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STUDENT LEARNING, CHILDHOOD & VOICES | RESEARCH ARTICLE

IQ, non-cognitive and social-emotional parameters influencing education in speech- and language-impaired children

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Abstract: Speech-/language-impaired (SL)-children face problems in school and later life. The significance of “non-cognitive, social-emotional skills” (NCSES) in these children is often underestimated. *Aim:* Present study of affected SL-children was assessed to analyse the influence of NCSES for long-term school education. *Methods:* Nineteen severely SL-impaired children (7 girls, 12 boys) from a specialised kindergarten were followed; follow-up period: Up to 12 years; the different skills or parameters were known. *Results:* Fourteen children visited successfully a regular secondary school (RS), five children a “school focussing on learning problems” (SFL). SL-differences between the children attending RS and SFL were small; differences in “IQ” and “self-confidence” were significant, smaller differences were observed concerning “skills at crafts/construction” and “auditory-visual perception”. *Summary:* Although the study group is small, results give evidence that beside SL- and “cognitive” skills “non-cognitive, social-emotional skills” are of major importance for long-term school education of SL-impaired children. These soft skills seem to be particularly important for “special need children” with SL-impairment.



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ABOUT THE AUTHORS

The authors are an interdisciplinary group (paediatrician, ENT, specialised educator) involved in practice and theory in the education of language- and/or speech-impaired pre-school children. In lower Saxony/Germany, those children with severe speech- and/or language impairment are able to attend a “speech-language therapy kindergarten”. The authors are not only interested in the development of the children during “kindergarten education” but also in long-term school education and the various skills/qualifications crucial for success or failure later. Theoretical knowledge and actual scientific findings have proved to be helpful in the improvement of practical work.

PUBLIC INTEREST STATEMENT

Worldwide speech-/language-(SL) impaired children face major problems in school career and later life. It is hypothesised that these issues are in part at least also an effect from focussing predominately on cognitive abilities and SL-competences in school education. In the present study, the development of school education was followed in a small group of 19 SL-impaired children by assessing non-cognitive, social-emotional skills. Fourteen children visited successfully a regular secondary school, five children were transferred to a “school focussing on learning problems”. Findings regarding non-cognitive, social-emotional parameters give evidence that for educational achievement beneath IQ soft skill, such as self-esteem and creativity are very important. There are also indications that the impact of soft skills might be more important than SL-abilities. According to the authors’ opinion the promotion of so-called soft skills should be strengthened in educational work, especially in disadvantaged children.

Subjects: Education Studies; Inclusion and Special Educational Needs; School Psychology

Keywords: speech-/language impairment; non-cognitive skills; social-emotional skills; IQ; self-confidence; special needs school education

Worldwide, speech-/language-(SL) impaired children are disadvantaged well into adulthood, but the exact causes of this discrimination remain the subject of much controversy. Multiple cognitive and speech parameters, as well as non-cognitive and social parameters seem to affect long-term prognosis in severely speech- and language-impaired children. The goal of this study is a comprehensive longitudinal assessment to understand the impact of (generally underestimated) soft skills on the development of children.

1. Introduction

Primary and secondary education allows children to develop skills and knowledge that are essential for social and economic success in later life (Glogowska, Roulstone, Peters, & Enderby, 2006; Heckman, 2011). Most developed countries have an education system that is focused predominantly on developing cognitive abilities in children. These abilities can be measured using intelligence quotient measurements and other formalised assessment processes. Cunhan, Heckman, Lochner, & Masterov (2007) demonstrated that psycho-social or “soft” skills, such as self-esteem, motivation and ability to work in a team are often undervalued in the education system, resulting in a lack of these essential skills in later life (Barron, 2003; Beitchman et al., 2008; Borghans, Meijers, & Ter Weel, 2008). Other studies demonstrated, that early childhood education can achieve a substantial level of skill development compared to the required effort to teach these skills to adolescents or adults (Borghans et al., 2008; Cunhan et al., 2007; Durkin, Simkin, Knox, & Conti-Ramsden, 2009; Heckman, 2011; Miniscalco, Hagberg, Kadesjö, Westerlund, & Gillberg, 2007).

Children with speech-/language impairment are disadvantaged from early childhood onwards, and lasting effects are often present into adulthood (Clark et al., 2007; McLeod & McKinnon, 2007; Wadman, Botting, Durkin, & Conti-Ramsden, 2011). In lower Saxony, Germany, children with severe speech- and language impairment are able to attend “speech therapy kindergartens” (STK) during their pre-school years. This system has been in place since the 1980s (Flöther, Schlüter, & Bruns, 2011).

Affected children tend to have a variety of speech and language deficits. Assessment by speech therapists and medical doctors is a prerequisite for attendance at an STK. This assessment confirms that the child’s speech-/language impairment qualifies him/her for additional therapy, and excludes other, possibly treatable, medical issues.

Children aged 4–6 years attend an STKs, and therapy is designed based on the assumption that any speech-/language impairment is curable. One childcare worker is responsible for up to four children leading to a good personal relationship between the children and the childcare worker. The childrens’ education is additionally supported by speech therapists, occupational- and physiotherapists and psychologists.

The author’s own findings demonstrate that, approximately 75% of children with significant language impairment attending an STK were later able to attend a regular secondary school. Approximately 25% of children require on-going support in specialised secondary schools with further learning support (Ullrich, Ullrich, & Marten, 2009, 2014).

Cognitive and speech-/language skills are important for on-going success in education, as are psycho-social skills and social support structures for children, particularly for those with a speech impairment. However, the impact of social-emotional and non-cognitive skills on a positive child development are frequently underestimated. In the present study, the authors aimed to conduct a comprehensive assessment of cognitive, language and non-cognitive skills, as well as social and

epidemiological parameters, which may affect the speech-/language-impaired child's sustainable learning abilities. So the study is focussing on the impact of social-emotional and non-cognitive skills and the educational outcome of speech-/language disturbed children. Once the importance of individual parameters for long-term educational success has been evaluated, education programs and therapy for children with SL impairment can be optimised accordingly.

2. Methods

The study was designed as a prospective, longitudinal study, with some retrospective data collection for completeness. The study population included 19 children (7 girls, 12 boys), aged 10–18 years, with a median age of 13 years. All children had attended the same study STK near Hannover, Germany between 2000 and 2007 for a median duration of 16 months (range 11–35 months).

As described above, SL education in the STK follows a multidisciplinary approach involving child-care staff, speech therapists and physiotherapists as well as psychologists. The concept is based on the assumption, that almost every affected child is treatable to such an extent that it can be educated at a regular primary and secondary school. Prerequisites for enrolment in the STK include disturbed speech-/language development, unsuccessful intensive outpatient therapy and exclusion of any major medical illness.

Upon admission to the STK children were approximately 4 years old and verbal communication skills were severely limited or non-existent. After therapy had been completed all children were 6–7 years old and continued their primary school education at a regular elementary school. Questionnaires assessed further education following discharge from the STK. Informed consent for data collection and publication of results was obtained from participants and their parent or legal guardian. The study adheres to the Declaration of Helsinki.

Table 1. Psycho-social parameters, language and other skills assessed in the study cohort

<i>Language skills</i>
Communication behaviour
Understanding of language
Vocabulary
Condition of speech organ
Articulation
Auditory perception
Grammar
<i>Social-epidemiological parameters</i>
Number of siblings
Family income
Duration of attendance speech therapy kindergarten
<i>Cognitive skills</i>
IQ
<i>Non-cognitive skills</i>
Self-confidence
Focussing/stamina
<i>Mixed cognitive, non-cognitive Skills</i>
Auditory-visual perception
Ideas at crafts/construction
Creativity during playtime
<i>Other skills</i>
Gross motor skills

Table 2. Skills examined, sources and test procedures

Skills	Sources	Test procedure
Language skills	Examination	<ul style="list-style-type: none"> • SETK – 3–5 Test for Speech Development of children aged 3–5 years; validated (Grimm, Aktas, & Frevert, 2001) • AWST-R – Vocabulary test for children aged 3–5 years; validated (Kiese-Himmel, 2005) • TROG-D – Grammar test; validated (Fox, 2011) • HSET – Test for Speech Development (Heidelberg); validated (Grimme & Schöler, 1991) • Assessment of Paediatric phonetics and pronunciation; not validated (Hild, 2002)
<i>Social-epidemiological Parameters</i>		
Number of siblings	Questionnaire, case files	
Family income	Questionnaire	
Duration of STK attendance	Questionnaire	
<i>Cognitive skills</i>		
IQ	Examination	<ul style="list-style-type: none"> • SON-R; validated (Snijders-Oomen, 1997) • HAWIWA III; validated (Ricken, Fritz, Schuck, & Preuss, 2007) • CFT1; validated (Cattell, Weiss, & Osterland, 1997) • Der Mann-Zeichen-Test; validated (Ziler, Brosat, & Töttemeyer, 2007)
<i>Non-cognitive skills</i>		
Self-confidence	Examination	
Focus/concentration	Examination	
<i>Mixed cognitive, non-cognitive skills</i>		
Auditory perception	Examination	
Visual perception	Examination	<ul style="list-style-type: none"> • FEW-2: Frostig Test for Assessment of Visual Perception; validated (Hammill, Pearson, & Voress, 2007)
Ideas at crafts/construction	Examination	
<i>Other skills</i>		
Gross motor skills	Examination	<ul style="list-style-type: none"> • MOT 4–6: Evaluation of Motor skills for children aged 4–6 years; validated (Zimmer & Volkamer, 1987)

The various language, cognitive and non-cognitive skills as well as psycho-social skills and social-epidemiological parameters assessed are listed in Table 1. Table 2 describes the various skills as well as their different sources of assessment and test procedures conducted in greater detail.

The evaluation is based on a variety of assessments performed at dismissal from the STK, case-note entries from the STK and questionnaires conducted in 2007 and 2011. Some skills are influenced by a variety of factors and are used as surrogate parameters. Self-esteem, for example, is thought to be a surrogate parameter, which includes abilities such as conscientiousness, openness to experience, extroversion, agreeableness and emotional stability.

For statistical analysis, some qualitative markers had to be converted to quantitative ones. Various abilities of the study population were grouped into categories of “below average”, “average” and “above average”, thus allowing for statistical comparisons. The ratings for the various skills were based on case-notes on the children, which include staff reports, psychological examinations and various test procedures. If the parameters were not well-defined, such as “self-esteem” the ranking was based on the summary of various information and an evaluation performed by three independent educational members of the staff. Speech- and language skills have been combined because in most children impaired language development was the main problem. The parameters, the specific evaluation of these parameters and their rankings are illustrated in Table 3.

Statistical analysis was computed using Microsoft Excel software and outcomes included frequency, relative frequency, mode, median and range.

Table 3. Skills/parameters examined and assessment criteria

Language skills	Above average, average, below average
Number of siblings	Above average: >2 siblings Average: 1–2 siblings Below average: No siblings
Family income	Above average: Waged Employees, self-employed, employer (high income) Average: Salaried and waged employee (Average Income) Below average: Unemployed, low income earner (Low Income)
Duration of attendance at speech-therapy kindergarten	Above average: >18 month Average: 11–18 month Below average: <11 months
Self-confidence	Above average, average, below average
Focus/concentration	Above average, average, below average
Auditory perception	Above average, average, below average
Visual perception	Above average, average, below average
Ideas at crafts/construction	Above average, average, below average
Gross motor skills	Above average, average, below average

3. Results

All children included in this study attended a regular primary school after discharge from the STK. Five children (2 girls, 3 boys) had to transfer to a “school for children with special needs” (SFL) after several years. The remaining study population (14 children: 5 girls, 9 boys) was attending a regular secondary or grammar school (RS) at time of assessment. On admission to the STK none of the children were able to communicate verbally. However, at commencement of regular primary school the speech-/language competencies for “understanding behaviour”, “vocabulary” and “grammar” were significantly worse ($p \leq 0,05$) in children later attending a school for special needs (SFL) compared to those attending a regular school (RS). Figure 1 illustrates the findings concerning the children’s language abilities upon admission to primary school. The data show the number of children with below average (BA), average (A) and above average (AA) skills of various language/speech parameters

Figure 1. Frequency distribution of speech-/language skills according to the assessment criteria “Average”(A), “Below Average”(BA) and “Above Average” (AA) in children later attending “regular schools” (RS) (n = 14) or “school for special needs”(SFL) (n = 5). Mode is shown in the figures; the criteria “oral function” and “articulation” in SFL-children is based on the assessment of four children.

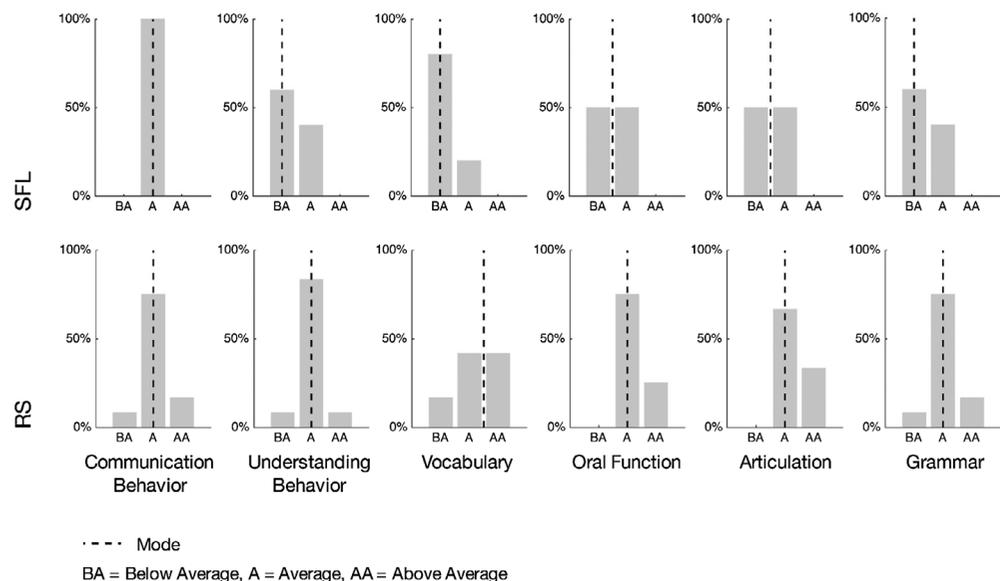
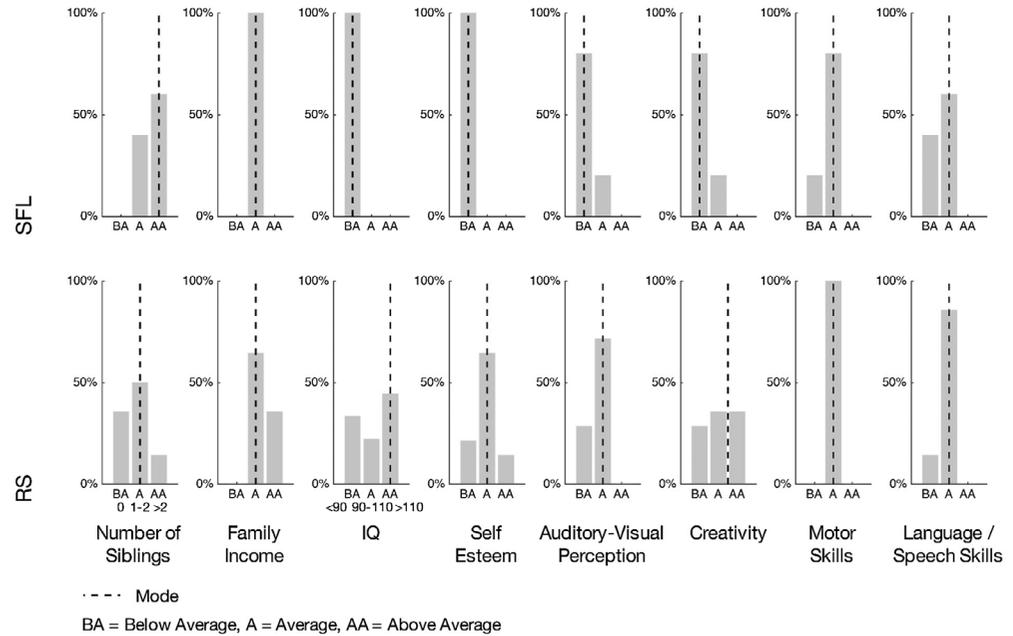


Figure 2. Frequency distribution of different psycho-social skills and social data according to the assessment criteria “Average”(A), “Below Average”(BA) and “Above Average”(AA) in children later attending “regular schools”(RS) (n = 14) or “school for special needs”(SFL) (n = 5). Mode is shown in the figures.



when attending either SFL or RS during their later educational development. Findings illustrate that, especially children lacking understanding behaviour, vocabulary skills and grammar ability have a high chance to attend the SFL after primary school education.

Figure 2 analyses the impact of various cognitive and non-cognitive skills, as well as social-epidemiological parameters, such as number of siblings, socio-economic circumstances, measured non-verbal intelligence quotient (IQ). Similar to Figure 1 the relative fractions of the children with “average” or “above/below average” parameters are shown. Findings presented in Figure 2 suggest that “number of siblings”, “IQ”, “self-esteem”, “auditory-visual perception” and “creativity” are significantly different ($p \leq 0.05$) in the two groups. The results indicate the impact of these skills on long-term school education in language/speech impaired children. According to these findings the surrogate parameter “language-/speech skills” seems to be of minor importance for long-term education.

While, those children attending an SFL have at least two or more “below average” ratings with respect to “ideas during play”, “IQ” and “self-esteem”, the subgroup of children attending an RS were deemed to have average and above average skills in these areas.

4. Discussion

Cognitive and speech-/language abilities in combination with epidemiological factors are usually considered essential for successful school education (Beitchman et al., 2008; Clark et al., 2007; Nelson, Nygren, Walker, & Panoscha, 2006; van Agt, van der Stege, de Ridder-Sluiters, Verhoeven, & de Koning, 2007). Therefore, the education system often places less emphasis on psycho-social and emotional skills, including in children with speech-/language impairment or delay. The present observational study was conducted to test the authors’ hypothesis that the impact of psycho-social and emotional skills in those children is underestimated.

Several studies demonstrated that children with speech-/language impairment, who do not receive specific support, continue to experience a variety of problems concerning language, social skills, psychological problems and education well into adulthood (Cohen, Barwick, Horodezky, Vallance, & Im, 1998; Conti-Ramsden, Durkin, Simkin, & Knox, 2009; Heckman, 2011; Needman, 1996).

The current study assesses children with significant speech-/language impairment, as no child in the cohort was able to communicate verbally at age 4–4.5 years. After conclusion of early childhood education in kindergartens with integrated speech-/language therapy, i.e. STK, they were able to attend a regular primary school. Children suffering from language/speech impairment during kindergarten years seem to be able to develop sufficient abilities (i.e. physical production of language, phonology) in order to attend a regular school. However, language competencies, which are important for identity formation, describing emotions and ideas seem to be underdeveloped, especially in those children later turning to the SFL. Impaired self-esteem and creativity appear to be (at least partially) harmful consequences of persisting language disorders (Jackson, Cavenagh, & Clibbens, 2014; McCrosky, Richmond, Daly, & Falcione, 1977). In the present study, epidemiological and social factors, such as the number of siblings or the parents' income, are of lower importance for the further education path. The aforementioned low influence of social parameters, i.e. number of siblings and family income, on the children's further education contrasts (partially) the findings of other studies by Needlman (1996), Nelson et al. (2006) or Ryan, Claessens, and Markowitz, (2015).

In the present study, the critical factors for successful long-term education include a combination of interdependent skills, such as language, cognitive, emotional, psycho-social skills. In particular, IQ and the soft skills “self-esteem” and “perception of one's environment”, as well as “creativity during play” were thought to be important.

A previous study has demonstrated, that intelligence is an important factor for successful schooling (Ullrich et al., 2009, 2014) in SL-impaired children. Findings of the present study indicate that average and higher IQ may be helpful to compensate for deficits in language competency as well as auditory perception. Contrary to popular opinion, IQ can be modified partially by social-emotional influences and therefore, it is amendable by education (Borghans et al., 2008; Cunhan et al., 2007).

Psycho-social aspects and skills, such as self-esteem are thought to represent surrogate parameters for children's individual characteristics, and they may affect other abilities. The importance of social and emotional skills for daily life and integration into society and the workforce is generally underestimated and should be emphasised by educators (Barron, 2003; Borghans et al., 2008; Coleman, 1998; Cunhan et al., 2007; Heckman, 2011). The importance of those non-cognitive skills for school success and/or problem-solving abilities have been assessed by Barron (2003) and Coleman (Coleman, 1998) in more detail.

The skills “auditory-visual perception” and “creativity during playtime” demonstrate a combination of cognitive and non-cognitive skills, thus functioning as surrogate parameters. For example, children's interest in their surroundings and their ability to deal with frustration, as well as their motivation to develop new games and skills demonstrate non-cognitive skills. In comparison, abstract thinking during play or recognition and matching of pictures and sounds represents cognitive skills. Various studies demonstrate, that during child development in children with an average IQ disturbed auditory-visual perception becomes negligible in the majority of cases (Keilmann & Wintermeyer, 2008; Norrix, Plante, Vance, & Boliek, 2007; von Suchodoletz, Alberti, & Berwanger, 2004).

The results of the current study suggest, that children attending specialised kindergartens with speech-/language therapy, i.e. STK, have not only to develop their speech-/language abilities, but also improve both, their psycho-social and cognitive skills considerably. This improvement is thought to be a relevant part of education, so that these children can attend a regular primary school without problems later (Cunhan et al., 2007; Paterson, Heim, Friedman, Choudhury, & Benasich, 2006).

The findings of this study support the hypothesis, that soft skills, such as “self esteem”, “creativity” and “auditory-visual perception” are important factors in early education of speech-/language impaired children. Training these skills helps children to attend regular primary schools, despite problems in other areas, such as SL-competencies.

5. Conclusion

Early childhood education with integrated speech-/language therapy can improve children's language skills, as well as their psycho-social and emotional capabilities. The present study illustrates the importance of multidisciplinary early childhood education, both, with integrated speech-/language therapy and pedagogic support of psycho-social and emotional skills. According to the authors' opinion the significance of psycho-social and emotional skills is frequently underestimated. However, this study indicates, that the combination of these various means are essential for successful education and integration into society in later life.

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