up, and 14 cases included a delayed-follow-up assessment. In 7 cases, the follow-up assessments included school achievement tests. Table 6.2 illustrates these results for the 19 studies the 23 cases refer to.

Data collection of the 23 casestook place between 1991 and 2014. The cases predominantly included children in their last year of ECEC (12 cases). In 4 cases, children were sampled based on a screening tool and in 3 cases, sampling relied on the teacher's opinion on who should be included in the study. In one case each, the children were selected on the basis of a detailed language assessment, their

Table 6.2 Time points of outcome measure for interventions targeting children, report with at least medium weight of evidence

Study	Pre-intervention	Immediately after intervention	Direct follow-up	Delayed follow-up	Not reported/ unclear	School achievements recorded
Franzkowiak (2008)	X	X	X	X		X
Fried (1988)	X		X	X		
Groth et al. (2017)	X		X	X		
Hartung (2015)[a]	X	X	X	X		
Hintz (2012)[a]	X	X	X			
Keilmann and Wintermeyer (2008)	X			X		
Kempert et al. (2015)	X	X	X	X		
Kuger et al. (2013)	X	X	X	X		X
Marx (2006)	X	X	X			
Noack and Brändel (2007)	X	X				
Pröscholdt et al. (2013)[a]	X	X	X		X	
Röhr-Sendlmeier and Krag (2007)	X	X	X	X		
Roos et al. (2010)[a,b]	X	X		X		X
Rückert et al. (2010)[c]	X	X				
Schneider et al. (2000)	X	X	X	X		X
Schneider et al. (1997, study I)	X	X	X	X		X
Schneider et al. (1997, study II)	X	X	X	X		X
Schöppe et al. (2013)	X	X		X		
Schröder and Schründer-Lenzen (2012)		X	X	X	X	X

[a]The studies marked with an asterisk are included in this systematic review as two separate cases each
[b]This study is also described in the section *Target group of intervention: Teachers*
[c]This study is also described in the section *Target group of intervention: Parents*

immigrant background or at random. In 3 cases other sampling strategies were used, e.g., the inclusion of children in their penultimate year of ECEC. Moreover, for 5 cases, no sampling strategy could be determined. The final sample size was included in 22 of 23 cases, with the samples ranging from 18 to 726 participants.

In all cases, the dependent variables were measured via tests. Moreover, in two cases, subjective measures (e.g., self-evaluations) and in one case, observation measures were included to assess a dependent variable. Typically, published tests were used (22 cases). In 9 cases, the evaluation team included a measure that was newly developed. In 17 of the 23 cases included in this step of reporting, phonological competencies were measured. In 10 cases each, semantic or problem-solving capabilities were assessed, and in 9 cases a measure to assess children's syntactic skills was applied. In 8 cases morpho-syntactic skills were assessed, in 4 cases lexical skills, and in 2 cases pragmatic language competencies. Only one case included non-cognitive outcomes. Moreover, in 14 cases, outcome measures applied were allocated to the "other" category. These measures focused on reading and writing skills, naming speed, phonological working memory, or letter knowledge. Table 6.3 illustrates these findings for the 19 studies on which the 23 cases are based.

In all cases, inferential quantitative analysis procedures were used. While in most cases the analyses concentrated on overall results (21 cases), in 9 cases analyses of differential effects for particular subgroups were also included. These subgroups were based on intensity of support, children's language proficiency, or their cultural background (immigrant vs. autochthonous children).

Based on the consideration of cases with at least medium weight of evidence that target children, the following conclusions can be drawn:

(a) Substantial short-term effects of language support at the child level can only be found for the meta-linguistic ability of phonological awareness (reported effect sizes range from $d = 0.62$ to 1.34). This conclusion is in line with the results reported in the meta-analysis of Fischer and Pfost (2015) as well as Wolf et al. (2016), both only focusing on the effectiveness of phonological awareness trainings. However, although almost all studies that focus on phonological awareness which are included in the present review are also recorded by both meta-analyses, the range of effect sizes is above the mean effect size reported in the meta-analysis (Fischer & Pfost, 2015: $d = 0.36$; Wolf et al., 2016: $g = 0.60$). This difference is likely due to different study-inclusion criteria, i.e., the inclusion of cases to the meta-analyses which were excluded in the last step of the present review due to lower than medium weight of evidence. Long-term training effects on phonological awareness were, however,

Table 6.3 Target of outcome measure for interventions targeting children, report with at least medium weight of evidence

Study	Phonological	Semantic	Morpho-syntactic	Syntactic	Pragmatic	Lexical	Problem-solving capabilities	Other, non-cognitive outcomes	Other
Franzkowiak (2008)	X								X
Fried (1988)	X								
Groth et al. (2017)			X	X		X			
Hartung (2015)[a]	X	X	X	X	X	X	X		
Hintz (2012)[a]	X								X
Keilmann and Wintermeyer (2008)									X
Kempert et al. (2015)			X	X			X	X	
Kuger et al. (2013)						X			X
Marx (2006)		X	X	X					
Noack and Brändel (2007)	X								X
Pröscholdt et al. (2013)[a]	X	X	X	X			X		X
Röhr-Sendlmeier and Krag (2007)	X								X
Roos et al. (2010)[a,b]		X	X	X			X		X
Rückert et al. (2010)[c]	X								X
Schneider et al. (2000)	X	X					X		X
Schneider et al. (1997, study I)	X						X		X

Schneider et al. (1997, study II)	X	X					X		X
Schöppe et al. (2013)	X	X							X
Schröder and Schründer-Lenzen (2012)				X		X			

[a] The studies marked with an asterisk are included in this systematic review as two separate cases each
[b] This study is also described in the section *Target group of intervention: Teachers*
[c] This study is also described in the section *Target group of intervention: Parents*

rarely demonstrated. Some cases revealed long-term transfer effects in the areas of reading and spelling. The cases described above do not allow for any clear conclusions as to whether the training of the meta-linguistic ability of phonological awareness leads to transfer effects on oral-language skills.

(b) Since a systematic variation of the conditions (e.g., instructor of the interventions, duration of the intervention, inconsistently vs. consistently trained) has not been tested in multiple cases, a conclusion regarding the question of conditions under which interventions are most effective cannot be drawn.

(c) The question of for which groups of children the interventions are most effective can hardly be answered. In most cases the intervention targets an unselected sample which was not further divided into subsamples (e.g., children at risk, children with German as second language). In the few cases where the sample was further divided, no differential effects were reported.

6.2 Interventions Targeting Teachers

Only seven cases that target teachers/carers as the main lever for language support in the classroom proved to be of at least of medium weight of evidence. These are given in Table 6.4 and specified in the following paragraphs. In addition to targeting certain domains of children's language development, all studies targeted other (teacher level) goals such as general knowledge about the language curriculum in early childhood education, typical or a-typical language development, developmental delays and possible reasons or strategies for language support. At child level, additional targets were e.g., children's engagement and enjoyment in oral interactions.

The first study by **Beller et al.** (2007) implemented a teacher training approach to language support in selected settings in Berlin. The rate of children with an immigrant background and the setting's history with deficient results in language assessments were criteria for selection. The target group of the intervention included children between their first and fourth birthday (aged 1–3 years). The intervention was implemented as a teacher training and supervision experiment with random allocation to experimental groups. 31 teachers and 155 children participated in the study. The intervention group contained 18 teachers and 88 target children in 13 classrooms (target children of the intervention were about half of all children in these classrooms). The remaining 13 teachers and 67 children were part of the control group. Across both experimental groups, only 57 children were already (at least) 3 years old (M = 38.07 months; SD = 3.85).

Table 6.4 Interventions with target group teachers addressing Research Question 2 and with at least medium weight of evidence

Study	Phonological awareness	Phonetics	Grammar	Vocabulary	Musical training	Sensory-motor training	Holistic: Oral	Holistic: Written	Other	Unclear
Beller et al. (2007)							X		X	
Beckerle et al. (2016)							X		X	
Kammermeyer et al. (2015)							X	X	X	
Roos et al. (2010)[a]							X		X	
Schütz (2015)			X	X			X		X	
Simon and Sachse (2013)							X		X	
Wolf et al. (2011)				X			X		X	

Note: This table includes the seven cases with a least medium weight of evidence that report about studies targeting teachers. Labels refer to the citation for the main text for each case

[a] This study is also described in the section Target group of intervention: Children

The intervention consisted of a not pre-structured teacher training that aimed at training teachers to increase the quality of their everyday integrated language support in classrooms. Instruction and feedback were delivered during weekly visits to the classrooms for 20 succeeding weeks between autumn 2004 and summer 2005. The visiting language specialists were well-trained research assistants (post-graduation student assistants or doctoral students) who stayed for a whole morning ("breakfast until lunch") and worked with the teachers during their regular classroom activities. The control group received no particular treatment.

Several measures were applied to test the programme's effectiveness. Videos documented daily interactions in the classrooms and pre-post comparisons tested teachers in the intervention group to provide better language support than staff in the comparison group. Between pre- and post-assessments 8 months passed on average, of which 6 months were spent on intervention measures. During this time, children in the control group increased their language competencies by about 9 months (measured via Kuno Beller's "Entwicklungstabelle", a published teacher self-report on children's general developmental status), while children in the intervention group increased their scores by about 13 months. Younger children displayed greater gains than older children. Results on further developmental measures are available for younger children but not for 3-year-olds. Subgroup analyses revealed no significant interaction effects for children with immigrant background, but a three-way interaction effect of intervention group, age and migration, more precisely ethnic, background. Older children with a Turkish or Arabic background display a greater skill gap in the pre-test measure that decreases during the intervention phase, although the gap does not fully close.

A second report refers to the Fellbach Study by **Beckerle et al.** (2016), an intervention concept that was implemented in the city of Fellbach in Baden-Württemberg. The two-group experimental design compared an experimental group with a waiting group. The experimental group comprised 14 teachers (eight ECEC carers and six primary school teachers) who cared for 120 children in the ECEC classrooms (in two settings and two primary schools). Six teachers (four ECEC care-givers and two primary school teachers) in one ECEC setting and one primary school with their 54 children were included in the waiting group. Settings and carers were selected following professional recommendation and allocated to groups in a double-blind procedure.

The intervention was designed as an ongoing initiative that incorporated ECEC settings and the primary schools to which children changed after attending ECEC. ECEC and primary school teachers attended nine training sessions lasting four hours each during one school year. The modules included theoretical sessions on children's language development, integrated language support, language

diagnostics, strategic planning and preparation of language support measures, and working with parents. Three subsequent coaching sessions per teacher were also included, each tailored to individual request and needs. Language support strategies that were explicitly taught are corrective feedback, modelling and extending, as well as stimulation (e.g., via open-ended questions, think-aloud and talk along).

Results on the interventions' effectiveness were derived from video observations, knowledge and educational beliefs, as well as children language screening and assessments. The design comprised a pre-test in autumn 2010 prior to starting the training sessions, a second measurement point in the summer of 2011 immediately after the intervention and a follow-up assessment of children's language competencies in winter 2011. One screening instrument (Heidelberger Auditives Screening in der Einschulungsuntersuchung HASE) and subtests of a published test ("Sprachentwicklungstest für drei- bis fünfjährige Kinder" SETK 3–5) were used to assess children's language skills (resp. "at-risk" status) in auditive working memory and language processing, receptive and productive language processing. Results of analyses of variance including repeated measurements revealed small effects in the intended direction. The found effect in the overall analyses (time x group) is about as strong ($Eta^2 = .095$) as that of the interaction effect contrasting children with low and medium to high language skills ($Eta^2 = .093$). According to the authors, these effects seem particularly promising because video observations also confirm a significant increase in ECEC teachers' supporting language behaviour. Yet, the study does not provide any evidence on lasting effects on teacher behaviour or on possible in-direct or delayed effects on language development that might follow—long-term changes in teacher behaviour.

Kammermeyer et al. (2015) compared three different approaches that each included a component of a teacher training and compared them to a control group who had not received any particular training. For this study, 397 children aged 5 and 6 years in 25 settings were included in one of the four experimental groups. The intervention programmes were drafted from well documented-intervention approaches, "the pyramid approach" (36 teachers, 95 children), "the letter and number world approach" (26 teachers, 100 children), and "the kindergarten of the future in Bavaria" (26 teachers, 114 children); the control group (28 teachers, 88 children) received no treatment at all. Comparability of participants in their language competencies prior to the intervention was ascertained with very small deviations, but there were marked differences in sample composition. This was in part because children in the condition "pyramide" were sampled from particular settings with a selected intake of children.

The treatments included different degrees of teacher training and also varied along their degree of domain-specifity and pre-structuredness of activities carried

out with children. Teachers in the pyramid approach finished a programme-specific certification course, those in the two other conditions received a 2-day training. Teachers in each condition received different materials to use in their everyday work with children. The intervention thus compared an integrated holistic approach (pyramid) with a domain-specific training programme focusing on literacy and numeracy (letter and number world) and a domain-specific Developmentally Appropriate Approach focusing on literacy and numeracy (Kindergarten of the Future). The data collection was between 2011 and 2012 but there is no information on how intensively teachers interacted with the children between the two assessments (intervention dosage).

Assessments via published tests on phonological skills, lexical competencies and problem-solving capabilities (and numerical outcomes not reported here) prior to and immediately after the intervention phase were used to confirm intervention effectiveness (wortgewandt und zahlenstark; CPM). After controlling for critical differences in children's family backgrounds, the results of repeated measurement ANCOVAS showed that children from all three intervention groups outperformed their peers in the control group on tests of phonological awareness (and numeracy), but the effect size was very small ($Eta^2 = .027$). Results on lexical competencies were not reported. No further differences between approaches could be determined.

One of the studies by **Roos et al.** (2010) was included previously because it compared two intervention groups targeting children with one that focused on a teacher training and a fourth group of children in a control group. In this section we report on the results that concentrate on the teacher training. The quasi-experiment consisted of a pre-post-test design implemented during the last year of kindergarten. Follow up assessments were conducted in year 1 and 2 (long term). The teacher training "Tracy" was administered to seven teachers of 40 children at risk for language impairment in the study.

The teacher training was pre-structured by the developer who was not involved in this evaluation. After the training, teachers organised regular classroom activities and thus implement the newly acquired language support strategies with great degrees of freedom. This integrated, holistic approach is aimed at fostering children's oral German language skills.

Measures of language comprehension, grammar, semantic and working memory were assessed in kindergarten (HSET, CPM); measures of reading and spelling skills were assessed at school age (ELFE 1–6, WLLP, HSP, DEMAT 2+). Results revealed no significant training effects between the different intervention groups. Moreover, the differences between trained children at risk and children without risk of language impairment remained. Also, later assessments with school performance tests displayed no intervention effects.

A well-known programme in the Netherlands was adapted for the German context and evaluated by **Schütz** (2015). The evaluation of "Language Route" sampled children in six larger settings in Cologne. At least 60% of children in these settings had an immigrant background. Three settings each were selected into the treatment and the control group. All 444 children in these six settings were screened for risk of language impairment with a focus on vocabulary, applying two measures of active/productive vocabulary skills, (sub-)tests of the "Aktiver Wortschatztest—Revision" (AWST-R) and the test "Patholinguistische Diagnostik bei Sprachentwicklungsstörungen" (PDSS). Below-average test scores ($T < 50$) were used to divide children into three proficiency levels in the control and the treatment group: above average, slightly below average, and at-risk. There is data for pre- and post-assessments of 94 children in the treatment group and 86 children in the control group.

The overarching goal of the teacher training in Language Route is to increase (the quality of) teacher integrated verbal interactions during every day play scenarios. Five bi-weekly pre-structured half-day trainings cover interactive language support, interactive reading, talking with children, working with vocabulary as well as digital media and involving parents. In addition to these training sessions, certified language trainers spend 6 days in the settings to provide direct (video) feedback to the teachers and to answer their questions. Children with the lowest language scores in control settings received an alternative language support in a pull-out programme which is not specified.

The evaluation relies on repeated measurement ANOVAs using tests results of the two measures of vocabulary that were used for the first screening (AWST-R and PDSS). All children show increased language skills after the year of intervention. ANOVAs of children in the treatment groups and those children in the control group with lowest test scores, i.e., those that received language support in a pull-out programme, vs children not at risk of language impairment in the control group showed small positive effects for the mixture of programmes ($Eta^2 = 0.03$). Subgroup analyses furthermore hint at particularly positive effects in one of the treatment settings, bigger effects for monolingual than for bilingual children, and slightly better results for bilingual children in the treatment group with lowest test scores at t1 (vs those with slightly below-average test scores). Interestingly, this result for bilingual at-risk children is also evident in the control group.

One of the more outstanding teacher trainings was reported in several documents and evaluated in at least three different intervention studies. A study conducted in the federal state of Hesse, reported in **Simon and Sachse** (2013), reached medium weight of evidence. The intervention "Heidelberger Trainingsprogramm", was used in a teacher training of 25 subjects, with 22 in a control group. Data of 34 people (across the two groups) is available across pre-, post- and follow-up test.

Children in these groups underwent a first screening procedure that applied a parent check list (testing for morpho-syntactic skills). After a median split in the checklist results, the children with relatively lower skills then received a second screening by teachers testing sentence repetition (subtest of the HASE-test battery). Children with substandard results were then defined as "children at risk of language impairment". For the purpose of the study, a maximum of three children were chosen (by chance) for each teacher group. All in all, there were 77 at-risk children in the training groups and 69 at-risk children in the control group. Due to drop-out, there is data for 146 children in the pre-, 135 children in the post- and 117 children in the follow-up test.

The intervention phase was run between the pre-test in February and post-test in May 2008, follow-up assessments followed in November 2008. Intervention sessions in the Heidelberger training included five highly pre-structured full-day monthly training sessions in groups with up to 15 teachers. A final session followed about 3 months after the last training day. The training was developed by members of the study team and applied a holistic approach to foster children's oral German language skills. Teachers in both the experimental and the control group were encouraged to interact with target children for at least 10 min per day to balance the treatment between both groups.

The evaluation is based on a number of different language and behaviour outcomes on the teacher and child level. and children's language interactions were video-taped to assess teachers' language stimulation and children's language engagement. Teachers furthermore answered questionnaires about their background, satisfaction with the training, and educational beliefs. Children's competencies were assessed regarding semantics, vocabulary and grammar skills, phonological working memory, language comprehension and non-verbal intelligence (SETK, AWST-R, HSET, TROG-D, CPM, teacher ratings). Results were most pronounced for children's language engagement in everyday interactions. Teachers in the experimental group used more stimulation strategies resulting in children's higher—and until the follow-up test continuingly rising—language involvement. Overall analyses of both design groups revealed parallel age-conform language development during the months of the study and no intervention effects. But subgroup analyses displayed the biggest improvements for children with the lowest language proficiency level at t1 in the experimental group regarding subtests for semantics and vocabulary.

Finally, a study by **Wolf et al.** (2011) evaluated a programme that was implemented in all settings in Brandenburg starting in the kindergarten year 2009/10. The study started in autumn 2008 and recruited all settings ($n_{ST} = 23$) that had not yet received a training (control group) as well as a convenience sampling of settings

(n_{SC} = 15) where teachers had already participated in the training (treatment group). Within these settings, all children in their final year of ECEC underwent language testing (N_c = 709). A total of n_{CC} = 136 children in control settings were identified as being at risk of language impairment and then matched with n_{CT} = 136 randomly chosen children in treatment settings. Post-test and follow-up assessments included n_{CT} = 99 and n_{CT} = 63 children with treatment and n_{CC} = 136 and n_{CC} = 99 control children without treatment.

The implemented programme "Handlung und Sprache" ("action and language") targets children with delayed language development that is likely to result from poor language context conditions, it does not aim at logopaedic problems. In highly pre-structured sessions, the programme aims at fostering children's productive vocabulary, language processing and language production as well as reducing children's inhibition to engage in verbal interactions. Theoretical foundations for the intervention programme are the dialogic co-constructive nature of language acquisition and natural mothers. Teachers are to implement the daily training sessions during a period of 12–14 weeks in their settings (each lasting about 20 min each). In order to prepare ECEC teachers for this task, they receive an extensive training spanning eleven full days that includes components of language development, diagnostics, modelling techniques as well as the intervention programme in detail.

Language screening to identify children at risk in this study applied the "Kindersprachtest für das Einschulalter" (KISTE), this measure was also used to evaluate training effects after 9 months at the end of the final year in ECEC. During the follow-up assessment at the end of the first year, the children were tested regarding their decoding skills (Würzburger leise Leseprobe; WLLP) and listening comprehension skills (Knuspel-L). The two experimental groups were found to differ with regard to children's language skills at t1 and their socio-economic background, subsequent analyses control for this selection bias. At t2 children in the treatment group significantly outperformed those in the control group in "sentence building" (Eta^2 = .06), but not significantly in the measure of productive vocabulary (Eta^2 = .02). There was no intervention-related difference in children's decoding skills in results of the follow-up test but children in the control group revealed lower listening comprehension skills even after controlling for language at t1 and family background (Eta^2 = .05). The study does not mention results on subgroup analysis.

To sum up, the seven interventions with at least medium weight of evidence presented above are mainly implemented locally (3 cases; 43%) or regionally. Only one case included settings from three different regions across Germany. Ultimately, all interventions intend to increase children's German-language skills. Yet, there is a continuum as to where authors put their emphasis of work and how they intend to

reach their goals. All studies target teachers in the classroom and use teacher trainings and/or supervision as a means to increase professional behaviour with a special focus on language support skills. On one end of the continuum, most cases (six), more pronouncedly emphasized professional behaviour or referred to a theoretical background in teacher professionalism. The seventh case, at the other end of the continuum, exclusively concentrated on children and trained teachers not primarily to professionalise them but solely as a means to improve children's language proficiency. As such, the studies somewhat differ in whether they isolate children and target change in their language proficiency or whether they take a broader approach to foster improvement in the ECEC system in general.

Interventions were typically highly structured and implemented by a programme developer (4 cases each; 57%). Only one case used an unstructured intervention, in two cases (29%) the interventions were pre-structured by someone other than the implementing team. In one case each (14%), the intervention was implemented by external trainers, teachers or other providers. In one case, there were additional providers. All seven cases focused on holistic oral language support. Two of the studies each (28%) combined this overarching goal with a component of vocabulary training or yet other approaches. One case each (14%) also included a grammar training or a holistic approach to fostering children's written language skills.

All cases report on substantial time spent on teacher trainings and supervisions. In detail, there are: "20 weeks with weekly on-site visits", "five training [sessions] within a six-to-eight-month period", "nine training [sessions] in a school year", "a two-day training combined with full-time additional extra-qualified staff", "between 2 and 14 days of training and home visits within half a year" or "five full-day training [sessions] in eight weeks combined with six coaching sessions in the following year". In one case, the additional additive programme implemented in the classroom consisted of daily 20-min sessions throughout half of a school year. The seven cases included in this step of reporting were carried out between 2004 and 2011.

All cases used an experimental design with four cases allocating subjects non-randomly and three cases sorting them to experimental groups by random. Five studies (71%) compared two experimental groups each, two of the cases report on four or more different groups (29%). Most cases compared children in the treatment group to a comparison group (5 cases), two cases each included a waiting group or another type of control group. All cases included an assessment pre-intervention (Table 6.5) and all but one included a post-test immediately after the intervention. Three cases' designs included a direct follow up, and two designs had a delayed follow up assessment.

Table 6.5 Time-points of outcome assessment for interventions with target group teachers, at least one outcome on child level and at least medium weight of evidence

Cases	Pre-intervention	Immediately after intervention	Direct follow-up	Delayed follow-up	Not reported/ unclear	School achievements recorded
Beller et al. (2007)	X		X			
Beckerle et al. (2016)	X	X	X			
Kammermeyer et al. (2015)	X	X				
Roos et al. (2010)[a]	X	X	X			
Schütz (2015)	X	X				
Simon and Sachse (2013)	X	X	X			
Wolf et al. (2011)	X	X	X			

Note: This table includes the seven cases with a least medium weight of evidence that report about studies targeting teachers Labels refer to the citation for the main text for each case

[a] This study is also described in the section *Target group of intervention: Children*

Reports on sampling strategies are diverse, since all these studies include a sampling procedure at setting level and sometimes also a sampling at child level. Two cases each sampled children based on language assessments, on language screening instruments or based on the teachers' own best judgement. One case each had a random sample or did not provide enough information to derive a clear coding category in this item. Four cases applied yet another sampling strategy (mainly convenience samples of "co-operating" settings). Sample sizes used in the final analyses (post-test or follow-up) are "31 teachers and 155 target children", "34 teachers and 117 children", "20 ECEC teachers and primary school teachers with 174 children", "36 teachers with 397 children", "325 children in 30 settings in one of the three intervention groups", "180 children [no details about teachers]" and "162 children [no details about teachers]".

All studies applied outcome measures at child level (Table 6.6), but three studies additionally included outcome measures at teacher level. Measures included published tests in all cases as well as observations, self-evaluations and other measures in two cases each. In one case, the evaluation team included a measure that was newly developed for this study. All types of outcomes coded in this report were included in at least one study: Four cases applied a measure to assess children's lexical skills and three cases each assessed semantic or syntactic skills. Two cases each assessed phonological or morpho-syntactic skills, problem-solving capabilities, non-cognitive or yet other outcomes. Only one included a measure to quantify language engagement.

Outcomes were typically evaluated based on analyses of variance with repeated measures. Most cases included control variables in their final model and therefore controlled for heterogeneity of children and/or unintended selection into experimental groups. Three of the studies also included elaborate subgroup analyses (see above, e.g., children with immigrant background, children at risk of or affected from delayed or impaired language development, children from disadvantaged homes). In one study, a selection into groups was based on a statistical matching strategy, on children's ethnic background, their age, or their initial language proficiency. Differential results—if included in the studies at all—point to a slight advantage of at risk children benefiting more from language interventions: (1) Schütz (2015) finds greater effects for multilingual children with low language proficiency, (2) Simon and Sachse (2013) report differential effects for low proficiency children in one out of five language outcomes but not for any of the other five grouping variables (e.g. gender, SES), (3) Roos et al. (2010) decided to drop subgroup analyses due to small sample size (only 11 statistical twins). Nevertheless, given the amount of subgroup analyses conducted (particularly in Simon and Sachse, 2013), the overall question of differential effects for disadvantage or at-risk children

Table 6.6 Outcome measures of interventions with target group teachers, at least one outcome on child level and at least medium weight of evidence

Study	Phonological	Semantic	Morpho-syntactic	Syntactic	Pragmatic	Lexical	Problem-solving capabilities	Other, non-cognitive outcomes	Other
Beller et al. (2007)		X	X	X	X				X
Beckerle et al. (2016)		X	X		X				X
Kammermeyer et al. (2015)	X					X	X		
Roos et al. (2010)[a]		X	X	X			X		
Schütz (2015)		X		X		X			
Simon and Sachse (2013)	X	X	X	X		X		X	
Wolf et al. (2011)						X		X	

Note: This table includes the seven cases with a least medium weight of evidence that report about studies targeting teachers Labels refer to the citation for the main text for each case

[a] This study is also described in the section *Target group of intervention: Children*

should consider potential effects of alpha inflation, diminishing this results' level of trustworthiness.

In sum, results are encouraging. Five out of seven cases with at least medium weight of evidence revealed significant treatment effects for children's development of language proficiency. One study additionally reported on positive treatment effects regarding children's language involvement. Two aspects need to be considered, however: (1) All significant effects are rather small, the largest effect is $Eta^2 = .095$ resp. five additional months in age norms (others are $Eta^2 = .06$, $Eta^2 = .05$, $Eta^2 = .034$, $Eta^2 = .030$). (2) The outcome measures across studies vary greatly. In addition, studies differ in their line of argument why they applied certain measures. Only in some cases, there is a clear framework between the hypothesized mechanism of treatment effects and matching outcome measures. Thus, the conclusion is more that some aspects of children's language proficiency may be improved by teacher trainings, but we cannot narrow this down to a certain (sub-) domain.

Finally, it seems important to add that the cases above are not limited to the results summarized for the purpose of this review which concentrates on "effects on child outcomes". Additionally, several of the cases reported on teachers' opinion or measures of their language stimulation behaviour and thus included a far broader view on improvements in the field of ECEC than is evident from the report above. Their research agenda takes into account the wider ECEC system, ECEC settings, as well as teachers and children in those settings. Consequently, their research agenda often includes further outcomes of ECEC such as teacher professionalization, satisfaction or turnover beyond educational effectiveness with respect to children's language outcomes.

6.3 Interventions Targeting Parents

Only one case reached medium weight of evidence. This study (**Rückert et al.**, 2010) focussed on fostering phonological awareness in children. With this approach to language support, the study is very untypical for parent-child programmes. The intervention compared the use of the Hören-Lauschen-Lernen programme in the day-care centre with a parent training that was newly designed to empower parents to foster phonological awareness in their children at home, and to a combination of both approaches. The study was run in 2007 and 2008 in seven day-care centres in the area of Munich. How this sample was selected remains unclear, the grouping was ad hoc. Five child-care-centres used the Hören-Lauschen-Lernen programme and three of them additionally carried out a parent training on

phonological awareness. Two more day-care centres only applied the parent training. The study ran 6 months. Within the day-care centres only some children or parents participated in the study, resulting in a sample of 14 children in the parent-training group, 24 children in the Hören-Lauschen-Lernen-group and 14 children for the combination group. Trainings were scheduled daily, however, for the parent trainings, the application at home varied. Child measures were taken pre-and post-training. These were the Bielefelder Screening zur Früherkennung von Lese-Rechtschreibschwierigkeiten (BISC), and the Heidelberger Auditives Screening in der Einschulungsuntersuchung (HASE), both of them published tests. Repeated-measures analyses of variance were applied to compare the growth of phonological awareness between the three groups. Descriptive measures of the central tendency and variability of the key variables overall are reported. Not all statistics on group comparisons and effect sizes are given. In the study by Rückert et al. (2010), all three groups showed significant and comparable growth of phonological awareness. The effect of the parent training is $d = 0.48$. The authors conclude that the parent training is a good way to foster phonological awareness at home. The reviewer agrees with this conclusion.

It is important to note that although most parent-child programmes focus on German and mother tongue and oral language competencies in a holistic way, the only study that has a sufficient weight of evidence is a study that used Hören-Lauschen-Lernen a training of phonological awareness, demonstrating the effectiveness of this type of training. However, there is no evidence available at all regarding the effectiveness of more typical parent-child trainings, i.e., trainings that take a holistic approach to language. This lack of evidence is particularly unfortunate, as only in parent-child trainings the simultaneous promotion of German and native language skills can be observed to a greater extent.

6.4 Conclusions on the Questions Addressed

Which interventions are effective in improving children's German-language competencies?

Based on the consideration of cases with at least medium weight of evidence, significant treatment effects on children's language proficiency could be detected. This held for interventions targeting children and focusing on the meta-linguistic ability of phonological awareness, as well as for interventions targeting teachers using a holistic approach to language support. In addition, there were encouraging results from one intervention study targeting parents to foster children's phonological awareness at home. On the downside, the reported treatment effects were

almost all demonstrated for a relatively short period of time only. Further limitations arise in terms of the language outcomes addressed. On the one hand, the training of the meta-linguistic ability of phonological awareness aims to prevent later problems in the development of reading and spelling. Accordingly, the effectiveness of the training is usually evaluated by assessing literacy rather than oral-language skills. The question of transfer effects of the training on oral-language skills therefore remains open. On the other hand, the holistic approach to language support found in the intervention studies targeting teachers is associated with a broader view on possible improvements in the field of ECEC. Outcome measures of these studies vary widely, which makes it difficult to evaluate the effectiveness with regard to a certain (sub-)domain of language development.

Which conditions apply to effectiveness?

The previous sections summarise the great diversity of approaches, providers, degree of structuredness, targets etc. But not a single study systematically varied conditions of implementation (e.g., instructor of the interventions, duration of the intervention, inconsistently vs. consistently trained). It is therefore hardly possible to stretch findings from the individual effectiveness studies to information on implementation research: Beyond scattered individual findings, even this extensive review of intervention studies cannot provide a comprehensive answer to the question on which conditions apply to the interventions' effectiveness.

For which groups of children are they most effective?

There is no conclusive answer to the question for which groups of children the interventions are most effective. In most cases the intervention targets an unselected sample which was not further divided into subsamples (e.g., children at risk, children with German as a second language). In the few cases where the sample was further divided (only in studies targeting teachers), there are small indications that children at risk of or affected by delayed or impaired language development might benefit somewhat more from language interventions.

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Concluding Remarks

7

Contents

This study chose to review the research literature on interventions fostering young children's language development in Early Childhood Education and Care (ECEC) settings in German speaking countries.

7.1 Language Support in ECEC Settings: What Have We Found?

Chapters 5 and 6 present our findings regarding the documented interventions and their effectiveness. Our overarching conclusions from the results summarized in the previous chapters are:

1. Effective and successful language support interventions can be found in German ECEC institutions.
2. It is possible to qualify ECEC teachers to successfully implement language-support interventions.

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This review shows the vast amount and great variety of intervention approaches in the field. Yet, given the poor documentation and the scarce conclusive evaluations found, this review cannot provide unambiguous information about unfailing, effective language interventions in German ECEC settings. That does not mean that most of the language support interventions available in the field are ineffective or even inappropriate in helping children develop sufficient language skills. Rather, in most cases, we still do not know with satisfactory certainty whether they are effective or not. There is one exception: Data available for the implementation of phonological-awareness training support that this approach reliably produces at least short-term positive effects on children's phonological processing, which is a facet of language competency especially important for the acquisition of reading and spelling skills in early primary school years.

There is further evidence that some other approaches may be effective, but the constraints and circumstances of their effectiveness are still not well understood. For most approaches, there is just not enough conclusive evidence on whether they are effective or not. In particular, it is not possible to decide whether interventions provide compensatory support for those sub-groups of children that are suspected of needing language support most. One reason for this is that across available data and studies, there is no consensus on subgroup definition(s). Moreover, there are only very few and mostly inconclusive results on subgroup analyses.

7.2 Research Desiderata

There are several research desiderata that emerged when synthesising the available information. Among the most critical blank spaces are:

1. *Broadness of language components addressed*. Most evaluations of the effects of language support interventions that gave enough information to be scrutinized in this review were designed to test whether proficiency in carefully specified language domains could be increased by a targeted intervention. Accordingly, in those cases that were judged to be most successful, only very specific language-proficiency data were collected. Given this fact, it is not surprising that the available data do not permit us to estimate intervention effects on a broader range of (components/subskills of) language proficiency.
2. *Broadness of intervention effects*. It becomes apparent that there is a lack of research on how support in one sub-domain can be transferred to another. Typically, if a case reported relevant intervention effects, there was a strong fit between support subdomains and tested domains.

3. *Conclusively designed evaluations*. Given the intense discussion on how to evaluate educational interventions conclusively even in the late last century, the small number of evaluations with rigorous research designs we found is alarming. The list of shortcomings includes failures in implementation-stringency as well as lack of rigor in research- and evaluation design. Sometimes the logic of intervention development is violated in the evaluation design, when measuring the success of an intervention at the individual level vs. intervention at higher levels (in the system).
4. *Implementation conditions*. Moreover, there is a marked absence of studies systematically varying conditions of implementation. Informative studies analyzing key success factors in implementing effective language development support in ECEC settings are still missing. This limitation, a lack of thoroughly designed and carried-out intervention studies, is well-known for most innovative interventions in education (see Hasselhorn et al., 2014).
5. *Common ground of practice and research*. There is a poor fit of language support in practice, on the one hand, and research on language support on the other: Here, a common further development of scientific theory-building, good practice in childhood education and care, and development of empirical studies, is needed in order to be able to scientifically evaluate and further develop e.g., holistic oral language support. In turn, practitioners are called upon to better document their language support practices, as it otherwise cannot inform research.

7.3 Information Search Desiderata

A need for broad search strategies became obvious. Our experience with the search for relevant documents and sources revealed a highly important role of the searches that have been conducted "outside of the academic box", i.e., the tapping of sources other than purely academic databases. In our case, besides the *FIS Bildung* database, which includes documentation from research and practice alike, direct requests to societal stakeholders and municipalities as well as the internet searches were especially useful in revealing the richness of initiatives. While a large proportion of these, owing to poor documentation or poor design, did not provide valid information on how effective the intervention turned out to be on the child level, the remaining cases still contribute significantly to it (RQ2, as addressed in Chap. 6).

More than half of the cases synthesised in Chap. 6 (17 of 31 cases) are unique, i.e., were found in one source only. This in itself is a strong argument for how im-

portant it is to make use of a wide and varied search strategy. We would argue that a search strategy above and beyond the usual scientific databases should be taken as a necessary characteristic of systematic reviews, especially since this is not the case in the tradition of conducting meta-analyses. Moreover, only 3 of 17 unique cases have been found in academic databases (PsychInfo and Psyndex), the remaining 14 have been elicited from *FIS Bildung*, Google and direct requests by postal mail/e-mail to stakeholders and municipalities. Hence, it is the latter data sources that have proved crucial for the integrity of the database and thus the quality of the systematic review. As a consequence, we advocate for drawing an initial map of a topic of interest and to reconcile the diverse stakeholders that are engaged in this topic. This might be a suitable base to explicate a constructive search strategy for potentially relevant sources of information about the topic of interest, which it is of paramount importance to engage in an open search procedure, including also information sources that are considered non-standard in academic research.

7.4 Documentation Desiderata

There is a huge gap between the number of language support projects and initiatives undertaken in many regions of the German-speaking countries in the last decades, and the number of data sets sufficiently robust to build a knowledge base with regard to what language-support activities are how effective for which children fostering which facets of language skills. In order to reduce this gap and to strengthen our related knowledge base, we recommend to standardize the documentation of those who implement language support measures in their ECEC institutions. We would like to suggest starting a participative process of stakeholders from research, administration and practice alike, to collect a list of information items which should be documented mandatorily. In addition, such a process necessarily should include discussions about who should be responsible for these standardized documentations and which kind of qualifications are necessary. From our point of view, the process we advocate to initiate needs to address, but should not be limited to, questions like:

- What is the format of the language support measure, and to which degree is it standardized?
- To which degree is the measure accepted among the involved ECEC teachers and the parents addressed?
- What are the prerequisite qualifications for those who administer the language-support measures?

7.5 Policy Implications

The implications for policymakers that might be drawn from the present systematic review are manifold. Taking into account the number of debates, plans, and political guidelines in the German Federal States, we would like to hallmark the following three as the most important ones.

The first implication addresses the conception of a distinction between "additive" and "integrated" language support approaches, which is commonly found among policymakers and educational administrators. After extensive study of a great variety of interventions we advise them to refrain from further use of these labels, which are widespread in Germany. The available documentation shows that the programme descriptions typically do not mention either, or include components of both, raising the question of how practically relevant this distinction is on the ground, in actual implementation settings. Scrutinizing the unambiguously assigned cases, two conclusions may be drawn. Firstly, most (effective) teacher trainings are categorised as an integrated approach, whereas most successful interventions targeting children are classified as an additional or additive intervention. The second is, that the dichotomy of integrated vs. additive is a misleading or at least unproductive one, since it suggests that integrated approaches do not provide additional support, and that additive approaches are not integrated in daily ECEC routines—evidently, these are both misconceptions.

Our second implication for those who are responsible for policy agenda-setting refers to research funding strategies. There is an urgent need for sophisticated field evaluations of language-support activities in ECEC settings. This does not mean that only randomized-controlled trials that are sometimes referred to as the gold standard of research activities in the "what works agenda" of intervention research, should be funded, but also studies focusing on the conditions of success of the implementation of theoretically sound interventions while making use of participatory research-practice partnerships. An implication of this conclusion is that the traditional 3-year time period of project funding will need to be challenged. Implementing evidence-based measures of language support in the field of ECEC institutions means being aware that it might take time to conquer start-up problems associated with the transformation of new procedures in the field. Thus, the real impact of the implementation might be expected not in the short run but only when they have become familiar and common-place among all involved stakeholders. As a consequence, the funding periods of informative implementation projects may have to be reframed and extended in many cases.

We see a third implication for educational policy, namely to continue investing in the engagement in language support measures for young children. Our argument for this implication is threefold: First of all, effective language support has been shown to be possible. Thus, although there is not enough empirical data to decide which interventions provide compensatory support for children with language support needs, yet, efforts to provide extra support for children with special language needs are not only reasonable but seem to have the potential to reduce risk for poor educational outcomes, both for individual children and the society. In this regard the coalition agreement of the present German government to achieve ECEC quality standards from 2025 onward is highly appreciated. Second, diagnostic strategies to reach effective language support for those with relevant needs deserve further expansion. Programmes like supporting children with German as a second language can be focused, yet the language-support needs are much broader and by no means completely addressed by these activities. To be effective, language-support measures have to be adapted to the kind of relevant needs of affected children. Thus, political engagement regarding language-support measures in young children will be well-advised to include efforts with regard to diagnostic tools and strategies. Third, although the available developed language-support approaches are impressive, most of them have so far not been adequately and sufficiently evaluated. Thus, all investments in related support activities without conclusive evaluations will not contribute to efficiently increasing the number of children who develop sufficient language competencies to become successful participants in the education system. Demonstrating the effectiveness of interventions is a kind of intervention itself, serving a broader audience, and might contribute to the long-term strategy to establish empirically founded good practice.

7.6 Was It Worth It?

Conducting this systematic review proved an even more challenging and resource-intensive endeavour than initially envisioned. Its result offers a solid foundation for further engagement with this topic, for both researchers and educational practitioners, that could not have been established without the rigorous, systematic, and transparent procedure applied.

As elaborated in the previous chapters of this book, this systematic review revealed several surprising facts which should be considered in further practical work and research activities. These are:

– The high investment in the topic, as evidenced by the wealth of initiatives, varying widely in terms of target groups, competencies addressed and intervention characteristics (Tables 4.2 and 4.3).
– The incomplete or lacking documentation of interventions and/or their evaluation in some areas that precludes learning from many of these initiatives. Most notably, this holds for parent programmes which often address particularly vulnerable groups (Sect. 4.3.2).

A major limitation of the present review is, that in spite of our efforts to involve experts from all relevant fields in the diverse steps of the present systematic review, we failed to systematically involve expert ECEC practitioners. This might have contributed to a somehow detached perspective of the appraisal in this review with regard to practical concerns. However, we would need frameworks that enable genuinely participatory—projects so that research and practice are re-aligned. For this, there is still a lack of suitable and accepted formats, or recognition and acceptance of the partner. Transfer of knowledge needs to be worth-while for all stakeholders.

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Appendix

A.1 SearchCodes for the Electronic Databases

A.1.1 PsychInfo

S1= (((DE "Early Childhood Development") OR (DE "Infant Development")) OR (DE "Child Day Care") OR ((DE "Childhood Development") OR (DE "Zone of Proximal Development")) OR ((DE "Education") OR (DE "Academic Settings" OR DE "Bilingual Education" OR DE "Curriculum" OR DE "Distance Education" OR DE "Elementary Education" OR DE "Family Life Education" OR DE "Multicultural Education" OR DE "Nontraditional Education" OR DE "Preschool Education" OR DE "Private School Education" OR DE "Public School Education" OR DE "Remedial Education" OR DE "Special Education")) OR (DE "Elementary Schools") OR (DE "Preschool Students") OR (DE "Kindergartens") OR (DE "Kindergarten Students") OR (DE "Day Care Centers"))

S2= ((DE "Native Language") OR ((DE "Language Disorders") OR (DE "Specific Language Impairment")) OR ((DE "Language Development") OR (DE "Language Delay")) OR ((DE "Speech Development") OR (DE "Delayed Speech")) OR ((DE "Verbal Learning") OR (DE "Nonsense Syllable Learning" OR DE "Paired Associate Learning")) OR (DE "Cognitive Linguistics") OR ((DE "Phonology") OR (DE "Phonemes" OR DE "Phonetics" OR DE "Prosody" OR DE "Syllables" OR DE "Vowels")) OR (DE "Phonological Awareness") OR ((DE "Grammar") OR (DE "Morphology (Language)" OR DE "Transformational Generative Grammar")) OR ((DE "Semantics") OR (DE "Antonyms" OR DE

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"Homonyms" OR DE "Synonyms")) OR ((DE "Syntax") OR (DE "Form Classes (Language)") OR (DE "Morphemes") OR ((DE "Vocabulary") OR (DE "Anagrams" OR DE "Homographs" OR DE "Mental Lexicon" OR DE "Neologisms" OR DE "Sight Vocabulary" OR DE "Slang")) OR ((DE "Words (Phonetic Units)") OR (DE "Word Problem")) OR (DE "Word Recognition") OR ((DE "Verbal Meaning") OR (DE "Word Meaning")) OR (DE "Literacy") OR (DE "Sentences") OR (DE "Sentence Structure") OR (DE "Sentence Comprehension") OR (DE "Bilingualism"))

S3= (((DE "Training") OR (DE "Assertiveness Training" OR DE "Biofeedback Training" OR DE "Communication Skills Training" OR DE "Computer Training" OR DE "Memory Training" OR DE "Motivation Training" OR DE "Parent Training" OR DE "Self-Instructional Training" OR DE "Sensitivity Training" OR DE "Social Skills Training")) OR ((DE "Language Arts Education") OR (DE "Phonics" OR DE "Reading Education" OR DE "Spelling")) OR ((DE "Intervention") OR (DE "Early Intervention" OR DE "Family Intervention" OR DE "Group Intervention" OR DE "School Based Intervention")) OR ((DE "Learning") OR (DE "Collaborative Learning" OR DE "Conditioning" OR DE "Cooperative Learning" OR DE "Discrimination Learning" OR DE "Foreign Language Learning" OR DE "Generalization (Learning)" OR DE "Implicit Learning" OR DE "Incidental Learning" OR DE "Intentional Learning" OR DE "Interference (Learning)" OR DE "Mnemonic Learning" OR DE "Observational Learning" OR DE "Perceptual Learning" OR DE "School Learning" OR DE "Self-Regulated Learning" OR DE "Sequential Learning" OR DE "Serial Learning" OR DE "Skill Learning" OR DE "Social Learning" OR DE "Transfer (Learning)" OR DE "Trial and Error Learning" OR DE "Verbal Learning")) OR ((DE "Longitudinal Studies") OR (DE "Prospective Studies")))

S4= S1 AND S2 AND S3

S5= **german**

S6= S4 AND S5

First, a separate search is run for each cluster. The search outcomes are then linked using the Boolean operator AND.

A.1.2 PsychArticles

S1= (((DE "Early Childhood Development") OR (DE "Infant Development")) OR (DE "Child Day Care") OR ((DE "Childhood Development") OR (DE "Zone of Proximal Development")) OR ((DE "Education") OR (DE "Academic Settings" OR DE "Bilingual Education" OR DE "Curriculum" OR DE "Distance Education" OR DE "Elementary Education" OR DE "Family Life Education" OR DE "Multicultural Education" OR DE "Nontraditional Education" OR DE "Preschool

Education" OR DE "Private School Education" OR DE "Public School Education" OR DE "Remedial Education" OR DE "Special Education")) OR (DE "Elementary Schools") OR (DE "Preschool Students") OR (DE "Kindergartens") OR (DE "Kindergarten Students") OR (DE "Day Care Centers"))

S2= ((DE "Native Language") OR ((DE "Language Disorders") OR (DE "Specific Language Impairment")) OR ((DE "Language Development") OR (DE "Language Delay")) OR ((DE "Speech Development") OR (DE "Delayed Speech")) OR ((DE "Verbal Learning") OR (DE "Nonsense Syllable Learning" OR DE "Paired Associate Learning")) OR (DE "Cognitive Linguistics") OR ((DE "Phonology") OR (DE "Phonemes" OR DE "Phonetics" OR DE "Prosody" OR DE "Syllables" OR DE "Vowels")) OR (DE "Phonological Awareness") OR ((DE "Grammar") OR (DE "Morphology (Language)" OR DE "Transformational Generative Grammar")) OR ((DE "Semantics") OR (DE "Antonyms" OR DE "Homonyms" OR DE "Synonyms")) OR ((DE "Syntax") OR (DE "Form Classes (Language)") OR (DE "Morphemes") OR ((DE "Vocabulary") OR (DE "Anagrams" OR DE "Homographs" OR DE "Mental Lexicon" OR DE "Neologisms" OR DE "Sight Vocabulary" OR DE "Slang")) OR ((DE "Words (Phonetic Units)") OR (DE "Word Problem")) OR (DE "Word Recognition") OR ((DE "Verbal Meaning") OR (DE "Word Meaning")) OR (DE "Literacy") OR (DE "Sentences") OR (DE "Sentence Structure") OR (DE "Sentence Comprehension") OR (DE "Bilingualism"))

S3= (((DE "Training") OR (DE "Assertiveness Training" OR DE "Biofeedback Training" OR DE "Communication Skills Training" OR DE "Computer Training" OR DE "Memory Training" OR DE "Motivation Training" OR DE "Parent Training" OR DE "Self-Instructional Training" OR DE "Sensitivity Training" OR DE "Social Skills Training")) OR ((DE "Language Arts Education") OR (DE "Phonics" OR DE "Reading Education" OR DE "Spelling")) OR ((DE "Intervention") OR (DE "Early Intervention" OR DE "Family Intervention" OR DE "Group Intervention" OR DE "School Based Intervention")) OR ((DE "Learning") OR (DE "Collaborative Learning" OR DE "Conditioning" OR DE "Cooperative Learning" OR DE "Discrimination Learning" OR DE "Foreign Language Learning" OR DE "Generalization (Learning)" OR DE "Implicit Learning" OR DE "Incidental Learning" OR DE "Intentional Learning" OR DE "Interference (Learning)" OR DE "Mnemonic Learning" OR DE "Observational Learning" OR DE "Perceptual Learning" OR DE "School Learning" OR DE "Self-Regulated Learning" OR DE "Sequential Learning" OR DE "Serial Learning" OR DE "Skill Learning" OR DE "Social Learning" OR DE "Transfer (Learning)" OR DE "Trial and Error Learning" OR DE "Verbal Learning")) OR ((DE "Longitudinal Studies") OR (DE "Prospective Studies")))

S4= S1 AND S2 AND S3

S5= **german**

S6= S4 AND S5

First, a separate search is run for each cluster. The search outcomes are then linked using the Boolean operator AND.

A.1.3 Psyndex

The search query uses the following Thesaurus terms:

(CT = training* or CT = educ* or CT = support* or CT = intervention* or CT = learn*) AND (CT = language* or CT = phon* or CT = grammar* or CT = morph* or CT = semantic* or CT = syntax* or CT = litera* or CT = word* or CT = sentence*) AND (CT = child* or CT = early*) AND (CT = elementar* or CT = preschool* or CT = kinderga*) AND **german**

A.1.4 Education Research Complete

In comparison to PsycInfo and PsycArticles, Education Research Complete uses the "Education Thesaurus", therefore different search queries are run.

S1= (((DE "BILINGUALISM") OR (DE "BILINGUAL education" OR DE "CODE switching (Linguistics)" OR DE "INTERFERENCE (Linguistics)" OR DE "LANGUAGE attrition")) OR (DE "CHILDREN—Language") OR (DE "COMMUNICATIVE competence") OR ((DE "COMPREHENSION") OR (DE "CLOZE procedure" OR DE "LEARNING" OR DE "LISTENING" OR DE "LISTENING comprehension" OR DE "LISTENING skills" OR DE "READING comprehension")) OR (DE "DIVERSITY training programs") OR (DE "BASIC education" OR DE "CHILDREN of immigrants—Education" OR DE "CHILDREN of migrant laborers—Education" OR DE "COEDUCATION" OR DE "DEVELOPMENTALLY appropriate education" OR DE "EARLY childhood education" OR DE "EARLY intervention (Education)" OR DE "EDUCATIONAL programs" OR DE "EDUCATIONAL quality" OR DE "EDUCATIONAL standards" OR DE "ELEMENTARY education" OR DE "GENDER differences in education" OR DE "INDIVIDUALIZED education programs" OR DE "LANGUAGE & education" OR DE "LANGUAGE arts" OR DE "LANGUAGE experience approach in education" OR DE "LEARNING" OR DE "LITERACY" OR DE "LITERACY education" OR DE "MINORITIES—Education" OR DE "MULTILINGUAL education" OR DE "NATIVE language & education" OR DE "PROBLEM children—Education" OR DE "PROGRAM validation (Education)" OR DE "SPECIAL education" OR DE "STORYTELLING in education" OR DE "SUPPLEMENTARY education") OR (DE "FLUENCY (Language learning)") OR (DE "INTONATION (Phonetics)") OR (DE "LANGUAGE acquisition") OR ((DE "LANGUAGE arts") OR (DE "COMPOSITION (Language arts)" OR DE "CREATIVE writing—Study &

teaching" OR DE "LANGUAGE arts (Elementary)" OR DE "LITERATURE—Study & teaching" OR DE "PENMANSHIP" OR DE "READING" OR DE "REMEDIAL language arts teaching")) OR ((DE "LANGUAGE arts (Early childhood)") OR (DE "LANGUAGE arts (Kindergarten)" OR DE "LANGUAGE arts (Preschool)" OR DE "LANGUAGE arts (Primary)" OR DE "READING (Early childhood)")) OR (DE "LANGUAGE rhythm") OR (DE "LANGUAGE transfer (Language learning)") OR ((DE "LANGUAGE & languages—Cognitive processing") OR (DE "COMPREHENSION" OR DE "EXPRESSIVE language" OR DE "INTERFERENCE (Linguistics)" OR DE "READING—Code emphasis approaches")) OR ((DE "LEARNING") OR (DE "ACTIVE learning" OR DE "COGNITIVE learning" OR DE "DREYFUS model of skill acquisition" OR DE "EXPERIENTIAL learning" OR DE "IMPLICIT learning" OR DE "INCIDENTAL learning" OR DE "INTERACTIVE learning" OR DE "LEARNING contracts" OR DE "MASTERY learning" OR DE "MEMORIZATION" OR DE "MULTICHANNEL learning" OR DE "NONVERBAL learning" OR DE "OBSERVATIONAL learning" OR DE "OPEN learning" OR DE "OVERLEARNING" OR DE "PASSIVE learning" OR DE "PRIMACY effect (Learning)" OR DE "PRIOR learning" OR DE "REFLECTIVE learning" OR DE "REPETITION (Learning process)" OR DE "ROTE learning" OR DE "SERIAL learning" OR DE "SITUATED learning theory" OR DE "SOCIAL learning" OR DE "THRESHOLD concepts (Learning)" OR DE "TRANSFORMATIVE learning" OR DE "VISUAL learning")) OR ((DE "LEARNING ability") OR (DE "APTITUDE-treatment interaction (Education)" OR DE "HYPERACTIVE children—Education")) OR ((DE "MORPHOLOGY (Grammar))" OR (DE "AUTOSEGMENTAL theory (Linguistics)")) OR (DE "NATIVE language") OR (DE "NATIVE language—Study & teaching") OR (DE "PHONICS") OR (DE "PHONOLOGICAL awareness") OR ((DE "PHONOLOGY (Grammar)") OR ((DE "AUTOSEGMENTAL theory (Linguistics)") OR (DE "CONSONANTS") OR (DE "SYLLABLE (Grammar)"))) OR ((DE "PRESCHOOLS—Curricula") OR (DE "NURSERY schools (Great Britain)")) OR ((DE "SYNTAX (Grammar)") OR (DE "CONNECTIVES (Linguistics)" OR DE "DEPENDENCY grammar" OR DE "TEMPORAL constructions (Grammar)")) OR ((DE "VERBAL ability") OR (DE "VOCABULARY") OR (DE "NEW words" OR DE "SIGHT vocabulary" OR DE "WORD recognition")))

S2= ((DE "CHILD development centers") OR (DE "CHILDREN") OR (DE "DAY care centers—Activity programs") OR ((DE "EARLY childhood education") OR (DE "EARLY childhood special education" OR DE "INTERPERSONAL relations—Study & teaching (Early childhood)" OR DE "KINDERGARTEN" OR DE "LANGUAGE arts (Early childhood)" OR DE "MONTESSORI method of education" OR DE "MORAL education (Early childhood)" OR DE

"PRESCHOOL education" OR DE "PRIMARY education" OR DE "REGGIO Emilia approach (Early childhood education)" OR DE "SCIENCE—Study & teaching (Early childhood)" OR DE "SOCIAL sciences—Study & teaching (Early childhood)" OR DE "VIRTUAL reality in early childhood education")) OR ((DE "ELEMENTARY education") OR (DE "FIRST grade (Education)" OR DE "LANGUAGE arts (Elementary)" OR DE "SECOND grade (Education)" OR DE "THIRD grade (Education)") OR ((DE "ELEMENTARY schools") OR (DE "CATHOLIC elementary schools" OR DE "JUNIOR schools (Great Britain)" OR DE "KINDERGARTEN")) OR ((DE "KINDERGARTEN") OR (DE "KINDERGARTEN teaching" OR DE "LANGUAGE arts (Kindergarten)" OR DE "MONTESSORI method of education" OR DE "OBJECT-teaching" OR DE "PRIMARY school supervision")) OR (DE "PRESCHOOL children") OR ((DE "PRESCHOOL education") OR (DE "AGAZZI method of teaching" OR DE "COMMUNICATION—Study & teaching (Preschool)" OR DE "HEAD Start programs" OR DE "LANGUAGE arts (Preschool)" OR DE "MORAL education (Preschool)" OR DE "NURSERY school education (Great Britain)" OR DE "PLAY groups" OR DE "PRESCHOOL tests" OR DE "SURE Start programs" OR DE "UNIVERSAL preschool (Education initiative)")) OR ((DE "PRESCHOOLS") OR (DE "PLAY schools")))

S3= S1 AND S2

S4= **german**

S5= S3 AND S4

The definitions of the third keyword cluster "Training, Intervention, Education" are not used in this database, because the thesaurus definitions differ substantially from the definitions of domain experts. Hence, only two clusters are used to search this database.

A.1.5 ERIC

Keyword search in ERIC is based on the English language search terms defined in Table 3.1—in alignment with the ERIC Thesaurus. ERIC offers only one field for queries, hence context components are combined by Boolean operators. Therefore, the following syntax is used for the search:

((descriptor:training* OR descriptor:educ* OR descriptor:support* OR descriptor:intervention* OR descriptor:learn*) AND (descriptor:language* OR descriptor:phon* OR descriptor:grammar* OR descriptor:morph* OR descriptor:semantic* OR descriptor:syntax* OR descriptor:word* OR descriptor:litera* OR descriptor:sentence*) AND (descriptor:child* OR descriptor:early*) AND (descriptor:elementary* OR descriptor:preschool* OR descriptor:Pre-school* OR descriptor:kindergarten*)) AND **german**

An initial keyword-query performed February, 7, 2017, retrieved only four publications, leading the authoring team's information experts to the assumption that the query using keywords is too restrictive. To achieve a high degree of completeness, an additional free-text search in the metadata was carried out:

((training* OR educ* OR support* OR intervention* OR learn*) AND (language* OR phon* OR grammar* OR morph* OR semantic* OR syntax* OR word* OR litera* OR sentence*) AND (child* OR early*) AND (elementary* OR preschool* OR Pre-school* OR kindergarten*)) AND **german**

A.1.6 FIS-Bildung Literaturdatenbank [FIS Education Literature Database]

The search query used the following keywords:

Schlagwörter: (*TRAINING* *oder* BILDUNG *oder* FOERDER *oder* INTERVENTION)

und Schlagwörter: (*SPRACH* *oder* PHON *oder* GRAMMATI *oder* MORPH *oder* SEMANT *oder* SYNTA *oder* LITERAL *oder* LEXI *oder* WORTSCHATZ *oder* WORTBILDUNG *oder* SATZ)

und Schlagwörter: (*KIND* *oder* FRUEH)

und Schlagwörter: (*ELEMENTAR* *oder* VORSCHUL *oder* KINDERGA *oder* KINDERTAGES)

A.2 Search Codes for the Internet Searches (Google, Google with Startpage, Google Scholar)

Utilizing the search terms that were initially identified by the Scientific Advisory Board together with the team of authors, the search experts initially used the following search queries for the internet-based search in English (Sen) and German (Sdeu) language:

Sen= ((training* or educ* or support* or intervention* or learn*) AND (language* or phon* or grammar* or morph* or semantic* or syntax* or word* or litera* or sentence*) AND child* AND (elementary* or preschool* or Pre-school* or kindergarten* or early*))

Sdeu= (training* OR bildung* OR foerder* OR intervention*) AND (sprach* OR phono* OR grammati* OR morph* OR semant* OR synta* OR literal* OR lexi* OR wortschatz* OR wortbildung* OR satz*) AND (kind* OR frueh*) AND (elementar OR vorschul* OR kinderga* OR Kindertages*)

Visual inspection of the first four pages of the search results obtained with the search terms Sen and Sdeu revealed that no relevant results was obtained. It was thus concluded that the search queries were too complex. The search queries Senk

and Sdeuk are simplifications or reductions of the respective search queries to their core terms. For this review, Senk and Sdeuk were used in Google, Google with Startpage and Google Scholar:

Senk= Language AND early child AND (evaluation OR intervention) AND Kindergarten AND german*

Sdeuk= Sprachentwicklung UND Kind* UND (Intervention ODER Wirkung ODER Evaluation)

It may be noted that personalisation effects were considerably smaller for Google Scholar than for Google.

A.3 Direct Information Requests: Institutional Search

A.3.1 Cities

City	Department
Aachen	Dezernat IV—Bildung und Kultur, Schule, Jugend und Sport
Augsburg	Referat 4—Bildungsreferat
Bergisch Gladbach	Fachbereich 4—Bildung, Kultur, Schule und Sport
Berlin	Abteilung III B—Familienpolitik, Kindertagesbetreuung, vorschulische Bildung
Berlin	Senatsverwaltung für Bildung, Jugend und Wissenschaft
Bielefeld	Dezernat 5: Soziales
Bochum	Dezernentin für die Ämter: Amt für Soziales und Wohnen, Jugendamt, Familienpädagogisches Zentrum, Gesundheitsamt
Bonn	Amt für Kinder, Jugend und Familie
Bottrop	Dezernat III, Amt 51—Fachbereich Jugend und Schule
Braunschweig	Sozial-, Schul-, Gesundheits- und Jugenddezernat
Bremen	Ressort für Soziales, Jugend, Frauen, Integration und Sport
Bremen	Senat für Kinder und Bildung
Bremerhaven	Kinderbeauftragte
Chemnitz	Dezernat 5—Bildung, Jugend, Soziales, Kultur und Sport
Darmstadt	Dezernat V—u.a. Amt für Soziales und Prävention, Jugendamt, Sozial- und Jugendhilfeplanung
Dortmund	Dezernat 4—Schule, Jugend und Familie
Dresden	Geschäftsbereich Arbeit, Soziales, Gesundheit und Wohnen
Duisburg	Dezernat III für Familie, Bildung und Kultur
Düsseldorf	Dezernent für die Ämter: Schulverwaltungsamt, Amt für Soziales, Amt für Migration und Integration, Jugendamt, Sportamt
Erfurt	Dezernat 5: Soziales, Bildung und Kultur

City	Department
Erlangen	Referat für Bildung, Kultur und Jugend
Essen	Geschäftsbereich 5—Geschäftsbereichsvorstand für die Ämter und Dienststellen: Amt für Soziales und Wohnen, Gesundheitsamt, Jobcenter Essen
Frankfurt am Main	Dezernat IV—Bildung und Frauen
Freiburg im Breisgau	Dezernat II für Umwelt mit Forst und Abfallwirtschaft, Jugend, Schule und Bildung
Fürth	Referat IV—Soziales, Jugend und Kultur
Gelsenkirchen	Vorstandsbereich 4—Kultur, Bildung, Jugend, Sport und Integration
Göttingen	Dezernat B—Personal, Schule und Jugend
Hagen	Vorstandsbereich 3 für Jugend und Soziales, Bildung, Sport und Umwelt
Halle (Saale)	Geschäftsbereich IV—Bildung und Soziales
Hamburg	Behörde für Arbeit, Soziales, Familie und Integration
Hamm	Fachbereich Jugend, Soziales und Gesundheit
Hannover	Bildungsdezernat
Heidelberg	Dezernat III für Familie, Soziales und Kultur
Heilbronn	Dezernat III für Bürgerservice, Kultur, Bildung und Betreuung, öffentliche Sicherheit und Ordnung, Soziales und das Gesundheitsamt
Herne	Dezernat III—Schule und Weiterbildung, Fachbereich Kultur, Fachbereich Kinder-Jugend-Familie
Hildesheim	Sozialdezernent
Ingolstadt	Referat IV—Kultur, Schule und Jugend
Jena	Dezernat IV—Familie, Bildung und Soziales
Karlsruhe	Dezernat III—Jugend und Eltern, Soziales, Bäder, Schulen, Sport, Migrationsfragen
Kassel	Dezernat V—Jugend, Frauen, Gesundheit und Bildung
Kiel	Stadträtin für Bildung, Jugend und Kreative Stadt
Koblenz	Fachbereich II—Sicherheit, Ordnung, Katastrophenschutz, Soziales, Jugend, Sport und Entsorgung
Köln	Dezernat IV—Bildung, Jugend und Sport
Krefeld	Geschäftsbereich IV—Bildung, Kultur und Jugend
Leipzig	Dezernat Jugend/Soziales/Gesundheit und Schule
Leverkusen	Dezernat IV—Schulen, Kultur, Jugend und Sport
Ludwigshafen am Rhein	Dezernat 3—Kultur, Schulen, Jugend und Familie
Lübeck	Fachbereich 4—Kultur und Bildung
Magdeburg	Dezernat für Soziales, Jugend und Gesundheit
Mainz	Dezernat IV—Soziales, Kinder, Jugend, Schule und Gesundheit

City	Department
Mannheim	Dezernat III—Jugend, Kinder, Bildung, Familie, Gesundheit
Moers	Dezernat II—Interner Service, Ordnung und Bürgerservice, Soziales, Senioren und Wohnen, Schule und Sport, Jugend
Mönchengladbach	Dezernat V—Recht, Soziales, Jugend, Gesundheit, Verbraucherschutz
Mülheim an der Ruhr	Dezernat V: Bildung, Soziales, Jugend, Gesundheit, Sport und Kultur
München	Referat für Bildung und Sport
Münster	Dezernat für Bildung, Jugend und Familie
Neuss	Dezernat 4: Schule, Bildung und Kultur
Nürnberg	Referat für Jugend, Familie und Soziales
Oberhausen	Dezernat 3—Familie, Bildung, Soziales
Offenbach am Main	Dezernat II
Oldenburg	Dezernat 3—u.a. Amt für Teilhabe und Soziales, Amt für Jugend und Familie, Amt für Schule und Bildung
Osnabrück	Fachbereich Kinder, Jugendliche und Familien
Paderborn	Dezernat 4—u.a. Jugendamt, Schulverwaltungs- und Sportamt, Sozialamt
Pforzheim	Dezernat III—Bildung, Soziales, Sport, Jobcenter, Stadtbibliothek
Potsdam	Geschäftsbereich 3—Soziales, Jugend, Gesundheit und Ordnung
Recklinghausen	Dezernat 1—Bildung und Sport, Soziales und Wohnen, Kinder, Jugend und Familie, Jobcenter
Regensburg	Referat für Bildung, Sport und Freizeit
Remscheid	Fachdezernat Bildung, Jugend, Soziales, Gesundheit und Sport
Reutlingen	Dezernat III: Verwaltungsdezernat
Rostock	Senatsbereich für Jugend, Soziales, Gesundheit, Schule und Sport
Saarbrücken	Dezernat für Bildung, Wissenschaft, Kultur und Umwelt
Siegen	Geschäftsbereich 2
Solingen	Jugend, Schule, Bildung, Kultur, Gesundheit, Sport und Integration
Stuttgart	Referat Kultur, Bildung und Sport
Trier	Dezernat II—Bildung, Soziales, Wohnen, Jugend und Arbeit
Ulm	Fachbereich Bildung und Soziales
Wiesbaden	Dezernat V—Dezernat für Schule, Kultur und Integration
Wolfsburg	Dezernat II—Bildungsdezernat
Wuppertal	Geschäftsbereich 2.1: Soziales, Jugend, Schule und Integration
Würzburg	Kultur, Schul- und Sportreferat

A.3.2 State Ministries

Federal state	Ministery	Department
Baden-Württemberg	Ministerium für Kultus, Jugend und Sport	Abteilung 3—Allgemeinbildende Schulen, Elementarbildung
Bayern	Bayerisches Staatsministerium für Arbeit und Soziales, Familie und Integration	Abteilung 2—Familie und Jugend, Bildung und Erziehung
Brandenburg	Ministerium für Bildung, Jugend und Sport	Abteilung 2—Kinder, Jugend, Sport und Weiterbildung
Hessen	Hessisches Ministerium für Soziales und Integration	Abteilung 2—Familie/ frühkindliche Bildung
Mecklenburg Vorpommern	Ministerium für Arbeit, Gleichstellung und Soziales	Abteilung Jugend und Familie
Niedersachsen	Niedersächsisches Kultusministerium	Abteilung 2—Kindertagesstätten, Grundschulen, Förderschulen, Politische Bildung
Nordrhein-Westfalen	Ministerium für Familie, Kinder, Jugend, Kultur und Sport des Landes Nordrhein-Westfalen	Abteilung 3—Kinder, Jugend
Rheinland-Pfalz	Ministerium für Integration, Familie, Kinder, Jugend und Frauen	Abteilung 74—Kinder und Jugend
Saarland	Ministerium für Bildung und Kultur des Saarlandes	Abteilung D—Berufliche Schulen, frühkindliche Bildung, Weiterbildung, Sport
Sachsen	Staatsministerium für Kultus	Abteilung 4—Allgemeinbildende Schulen / Kindertagesbetreuung
Sachsen-Anhalt	Ministerium für Arbeit, Soziales und Integration	Referat 43: Kinder
Schleswig-Holstein	Ministerium für Soziales, Gesundheit, Wissenschaft und Gleichstellung	Abteilung VIII 3: Kinder, Jugend, Familie und Gleichstellung—Landesjugendamt
Thüringen	Thüringer Ministerium für Bildung, Jugend und Sport	Abteilung 4—Kinder, Jugend, Sport und Landesjugendamt

A.3.3 Foundations

Foundation	City
Baden-Württemberg-Stiftung (Sag mal was)	Stuttgart
Friedrich-Ebert-Stiftung	Bonn
Hertie-Stiftung	Frankfurt am Main
Jacobs Foundation	Zürich
Konrad-Adenauer-Stiftung	Sankt Augustin
Mercator-Stiftung	Essen
Robert-Bosch-Stiftung	Stuttgart
Stiftung Bildung und Gesellschaft	Berlin
Stiftung Bildungspakt Bayern	München
Stiftung Kinderland	Stuttgart
Stiftung Lesen	Mainz
Stiftung Polytechnische Gesellschaft	Frankfurt am Main
Telekom Stiftung	Bonn
VolkswagenStiftung	Hannover

A.3.4 Associations

Association	City
Bundesverband für Kindertagespflege e.V.	Berlin
Bundesvereinigung Evangelischer Tageseinrichtungen für Kinder e.V.	Berlin
Deutscher Caritasverband e. V.—Referat Kinder, Jugend, Familie, Generationen	Freiburg
Diakonie—Zentrum Familie, Bildung und Engagement	
Pestalozzi-Fröbel-Verband e.V.	Berlin
Verband Katholischer Tageseinrichtungen für Kinder	Freiburg

A.3.4.1 Arbeiterwohlfahrt (AWO)

Association	City
Bezirksverband Baden e. V.	Karlsruhe
Bezirksverband Braunschweig e. V.	Braunschweig
Bezirksverband Hannover e. V.	Hannover
Bezirksverband Hessen-Nord e. V.	Kassel
Bezirksverband Hessen-Süd e. V.	Frankfurt a.M.
Bezirksverband Mittelrhein e. V.	Köln
Bezirksverband Niederrhein e. V.	Essen
Bezirksverband Ostwestfalen-Lippe e. V.	Bielefeld
Bezirksverband Pfalz e. V.	Neustadt

Association	City
Bezirksverband Rheinland e. V.	Koblenz
Bezirksverband Westliches Westfalen e. V.	Dortmund
Bezirksverband Weser-Ems e. V.	Oldenburg
Bezirksverband Württemberg e. V.	Stuttgart
Landesverband Bayern e. V.	München
Landesverband Berlin e. V.	Berlin
Landesverband Brandenburg e. V.	Potsdam
Landesverband Bremen e. V.	Bremen
Landesverband Hamburg e. V.	Hamburg
Landesverband Mecklenburg-Vorpommern e. V.	Schwerin
Landesverband Saarland e. V.	Saarbrücken
Landesverband Sachsen e. V.	Dresden
Landesverband Sachsen-Anhalt e. V.	Magdeburg
Landesverband Schleswig-Holstein e. V.	Kiel
Landesverband Thüringen e. V.	Erfurt

A.3.4.2 Paritätischer Wohlfahrtsverband

Association	City
Der Paritätische Wohlfahrtsverband, Landesverband Baden-Württemberg e.V.	Stuttgart
Paritätischer Wohlfahrtsverband, Landesverband Bayern e.V.	München
Der Paritätische Wohlfahrtsverband Landesverband Berlin e.V.	Berlin
Der Paritätische, Landesverband Brandenburg e.V.	Potsdam
Deutscher Paritätischer Wohlfahrtsverband, Landesverband Bremen e.V.	Bremen
Der Paritätische Wohlfahrtsverband Hamburg e.V.	Hamburg
Der Paritätische Wohlfahrtsverband Landesverband Hessen e.V.	Frankfurt a. M.
Deutscher Paritätischer Wohlfahrtsverband, Landesverband Mecklenburg-Vorpommern e.V.	Schwerin
Paritätischer Wohlfahrtsverband Niedersachsen e.V.	Hannover
Paritätischer Wohlfahrtsverband NRW	Wuppertal
Der Paritätische Landesverband Rheinland-Pfalz/Saarland e.V.	Saarbrücken
Der Paritätische Sachsen	Dresden
Der Paritätische Sachsen-Anhalt	Magdeburg
Paritätischer Wohlfahrtsverband Schleswig-Holstein e. V.	Kiel
Der Paritätische Wohlfahrtsverband Landesverband Thüringen e.V.	Nesse-Apfelstädt

A.3.5 Scientific Institutions and Further Societal Stakeholders

Institution	City
Berliner Institut für Frühpädagogik	Berlin
Bielefelder Institut für frühkindliche Entwicklung	Bielefeld
Deutsche Gesellschaft für Erziehungswissenschaft—Sektion Sozialpädagogik, Pädagogik der frühen Kindheit	Berlin
Deutscher Städtetag	Berlin
Deutsches Jugendinstitut—Abteilung Kinder und Kinderbetreuung	München
DialogWerk Braunschweig	Braunschweig
Freie Universität Berlin	Berlin
Frühinterventionszentrum Heidelberg	Heidelberg
Gesellschaft für Angewandte Linguistik e.V.	Bayreuth
Gesellschaft für Arbeit und Qualifizierung im Saarpfalz-Kreis (AQuiS GmbH)	Homburg
Institut für Pädagogische Diagnostik	Siegburg
Katholische Hochschule NRW	Aachen, Köln, Münster, Paderborn
Kompensatorische Sprachförderung Brandenburg	
Landeskompetenzzentrum zur Sprachförderung an Kindertageseinrichtungen in Sachsen (LakoS)	Leipzig
Landesprogramm Sprachförderung Brandenburg	
Ludwigs-Maximilians-Universität München	München
Niedersächsisches Institut für frühkindliche Bildung und Entwicklung	Osnabrück
Pädagogische Hochschule Weingarten	Weingarten
Prolog-WISSEN	
Ruhr-Universität Bochum	Bochum
St. Michaelis Familienzentrum Eversburg	Eversburg
Staatsinstitut für Frühpädagogik (IFP) Bayern	München
Universität Duisburg-Essen—Fakultät für Bildungswissenschaften	Duisburg, Essen
Universität Gießen—Zentrum für fremdsprachliche und berufsfeldorientierte Kompetenzen	Gießen
Universität Hannover—Institut für Sonderpädagogik—DGP Fachgruppe Entwicklungspsychologie	Hannover
Universität Zürich	Zürich
Volkshochschule Freiburg	Freiburg
Staatsinstitut für Frühpädagogik	München

A.4 Coding Tool for Data Extraction and for Assessing the Quality of Studies and the Weight of Evidence

Section A: General and administrative information

- 01—Publication year
- 02—Linkage to other papers with same study or studies

Section D: Programme or intervention description—answer the questions separately for each programme/intervention in the study

- 03—Spread/site
- 04—Target group of programme/intervention
- 05—Type of programme/intervention
- 05a—Type of programme/intervention—self-assessment of authors
- 06—Intervention is pre-structured
- 07—Approach to language support
- 08—Language targeted
- 09—Duration of programme/intervention
- 10—Length of programme/intervention sessions
- 11—Frequency of sessions
- 12—Provider(s) of intervention

Section E: Method—Study design and groups

- 13—Type of design
- 14—Number of groups
- 15—If more than one group: Type of control group

Section I: Actual study sample (s)—Specification of realized sample

- 16—Sample selection of participants
- 17—Number of participants

Section J: Methods—Data collection of outcomes

- 18—Year of data collection
- 18a—Level on which outcome is measured

- 19—Only for outcomes measures on child level: Data collection methods. Which methods were used to collect the data?
- 20—Only for outcome measures on child level: Details of the outcome instruments used
- 21—Only for outcome measures on child level: What is the target of the outcome measure?
- 22—Only for measures on child level: Time point of outcome measurement

Section K: Data analysis

- 23—Data analysis methods
- 24—Overall analysis: Specification
- 25—Sub-group analysis? Which?

Section L: Results and conclusions

- 26—Descriptive measures of the central tendency and variability of the key variables overall
- 27—Descriptive measures of the central tendency and variability of the key variables in all sub-groups
- 28—Inferential statistics on group comparisons
- 29—Results and conclusions as reported by the authors of the study

Section M: Quality of study

- M.1—Focus on the intervention: Was the allocation sequence adequately generated?
- M.2—Focus on the intervention: Was the allocation adequately concealed?
- M.3—Focus on the outcome measure: Was knowledge of the allocation to groups adequately prevented during the study? Please consider blinding of participants, of personnel such as those delivering the intervention, and of those assessing the outcomes.
- M.4—Focus on the outcome measure: Was incomplete outcome data addressed? Please consider issues of attrition or exclusion.
- M.5—Focus on the outcome measure: Were the groups treated equally? For example: Were the data collection measures for the intervention and control group(s) the same? Were the settings the same for both groups? If relevant, was the activity delivered to both?
- M.6—Focus on the outcome measure: Is the outcome measure reliable?

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