
Title Registration for a Systematic Review: Language Interventions for Improving the L1 and L2 Development of Dual Language Learners in Early Education and Care: A Systematic Review and Meta-Analysis

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TITLE OF THE REVIEW

Language Interventions for Improving the L1 and L2 Development of Dual Language Learners in Early Education and Care: A Systematic Review and Meta-analysis

BACKGROUND

In 2014, more than 625.000 refugees applied for asylum in countries of the European Union and the amount of expected migrants for 2015 and 2016 grows (Eurostat, 2015). In Germany, for example, between January and December 2015 476.649 refugees applied for asylum. This is more than twice as much compared to the year before (+135 %; Federal Office for Migration and Refugees / Bundesamt für Migration und Flüchtlinge, 2015). From the Europe-wide 625.000 refugees in 2014, approximately one quarter was children (19 % under 14 years) and adolescents (7 % under 18 years) who are obliged for formal schooling. However, the amount of immigrated children varied significantly per country (i.e., Poland 37 %; Germany 25 %; Switzerland 22 %). For example, 99.472 children with immigration background were required to attend school (Massumi et al., 2015) and entered formal schooling without the language proficiency skills in societal spoken language in Germany.

Despite the refugee challenge, a large and growing number of students in Europe or the US come from homes where the societal language spoken in schools and daycare centers is not the primary language spoken at home (Passel, 2011). In Germany, about 35 % of all 5-year old children come from migrant families (Federal Statistics Office/ Statistisches Bundesamt, 2010). A large number of these children grow up with different languages. Dual language learners are a diverse group of children. Children who learn two or more languages simultaneously and children who learn two or more languages successively (i.e., who have made progress in learning one language when they begin the acquisition of another language). Furthermore, children whose parents speak a different language or children who are faced with a different language at home than in society are also considered as dual language learners. Growing up with two languages may cause variation in language development, but is not necessarily associated with developmental problems (Bialystok, 2001; De Houwer 2009; Tracy, 2007).

To acquire one, two or more languages, the exposure to all these languages is needed. In particular, quantitatively and qualitatively high language input is needed. But the input children receive in the second (societal) language varies considerably. Therefore, the oral language skills in the L2 and also the L1 vary significantly. In particular, most dual language learners enter school with language skills and experiences that differ substantial from monolingual children (Ballantyne, Sanderman, & McLaughlin, 2008). They often lag behind their monolingual peers due to varying input and socioeconomic situations (Dubowy, Ebert, von Maurice, & Weinert, 2008; Reardon & Galindo, 2006).

In general, language-minority students who cannot communicate proficiently in the societal language cannot participate fully in schools, workplaces, or society (August & Shanahan, 2006). Oral language skills in the preschool years are very critical to educational success. Competencies in the societal language provide the foundations for the later development of reading and writing (Weinert, 2008). A high proportion of dual language learners lags behind that of native born first language learners in academic progresses (Stanat et al., 2002; Tienda & Haskins, 2011). Early childhood is seen as a critical period for children who are dual language learners, because children are challenged in learning a new language while acquiring essential skills for school (Buysse, Peisner-Feinberg, Paez, Scheffner Hammer, & Knowles, 2014).

In addition to the challenge to acquire school readiness skills, a complex and interacting relationship between the language system of the L1 and L2 of children are suggested in literature (e.g. Brisk & Harrington, 2007; Cummins, 1979). However, findings on the learning transfer to the second language when one language is specific promoted are inconsistent. For example, no effects were found by Moser, Bayer and Tunger (2010) while small transfer effects were found by Leseman, Scheel, Mayo and Messer (2009). A high proficiency level in both languages is considered as desirable (Chilla, Rothweiler, & Babur, 2010).

A high proportion of language minority children learn their L2 within early education settings (Sachse, Budde, Rinker, & Groth, 2010). This finding highlights the need for early and effective language interventions. Several language interventions and programs in early education and care settings exist (Lisker, 2011). In the last decade, some of the language intervention programs had been implemented statewide (Lisker, 2013; Preschool Curriculum Evaluation Research Initiative, 2008). Furthermore, national language assessment and screenings were established to capture children who lag behind their peers). These children were legally bounded to participate in language interventions in early education settings (Lisker, 2011; 2013).

Language interventions in early education can be categorized in:

- a) additive programs/pull out programs with small group interventions (i.e., structured-linguistic approaches),
- b) integrated intervention with embedded strategies (i.e., interaction-promoting strategies in daily routines, shared book reading), and
- c) immersion programs with natural language input in at least two languages.

In our definition, language interventions promote oral language skills like expressive and receptive abilities in vocabulary, narration, grammar (syntax and morphology), phonology or pragmatics.

In international context, several evaluations on the impact of language intervention in early years for children who lag behind their peers exist. Some results show beneficial effects of integrated interventions (e.g., interaction-focused strategies, language modelling) on oral language development of young children (cf. Buschmann, Simon, Jooss, & Sachse, 2010; Girolametto, Weitzman, & Greenberg, 2003). Other studies, including preschool aged children, show intervention effects on phonological awareness skills that are strongly related to later reading and writing skills (Fischer & Pfost, 2015). Findings on the impact of additive language promotion programs are quite heterogeneous (e.g. Fricke, Bowyer-Crane, Haley, Hulme, & Snowling, 2013; Hofmann, Polotzek, Roos, & Schöler, 2008; Preschool Curriculum Evaluation Research Initiative, 2008). Potential explanations of the null effects of additive language programs are implementation fidelity (e.g., in-service teacher training, experience of teachers) and intervention fidelity (e.g., exposure, attention rates, and implementer). Many of those studies include dual language learners in their samples, but only few do explicitly report findings for this specific group of children.

Considering the refugee challenge and the school readiness dilemma, there is a pressing practical need for more information about effective language promotion strategies and instructional practices for dual language learners (Buysse et al., 2014; Lisker, 2010; Redder et al., 2011). This is essential for researches and practitioners to develop better intervention in early education settings to promote second language development. The systematic review and the following meta-analysis can provide important insights on what works to foster language development of dual language learners.

OBJECTIVES

The systematic review has the following research objectives:

- (1) Descriptive research synthesis of evidence based language interventions for dual language learners in early childhood education and care.
- (2) Rating of study quality through a bias index and implications for language intervention studies.
- (3) Research synthesis on the effects of language interventions for dual language learners.

The meta-analysis has the following research objectives:

- (4) Estimation of the magnitude of the effects of language interventions for dual language learners in general.
- (5) Estimation of the intervention effect of additive programs and of integrated interventions.

- (6) Subgroup analysis on variations in the effect size due to language outcomes:
 - a. L1 vs. L2
 - b. Expressive and receptive abilities in vocabulary, narrative skills, grammar (syntax and morphology), phonology and pragmatics.
- (7) Moderator analysis on the influence of intervention design
 - a. Exposure (dosage and duration)
 - b. Adherence
 - c. Beginning of intervention / Age of children
 - d. Implementer

The project aims can be summarized in the following research questions:

- (1) To which extent do language interventions in early childhood education and care effect the L2 acquisition (in the society language) of young children?
- (2) To which extent do language promoting approaches in early childhood education and care effect the L1 development of young children?
- (3) Which language intervention approach (additive vs. integrated) is more effective in promoting L2 acquisition?
- (4) Are interventions more effective, when they start early in life (before the age of three)?
- (5) Are interventions more effective when they are implemented with high fidelity (e.g., exposure, attention, external implementer vs. teacher)?

EXISTING REVIEWS

At the current state of research, three groups of reviews and meta-analyses exist: (1) Reviews on the impact of speech and language therapy for children before school, (2) reviews on the impact of bilingual education in schools, and (3) reviews on the effectiveness of early education interventions on language development (and other domains).

- (1) In the area of speech and language therapy, most reviews on the impact of language intervention either address monolingual children with speech and language impairments (Law, Garrett, & Nye, 2010; Marulis & Neumann, 2010) or preschool children who are at risk of reading disabilities (Ehri et al., 2001; McArthur et al., 2012). Furthermore, all

these reviews are concerned with abilities like phonological awareness or phonics. None of them focused on dual language learners.

- (2) Reviews addressing the effect of bilingual education and language intervention concentrate mainly on elementary and middle school aged children (Cheung & Slavin, 2012; García, Kleifgen, & Falchi, 2008; Gersten et al., 2007; Goldenberg, 2008; Reljić, Ferring, & Martin, 2014; Rolstad, Mahoney, & Glass; 2005; Slavin & Cheung, 2004). Consequently, a lot of these studies examined the development of literacy skills in dual language learners (August & Shanahan, 2006; Hammer et al., 2014) instead of oral language skills. Others focus only on specific language abilities like phonological awareness (Branum-Martin, Tao, & Garnaat, 2012) or on the development of literacy skills in dual language learners (August & Shanahan, 2006; Hammer et al., 2014). These reviews addressed topics and/or populations that are not in the scope of our research interest.
- (3) Reviews on comprehensive early education programs show that some interventions have beneficial effects on language development on preschool and kindergarten children (Chambers, Cheung, Slavin, Smith, & Laurenzano, 2010). Further, in two reviews dialogic reading was also found to be effective in fostering children's oral language skills (Mol, Bus, & de Jong, 2009; What Works Clearinghouse, 2015). In the "What Works Overview" on 17 different U.S. early education interventions on oral language abilities heterogeneous effects were found (What Works Clearinghouse, n.d.). Overall, 33 studies were included, but the majority of interventions showed no discernible effects. In the meta-analysis by Egert and Hopf (2016) including 22 studies, only marginally effects of additive programs and integrated interventions were found to foster German language skills in early education settings. Rogde, Hagen, Melby-Lervåg and Lervåg (2013) are currently conducting a systematic review on the effects of language comprehension trainings on standardized tests for children aged 4 to 16 (see Title Registration at Campbell Collaboration). Their review is limited to language and reading comprehension test scores and not specified for bilingual children. The review by Duggan and colleagues (2014) investigated the impact of early language development interventions in child care and family homes for children under the age of four, but concentrated specifically on successfully evaluated intervention studies. In the review, 11 studies were identified from which 5 were performed with bi- or multilingual children.

However, all these reviews and meta-analyses did not explicitly investigate the impact of language intervention and education on dual language learners. The article by Björklund and colleagues (2014) summarize the findings on effects of immersion education for early second language learning in Finland. However, the impact of immersion education in preschools is mostly investigated qualitative and cannot be included in systematic reviews. An explorative internet search indicated that a few intervention studies investigated immersion education or bilingual instruction in preschool and kindergarten

settings for second language learning (Cohen et al., 2014; Duran et al., 2015; Lindholm-Leary, 2014).

To the best of our knowledge only one review focused on language intervention effects in dual language learners. The review by Buysse et al. (2014) summarizes the impact of different types of interventions (early childhood programs, professional development, and curriculum implementation) on the language and literacy development of dual language learners. However, this review with 25 studies was limited to U.S. investigations published in peer reviewed journals until 2011. Most of the included studies concentrate on the impact of literacy skills instead of language abilities.

Table 1. Existing reviews and potential number of studies

Authors/Source	Topic	Target group	Number of Studies
Buysse et al., 2014	Early education	DLL	25 studies
Chambers et al., 2010	Early education programs	Preschool children	38 studies
Duggan et al., 2014	Immersion	Preschool children	5 studies
Egert & Hopf , 2016	Language interventions	Children before school	22 studies
Mol et al., 2009	Dialogic Reading	Children before school	31 studies
What Works Clearinghouse, 2015	Dialogic Reading	Preschool children	55 studies 6 (full evidence standards) 2 (standards with reservation)
What Works Clearinghouse, n.d.	Early education (oral language)	Preschool children	61 studies 22 (full evidence standards) 11 (standards with reservation)
Explorative internet search	Immersion	Preschool children	10 studies
TOTAL			247 potential studies

Altogether, the reviews on the effects of early education programs and language interventions for children before school consist of 247 potential studies (see table 1). Not all of them meet evidence standards (What Works Clearinghouse, 2013) and/or focus on language development of dual language learners. Nevertheless, some of these studies include our target population and re-analyses for DLLs are possible. The majority of studies examine additive programs. We assume to include the data of approx. 45 studies on additive

programs, approx. 20 studies with integrated approaches and 15 studies on bilingual education/immersion programs.

To summarize, the recently conducted meta-analyses and reviews did not investigate the impact of language interventions in early education settings on dual language learners. Meaningful research questions (e.g. what works for dual language learners? Are additive or integrated interventions more powerful?) were not answered yet due to constraints in selection criteria. Territory restrictions by Buysse and colleagues (2014) and What Works Clearinghouse (2015; n.d.) excluded all studies applied outside the U.S. and the review by Egert and Hopf (2016) excluded all studies outside Germany. A publication bias might appeared by Buysse et al. (2014) limiting the review to peer-reviewed journal article. Other reviews were out of our research scope due to outcomes (e.g., phonological awareness, literacy) and target group (e.g., school aged children, children with language impairments). So far, a meta-analytic statistical procedure was not performed to disentangle the impact of additive and integrated interventions. In summary, it can be stated that there is a lack of systematic analyses on the effects of different language intervention approaches on L1 and L2 development of dual language learners.

Based on the findings of the present literature, this review will differ from prior reviews on several important aspects:

- (1) The review will focus on international literature and is not limited to a territory.
- (2) To avoid a publication bias, published and non-published literature is included and the review is not narrowed to peer-reviewed journals.
- (3) Literature will be expanded to studies published after 2011.
- (4) Literature will be expanded and studies published in German and English will be included.
- (5) Selection criteria are not limited to randomized control trials. Quasi-experimental studies (without randomization) are included.
- (6) Different intervention types (e.g., integrated, additive or immersion approaches) will be included that are already established in the early education field. The effects of these interventions will be analyzed separately. Separate analyses still warrant high quality methodological analyses.
- (7) The analysis of intervention effects will be expanded on L1 and L2 oral language abilities.
- (8) When dual language learners are included in the sample of a study, but no separate data for DLLs are reported, authors will be contacted to re-analyze the data.

INTERVENTION

In early education and care, several language intervention approaches exist. In the review, intervention studies are included that measure the impact of a specific language intervention on the L1 or L2 development of dual language learners. The control group of children must be also dual language learners. Studies are included that provide language interventions in the following categories:

a) Additive, pull-out programs

Children receive specific instruction/structured intervention. The intervention is in a pull out format and the activities are applied outside the classroom (separate room) and are not integrated in daily routines. These approaches use small groups or individual lessons.

b) Integrated, interaction-based strategies in classrooms

Teacher uses specific interaction strategies during daily routines, free play and center time to foster language development (open questioning, expanding and extending ideas and utterances, corrective feedback etc.). This approach also includes (daily) dialogic reading activities.

c) Two-way immersion approaches

Children in the classroom receive language input/exposure in two languages. At least one teacher in the classroom speaks to children in first language or provides instructions in first language during the day or in circle time. Specific interaction strategies are not necessarily provided.

d) Combination of language support approaches

This category includes successive or merged combinations of programs as well as combinations of additive and integrated strategies (e.g., Recognition & Response; RTI).

POPULATION

The review includes studies that are conducted in early childhood education and care setting containing infant-toddler, preschool, or kindergarten classrooms. We exclude studies accomplished in family day care centers, because regulations for center-based child care and care in home provision differ substantial with regards to pre-service education of provider, adult-child-ratio, group size, presence of an educational curriculum and solely safety and sanitary norms (Barnett, 2014, Eurydice, 2014; Schoyerer, Weimann-Sandig, & Klinkhammer, 2016).

Target population of the review are bi- and multilingual children from birth to six years of age. Consistent with the definition of Child Trends (2014)¹, dual language learners are an diverse group of children. Children who learn multiple languages simultaneously and children who made progress on language when they begin to learn a second language. Furthermore, children whose parents speak a different language or children who are faced with a different language at home than in society are also considered as dual language learners. In particular, dual language learners who acquire the second language in early childhood setting are center of interest. Studies focusing on children with language and speech disorders, or being at risk for reading disabilities, as well as on children with physical, mental, or sensory handicaps will not be included in the review. Further, studies investigating interventions in day care homes and family day care will be excluded.

OUTCOMES

The review focuses on L1 development and L2 acquisition and development of children (one to six years of age). All facets of language outcomes are eligible. The review includes expressive and receptive measures of vocabulary/semantics, syntax and morphology, phonology, pragmatic abilities, and narrative abilities. Eligible are standardized tests, video ratings, and ratings from parents or teachers.

L1 development of dual language learners can be measured in different ways. Standardized tests and assessments are available only for a limited amount of languages (e.g., Spanish, Russian, Turkish, French). Tests can be administrated by native-speaking evaluators (e.g., PPVT, Dunn & Dunn, 2007; TVIP, Dunn, Padilla, Lugo, & Dunn, 1986). Alternatively, computer assisted assessments for some languages exists (e.g. SCREEMIK 2 for Turkish and Russian children, Wagner, 2008). Further, parental ratings on L1 development will be eligible, because of the lack of standardized instruments.

L2 acquisition and development of dual language learners should be measured through objective procedures and reliable instruments. Therefore, standardized tests accomplished by assessors or parents are eligible. Quantity and quality of utterance of children (e.g., syntax complexity, MLU) will be captured and investigated through video analyses.

Potential effect moderators:

In addition to publication bias and language bias, methodological and intervention variables will be tested as potential effect moderators. *Methodological artefacts* will be coded at treatment and effect size level. Methodological variables consist of sample size, unit of analysis, and study type (quasi-experimental vs. experimental). At effect size level, reliability of instruments, source/informant (e.g., teacher rating, observation, assessment / assessor

¹ „There is no single consistently used definition of dual language learners. The one used here takes an inclusive approach, counting as DLLs all children living in a household where one or more members speak a language other than English. We assume that these children, in addition to their exposure to a non-English language, have some degree of exposure to English.” (Child Trends (2014). *Databank indicators. Dual Language Learners*. Available at: <http://www.childtrends.org/?indicators=dual-language-learners>)

blind) and selection bias (initial difference at pre-test) will be coded. Further, *treatment* effects are assumed to be influenced by type of intervention, dosage and duration, group size of intervention, and implementer. Several *individual developmental factors* are known to influence dual language learners' development. In particular, age, nonverbal intelligence, phonological working memory, exposure to language, and type of bilingualism are listed in literature. Further, children's starting level at pre-test and a risk index for language delays are potential effect moderators, which have to be considered.

STUDY DESIGNS

Selection criteria for inclusion:

- (1) Intervention studies (e.g., randomized controlled trials, clustered randomized trials, and quasi-experimental studies) must address dual language learners receiving specific language intervention in early education and care settings. Treatment must be compared to one (or more) comparison condition(s).
- (2) Control group of children must be also dual language learners who receive either a wait list treatment, a treatment as usual (e.g., regular child care attendance), placebo treatment, no treatment or an alternative treatment (e.g., similar condition set up as a contrast to the treatment condition that should not have an impact on language development). Studies are excluded in which control children are not enrolled in center-based care or early childhood education.
- (3) There must be quantitative data for at least 10 participants in each condition. The statistical power analysis ($\rho=0,5$; $1-\beta=0,9$; $\alpha=.05$) for a 2 x 2 ANOVA (two groups with two measurement points) requires this minimum standard of 10 participants per group for a large effect size. This is in accordance with Döring and Bortz (2016) who suggest for a 2 x 2 ANOVA ($\rho=0,5$; $1-\beta=0,8$) minimum sample sizes of 8 ($\alpha=.05$) to 11 ($\alpha=.01$) participants per group for a large effect size.
- (4) Treatment(s) must be implemented in center-based care settings (e.g. infant-toddler classrooms, preschools, or kindergartens). Studies will be excluded if intervention was accomplished in clinical or family settings.
- (5) Treatment can be implemented by educator/teacher or external trainer. Therapeutic interventions that are implemented by speech pathologists in early childhood settings are not eligible.
- (6) Studies must provide quantitative data on language development of young children aged zero to six (for details see outcome section).

Further, the date of publication must be 1960 or later. Studies from any country will be included, but the country of origin will be examined as covariate.

OTHER CRITERIA

Following current standards, we will select academic and grey literature. We will include literature in English and German. Authors of reports will be contacted if sufficient information is not reported to calculate effect sizes.

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ROLES AND RESPONSIBILITIES

- **Expertise on content (language development, assessment of language, reading and spelling abilities, language and literacy intervention, dual language learners), information retrieval and systematization of findings within this topic:**

Prof. Steffi Sachse is professor for “Developmental Psychology on Language Development” at the University of Education Heidelberg. *Dr. Katarina Groth* is a psychologist and speech and language pathologist and was until December 2015 head of the research group “Language and literacy development” of the ZNL Transfer Center for Neuroscience and Learning at the University Medical Center Ulm. Currently she is member of the learning academy of the ZNL Transfer Center for Neuroscience and Learning at the University Medical Center Ulm and a Senior Scientist at the Department of Child Development and Child Care of the German Youth Institute in Munich (Deutsches Jugendinstitut, DJI).

Steffi Sachse and Katarina Groth have both great expertise in the field of language development in mono- and multilingual children, are familiar with assessing language abilities in different age groups and are aware of the challenges regarding the assessment of the different languages of dual language learners. They conducted several intervention studies (randomized controlled trials as well as quasi-experimental designs) in the field of language promotion in mono- and multilingual children in pre-school and kindergarten which were published in the national domain. Additionally, Katarina Groth investigated at the Department of Child and Adolescent Psychiatry and Psychotherapy of the University Hospital

Munich the effectiveness of literacy programs for children with developmental dyslexia and intervention induced neurophysiological correlates. Results are published nationally and internationally. Currently, Steffi Sachse and Katarina Groth are involved in research projects examining the effects of language promotion programs, as well as the effects of interaction trainings of day care staff in dual language learners and investigate specific factors that predict successful development of second language abilities (here German) of three- to five-year-old children in early day care centers.

- **Expertise on systematic review methods, statistical analysis, and information retrieval:**

Dr. Franziska Egert is a member of the research group “Language and literacy development” of the ZNL Transfer Center for Neuroscience and Learning at the University Medical Center Ulm and a Senior Scientist at the State Institute of Early Childhood Research (Staatsinstitut für Frühpädagogik, IFP Bayern). She was professor for “Quantitative Social Research” (Quantitative Sozialforschung) at the University of Applied Science Esslingen. Franziska Egert conducted several meta-analyses in the early childhood education field. Recently, she finished a meta-analysis on the impact of language intervention in preschool in Germany with Prof. Dr. Hopf (University of Applied Science Düsseldorf). In her PhD-Project, she conducted four meta-analyses on the impact of in-service professional development programs for preschool teachers on quality ratings and child outcomes (language, literacy, social-emotional competencies). From 2008 – 2010, she was research assistant and rater in a Campbell Collaboration review and is familiar with the procedures. In 2009 she made certificate on “information retrieval and electronic search” at the University of Constance. Franziska Egert has great expertise with the statistical procedures and meta-analytic techniques in the statistical packages Comprehensive Meta-analysis CMA or MLwiN-software for multi-level meta-regression.

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Our deadline to complete the review is December 2017.

POTENTIAL CONFLICTS OF INTEREST

All authors published research papers in the area of review. The authors are all experienced researchers in the field of language and literacy development and externally evaluated the impact of two different language interventions (e.g. KIKUS or Vorlaufkurs Deutsch). Further, two authors developed in-service teacher trainings in the area of language development (e.g., HIT or VERBAL*).

All authors assure that there is no potential conflict of interest. The systematic review and the meta-analysis will be conducted with regards to the standards and guidelines of the Campbell Collaboration and the Cochrane Collaboration with high quality, rigor and research objectivity.

PRELIMINARY TIMEFRAME

- Date of title registration: 24 June 2016
- Date to submit a draft protocol: 31 October 2016
- Date to submit a draft review: 31 December 2017

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Date: 24 June, 2016