

How early can risk factors for language and literacy problems be identified?



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Introduction

The broad question of this systematic review is how early in development we can identify the risk factors that influence occurrence of oral language and reading comprehension problems. There are numerous individual studies on different aspects of language and reading comprehension problems showing evidence relating to identification of some risk factors. One objective of these studies is to inform policy and practice. The great diversity in research designs, the outcomes measured, methodological approaches to data analysis, and variability in research participants' demographics in the published literature, does not permit generalization. The systematic review of this literature undertaken on this project is important to informing both policy and practice.

Objectives

The systematic review is designed to

- 1) identify, evaluate, and synthesize the findings of the high quality literature on early risk factors for **oral language impairment** and **reading comprehension difficulties**
- 2) provide rigorous, reliable and valid conclusions that can be used for policy and practice with confidence

Procedures/Steps taken

1) Identification of the research question(s) and conceptual framing

Research team identified the outcome variables, potential risk factors/predictor variables, population, location, type of study/methodology including intervention/treatment and discussed them with the systematic review team. Relevant databases were identified.

2) Development of Search Strategies

To ensure a broad yet focused capture of literature devoted to the research question, we used the search strategy process that includes a comprehensive list of **free terms** and **controlled vocabulary**.

- **Free terms** were used to identify matching and/or complementing **controlled vocabulary** using database thesauri.
- A **facet analysis** (grouping like terms according to category) was performed for all population, location, intervention/treatment, and outcome terms.
- Search terms were linked using truncation and **Boolean** terms, resulting in a single search strategy for each category of terms.
- All category search strings were then combined to create the **final search strategy**.

3) Searching

- **Search Engines:** Academic Search Premier, Education Index Full Text, ERIC, International ERIC (Australian & British), Linguistics and language Behavior Abstracts, PsycINFO, PubMed, Web of Science
- **Years covered by search:** 1995-2007
- Search results were documented in a **search diary**.
- The final search strategy was applied within each database and results were imported to **RefWorks**.

4) Initial Review of Results

Once all the search results were imported to RefWorks and sorted for duplicates, inclusion and exclusion criteria were applied to remove non-relevant material from the review process. The criteria were developed collaboratively by the Research team, Information Retrieval Specialist and Reviewer(s). Initial inclusion/exclusion took place using titles and abstracts only.

5) Inclusion/Exclusion Criteria

Inclusion: Studies that

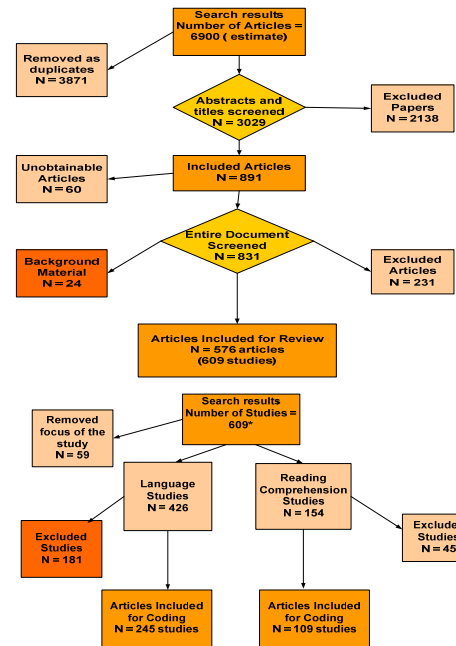
- are empirical
- are written in English language in peer reviewed journals
- used valid measures of language or reading comprehension as an outcome
- focused on one or more risk factors (i.e., independent variables) at a point in time or measured change over time
- include sample size of 30 or above per group

Exclusion: Studies that focus on

- children with developmental disabilities and acquired neurological problems
- hearing impairment, deafness, and blindness
- autism
- literacy and language impairment in English as a second/foreign language
- descriptives or correlational analyses only
- language and reading skills in youth older than 11 (grade 7 and up).

Predictors of Language and Reading Comprehension Included in the Study Screened by Sample Size and Analytic Method

Predictors	Language	Reading Comprehension
Verbal ability measures	23	27
Nonverbal ability measures/Non-verbal IQ	14	11
Verbal/phonological short-term memory	15	13
Verbal working memory	7	15
Rapid Automated Naming (RAN)	11	20
Phonics	31	15
Orthographic knowledge	40	34
Word reading	34	34
Reading fluency	13	14
Sentence comprehension	3	1
Text comprehension	5	15
Mother/caregiver-child interaction	32	2
Phonological awareness	64	50
Vocabulary	58	33
Syntax	17	11
Listening comprehension	8	10
Home factors	42	10
Effect of instruction/intervention	56	34
Gender	39	10
Learning Disabilities (LD)	12	3
Reading Disabilities (RD)	10	6
Socioeconomic Status (SES)	54	17



*Some studies may include both language and reading comprehension as the outcome measure. These studies are included in the language and reading comprehension sections. As the result, the total of language studies and reading comprehension studies is more than the total of 609 studies.

6) Documentation and Reliability Check

- Reviewers record all inclusion/exclusion decisions.
- A reliability check is completed by a second reviewer. **Reliability was set at 90%**.

7) Document Retrieval

- After the initial quality assessment, the full texts of all "qualified" studies were retrieved for the second stage of review, on line, via university libraries or interlibrary loans.
- A record of the articles that are being retrieved is kept to ensure that all studies are indeed retrieved.
- Qualified citations were exported from RefWorks to Excel spreadsheets. the reviewers complete the "Document Retrieval Form".

8) Secondary Review & Coding

- The researchers and reviewers created a more detailed secondary Inclusion Eligibility Form and Coding Criteria.
- Studies were reviewed based on the inclusion eligibility and coding criteria. It was at this stage that more studies were excluded due to inappropriate research designs.
- The secondary review was performed by two reviewers with keen understanding of experimental design and statistical methodologies.
- Reliability check was run on all 'excluded' studies. **Reliability was set at 100%**.

Current Stage of the Systematic Review: Coding

- We developed coding categories for data extraction using **EPPI-Reviewer database version 3.0**.
- Up until this point, 46 studies have been coded by the reviewers. All articles that met the review criteria after the secondary review process will be coded.
- Reviewers code information according to the appropriate data extraction categories developed by the research team using a **data extraction spreadsheet**.

Next Step: Meta-analysis

Meta-Analysis standardizes and quantifies the findings of multiple studies investigating the impact of a predictor, a treatment or an intervention, allowing researchers to report a combined, single result for an identified outcome variable. Meta-Analysis combines the effect sizes of multiple studies and calculates a single expression of impact.

We will gather data for meta-analysis during the data extraction procedure. The following steps will be taken to calculate the effect size for independent variables on reading comprehension or language measures. We will

- retrieve various statistical information necessary to calculate effect sizes,
- calculate effect sizes for each study,
- combine the effect sizes for each predictor variable.

Conclusion

The results of this review will have the potential to make a direct impact on development of Canadian children's language and literacy as it aims at composing, analyzing, and synthesizing the results of research on oral language and reading comprehension in the past twelve years. At a theoretical level, the main objective of this review is to identify early risk factors for language impairment and reading comprehension difficulties. At a practical level, the objective of this review is how early we can identify children who are at-risk for developing language and literacy difficulties. Having this in mind, this review will provide sufficient information to make it possible for policy makers, educators, and/or practitioners to identify and intervene with children at risk for oral language and reading comprehension difficulties and to devise age-appropriate assessment tools.

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