

Risk Factors Associated with Language Development Problems in Childhood - A Literature Review

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Background: Children with language problems are found to have a higher risk for future academic difficulties and learning disabilities. Conclusions from related literature were in many ways inconsistent.

Objective: To identify systematically, the existing literature, and factors that influence language development in children.

Material and Method: Databases of scientific literature were screened through the internet for publications that involved factors effecting language development in childhood. Hard copies of related scientific journals were also sought for relevant topics by the authors, making use of reference lists of publications, and citation search. Studies were included if they were published since 1984 and investigated factors that affect language development in children. They were excluded if they were not original research articles.

Results: Fifteen studies were included for this review - a case-control study, a cross-sectional study, and thirteen longitudinal studies. Most studies demonstrated that the following factors affect language development - antenatal care, Apgar scores, birth weight, premature delivery, birth order, parental education, environmental factors, gender of the children, and family history with specific language impairment.

Conclusion: Perinatal/postnatal and environmental factors influence language development. Such factors should be taken into account as confounding factors in further language development studies.

Keywords: Language development, Child language development, Antenatal care, Apgar score, Birth weight, Premature, Birth order, Parental education, Environmental factors, Gender and family history, Perinatal, Postnatal, Social and Literature review

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Language development among children is a complex process and very important for communication⁽¹⁾. Language impairments are common and well - recognised as important neurodevelopmental childhood disorders⁽²⁾ defined as Specific Language Impairment (SLI). Children with sensory, neuromotor and cognitive deficits present an impairment of language development. The prevalence of SLI among preschool children has been estimated to be about 2% to 8%⁽³⁻⁵⁾. Children with language problems have been found to have a higher risk for future academic difficulties and learning disabilities⁽⁶⁾, as well as for psychiatric, neurological, and/

or behavioral problems⁽⁷⁻¹⁰⁾. However, conclusions from this literature were in many ways inconsistent. This paper reviews these studies in a systematic approach.

Material and Method

Inclusion and exclusion criteria

Studies were included if they were published since 1984 and investigated factors that affect language development in children. The studies were excluded if they were not original research articles, such as meta-analysis or other types of review.

Searching method

The authors searched relevant research articles in PubMed database (www.ncbi.nlm.nih.gov), a

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reference database provided by the National Library of Medicine, USA. For searching titles, abstracts and keywords of papers the following terms had been used: “factors”, “language”, “development” and “children”. Initially the terms and combination of keywords or phrases have been applied such as “language development” and “child development”, and “factors and language development”. Additional search sessions used the keywords mentioned above in combination with the terms “factors”, “language”, “development” and “children”. The MESH terms were used on these for searching as well.

Another source of the articles was hard copies of the leading journals of a given field and identified relevant publications, especially those who cross about narrow boundaries of a given topic of interest. The authors also followed references listed in the relevant articles found by the searching methods mentioned above. The authors did these until there were no more articles left unidentified.

Critical appraisal method

The authors focused their approach on the magnitude of effects for each factor using statistics that were presented in the papers. Mean differences were used if the outcome was measured on a continuous scale such as a score obtained by language development tools. In cases where the outcome was dichotomous, Relative Risk (RR) or Odds Ratios (OR) were used as available. If such figures were not available in the papers, existing numbers that allowed calculating these were used STATA. The 95% confidence intervals were calculated for each of the effects. To facilitate interpretation, findings were presented as forest plot. However, no attempt was made to combine such results as this was not the aim of the presented paper.

Results

Twenty-five publications related were found but ten of these were excluded from the present review. The excluded studies were on unrelated language development (four on mental and psychological development, one on adult language), not original research articles (2), and inaccessible original papers (3).

Fifteen publications were included and were on case-control studies⁽¹¹⁻¹⁵⁾ (5), cross-sectional studies⁽¹⁶⁻¹⁸⁾ (3), cohort studies^(1,19,20) (3), and longitudinal studies⁽²¹⁻²⁴⁾ (4). Summary of the findings are shown in Fig. 1 and 2. The summary is presented in forest plots. The studies were grouped according to factors and described in detail.

Antenatal care (ANC)

As shown in Fig. 1, only one study investigated the association between antenatal care and language development outcomes such SLI. From the cross-sectional study by Stanton-Chapman et al⁽¹⁸⁾ in children age 6-7 years, there was a weak risk of SLI. The children born to mothers enrolled for ANC at the 2nd, 3rd trimester showed a smaller risk compared to children born to mothers enrolled for ANC at the 1st trimester.

Apgar scores

Apgar score is associated with child’s brain functional and neurological development. It is an indicator of increased risk for specific language development in school children. The study of Staton-Chapman et al⁽¹⁸⁾ demonstrated that children who had Apgar scores of 0-3 at five minutes are more than two times likely to have SLI than those who had Apgar scores of seven or higher (Fig. 1).

Birth weight and premature birth

Four studies reported the association between birth weight and language outcome as shown in Fig. 1 and 2. The studies by Stanton-Chapman et al⁽¹⁸⁾, Aram et al⁽¹¹⁾, and Weicdrich et al⁽²¹⁾ clearly showed that birth weight was a risk of unsatisfied language development outcome while the study by Rice et al⁽¹⁴⁾ showed that such evidence was not conclusive. Luoma et al⁽²⁰⁾ also investigated language comprehension and production in prematurely born children. This study found that there were lower scores in both language comprehension and production.

Breast feeding

In Fig. 1, Tomblin et al⁽¹⁵⁾ shows the significant protective effect of breast feeding on SLI. That is, breastfeeding can reduce the risk of SLI in about 50% and 60% in children that have been breast fed and had breast feeding for more than nine months respectively. The risk effects were also reported to be about 1.5 times as likely for a child that had been breast fed for less than three months, but were not significant. In addition, a study by Vestergaard et al⁽²⁴⁾ found that the longer the duration of Exclusive Breast Feeding (EBF), the better the polysyllable babblers.

Gender

SLI is four times more prevalent in males than females (4:1)⁽¹⁶⁾. Mothers with SLI had seven times as many boys and four times as many girls with SLI. A

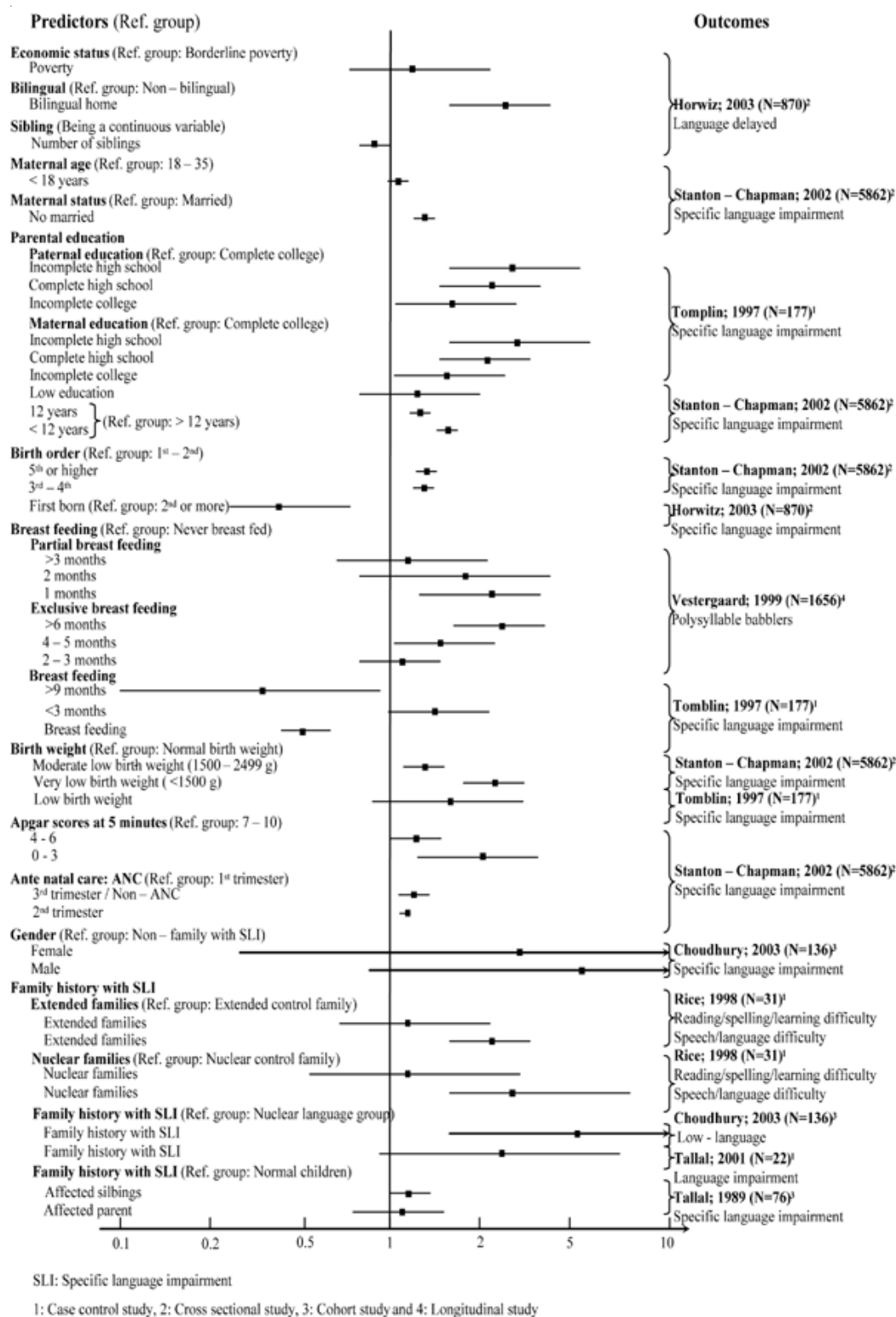
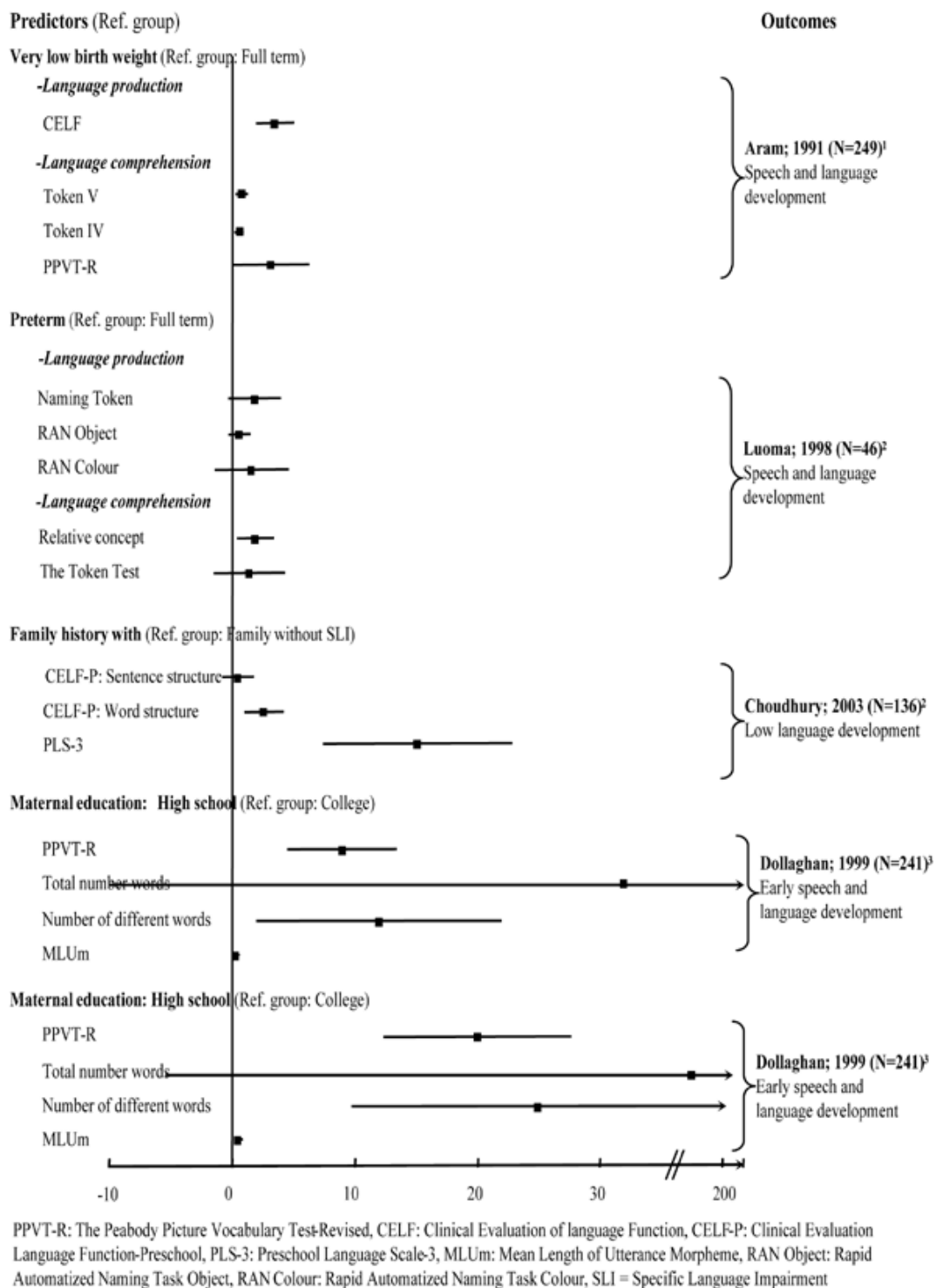


Fig. 1 Summary the association of potential factors influencing language development in childhood. The magnitudes of effects are presented as Odds Ratios (OR) and Relative Risks (RR) and 95% confidence intervals



1: Case control study, 2: Cohort study and 3: Longitudinal study

Fig. 2 Summary the association of potential factors influencing language development in childhood. The magnitudes of effects are presented as mean differences and 95% confidence intervals

recent study supported that children with a family history of SLI tend to be at greater risk for SLI than those in families without SLI. This is true for both males and females. In general, boys are at greater risk than girls⁽¹⁹⁾ as shown in Fig. 1.

Birth order

Two studies demonstrate that the birth order effects children's language development as shown in Figure 1. From the Horwitz et al study⁽¹⁷⁾, the first born children are two times more likely to gain benefits for language developmental skills than the later/single born child⁽¹⁷⁾. Moreover, the results showed that later born children are 1.5 times more likely to have SLI than children of first born order⁽¹⁸⁾.

Parental education

Three studies investigated parental education and children's language development as shown in Fig. 1 and 2. Dollaghan et al⁽²²⁾ demonstrated that the mean language score of mothers who completed less than high school was significantly lower than children born to mothers who graduated from high school or higher. Tomblin et al⁽¹⁵⁾ showed that parental education was associated with their children's language development. Children born to parents with low educational level are more than two to three times likely to have language impairment than those who were from parents with a higher degree^(15,18).

Environmental factors

Several environmental factors are associated with a child's language abilities such as children born from unmarried mothers are 1.5 times more likely to have SLI than children born from married mothers. Factors such as maternal age, number of siblings, bilingual home and poverty are more likely to be risk factors of children with SLI⁽¹⁷⁾. Children, who have bilingual homes, particularly, are about three times more likely to have increased expressive language delay in preschool as shown in Fig. 1.

Family history with language developmental delays

There are several studies that have reported the association between family history and language development delay as shown in Fig. 1 and 2. Children born to families with a history of SLI are at risk of language impairment.

Conclusion

The authors systematically summarized 15

original studies using a critical appraisal approach. This present review was scientifically concluded from those studies to answer the purpose mentioned above. This implies that a number of potential risk factors influence language development in children, giving details of those factors.

The literature suggests that factors that significantly increase the risk of language impairment include antenatal care, Apgar scores, birth weight, premature delivery, birth order, parental education, environmental factors, gender of the children, number of siblings and family history with specific language impairment. However, the roles of some factors are not conclusive and need further investigation. These include environmental factors such as maternal age, poverty, type of family. This review shows the clear benefit of breast feeding on language development. That is, the longer the duration of breast feeding, the lower the risk of language impairment. While the studies have recently been completed, further research is needed to determine the exact role of breast milk.

References

1. Tallal P, Ross R, Curtiss S. Familial aggregation in specific language impairment. *J Speech Hear Disord* 1989; 54: 167-73.
2. Busari JO, Weggelaar NM. How to investigate and manage the child who is slow to speak. *BMJ* 2004; 328: 272-6.
3. Law J, Boyle J, Harris F, Harkness A, Nye C. The feasibility of universal screening for primary speech and language delay: findings from a systematic review of the literature. *Dev Med Child Neurol* 2000; 42: 190-200.
4. Law J, Boyle J, Harris F, Harkness A, Nye C. Screening for primary speech and language delay: a systematic review of the literature. *Int J Lang Commun Disord* 1998; 33(Suppl): 21-3.
5. Law J, Boyle J, Harris F, Harkness A, Nye C. Screening for speech and language delay: a systematic review of the literature. *Health Technol Assess* 1998; 2: 1-184.
6. Lewis BA, Freebairn LA, Taylor HG. Academic outcomes in children with histories of speech sound disorders. *J Commun Disord* 2000; 33: 11-30.
7. Redmond SM, Rice ML. The socioemotional behaviors of children with SLI: social adaptation or social deviance? *J Speech Lang Hear Res* 1998; 41: 688-700.
8. Sasaki T, Okazaki Y, Akaho R, Masui K, Harada S, Lee I, et al. Type of feeding during infancy and

- later development of schizophrenia. *Schizophr Res* 2000; 42: 79-82.
9. Kim H. What is the prevalence of social skill, speech and language deficits in adolescents with significant psychiatric mental health problems? [Web Page]. 2002; Available at <http://www.med.monash.edu.au/healthservices/cce/evidence/pdf/b/377.PDF>. (Accessed 8 March 2005).
 10. Fergusson DM, Woodward LJ. Breast feeding and later psychosocial adjustment. *Paediatr Perinat Epidemiol* 1999; 13: 144-57.
 11. Aram DM, Hack M, Hawkins S, Weissman BM, Borawski-Clark E. Very-low-birthweight children and speech and language development. *J Speech Hear Res* 1991; 34: 1169-79.
 12. Tallal P, Hirsch LS, Realpe-Bonilla T, Miller S, Brzustowicz LM, Bartlett C, et al. Familial aggregation in specific language impairment. *J Speech Lang Hear Res* 2001; 44: 1172-82.
 13. Tomblin JB. Familial concentration of developmental language impairment. *J Speech Hear Disord* 1989; 54: 287-95.
 14. Rice ML, Haney KR, Wexler K. Family histories of children with SLI who show extended optional infinitives. *J Speech Lang Hear Res* 1998; 41: 419-32.
 15. Tomblin JB, Smith E, Zhang X. Epidemiology of specific language impairment: prenatal and perinatal risk factors. *J Commun Disord* 1997; 30: 325-43.
 16. Robinson RJ. Causes and associations of severe and persistent specific speech and language disorders in children. *Dev Med Child Neurol* 1991; 33: 943-62.
 17. Horwitz SM, Irwin JR, Briggs-Gowan MJ, Bosson Heenan JM, Mendoza J, Carter AS. Language delay in a community cohort of young children. *J Am Acad Child Adolesc Psychiatry* 2003; 42: 932-40.
 18. Stanton-Chapman TL, Chapman DA, Bainbridge NL, Scott KG. Identification of early risk factors for language impairment. *Res Dev Disabil* 2002; 23: 390-405.
 19. Choudhury N, Benasich AA. A family aggregation study: the influence of family history and other risk factors on language development. *J Speech Lang Hear Res* 2003; 46: 261-72.
 20. Luoma L, Herrgard E, Martikainen A, Ahonen T. Speech and language development of children born at < or = 32 weeks' gestation: a 5-year prospective follow-up study. *Dev Med Child Neurol* 1998; 40: 380-7.
 21. Weindrich D, Jennen-Steinmetz C, Laucht M, Esser G, Schmidt MH. At risk for language disorders? Correlates and course of language disorders in preschool children born at risk. *Acta Paediatr* 1998; 87: 1288-94.
 22. Dollaghan CA, Campbell TF, Paradise JL, Feldman HM, Janosky JE, Pitcairn DN, et al. Maternal education and measures of early speech and language. *J Speech Lang Hear Res* 1999; 42: 1432-43.
 23. Spitz RV, Tallal P, Flax J, Benasich AA. Look who's talking: a prospective study of familial transmission of language impairments. *J Speech Lang Hear Res* 1997; 40: 990-1001.
 24. Vestergaard M, Obel C, Henriksen TB, Sorensen HT, Skajaa E, Ostergaard J. Duration of breastfeeding and developmental milestones during the latter half of infancy. *Acta Paediatr* 1999; 88: 1327-32.

ปัจจัยที่มีความสัมพันธ์ต่อความผิดปกติของพัฒนาการทางภาษาในเด็ก - การทบทวนวรรณกรรม

บุญญพัฒน์ ไชยเมล์, บัณฑิต ถิ่นคำพร, เจศฎา ถิ่นคำพร

ที่มา: เด็กที่มีความผิดปกติทางด้านภาษาพบว่ามีความเสี่ยงและส่งผลต่อความผิดปกติทางการเรียน และการเรียนรู้ในวัยที่สูงขึ้น จากทบทวนวรรณกรรมที่เกี่ยวข้องให้ผลที่ไม่สอดคล้องกันในหลายประเด็น

วัตถุประสงค์: เพื่อที่จะศึกษาปัจจัยที่มีผลต่อการพัฒนาการทางด้านภาษาในเด็กจากการทบทวนวรรณกรรมที่เกี่ยวข้องอย่างเป็นระบบ

วัสดุและวิธีการ: การศึกษาครั้งนี้เป็นการทบทวนวรรณกรรมที่เกี่ยวข้องกับปัจจัยที่มีผลต่อพัฒนาการทางด้านภาษาในเด็ก โดยทำการสืบค้นข้อมูลจากฐานข้อมูลทางอินเทอร์เน็ต วารสารวิชาการที่เกี่ยวข้อง การสืบค้นจากเอกสารอ้างอิงตามงานวิจัยที่ได้รับการตีพิมพ์ และฐานข้อมูลในเอกสารอ้างอิง โดยรวบรวมงานวิจัยที่ศึกษาถึงปัจจัยที่มีผลต่อพัฒนาการทางด้านภาษาในเด็กที่ได้รับการตีพิมพ์ตั้งแต่ปี พ.ศ. 2527 งานวิจัยถูกทำการคัดออกในกรณีที่ไม่ได้เป็นงานวิจัยต้นฉบับ

ผลการศึกษา: จากการทบทวนวรรณกรรมพบว่าม้งานวิจัยที่เกี่ยวข้องจำนวน 15 เรื่อง เป็นการศึกษาแบบ case - control study จำนวน 1 เรื่อง, การศึกษาแบบ cross-sectional study จำนวน 1 เรื่อง และการศึกษาแบบ longitudinal study จำนวน 13 เรื่อง ผลการศึกษาส่วนใหญ่แสดงให้เห็นว่ามีปัจจัยต่าง ๆ ที่มีผลต่อพัฒนาการทางภาษา ได้แก่ การฝากครรภ์, Apgar score, น้ำหนักทารกแรกคลอด, การคลอดก่อนกำหนด, ลำดับที่ของบุตร, การศึกษาของบิดามารดา, ปัจจัยทางสิ่งแวดล้อม, เพศ และประวัติครอบครัวที่มีผิดปกติทางด้านภาษา

สรุป: ปัจจัยก่อนและหลังตั้งครรภ์ และปัจจัยทางสิ่งแวดล้อมมีอิทธิพลต่อพัฒนาการทางภาษาในเด็ก ดังนั้นปัจจัยดังกล่าวควรได้รับการควบคุมในการศึกษาในรูปแบบของปัจจัยกวน (confounding factors) ในการศึกษาทางด้านพัฒนาการทางภาษาต่อไป