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ВЗАИМОСВЯЗИ СОЦИАЛЬНО-КОММУНИКАТИВНЫХ, ПОЗНАВАТЕЛЬНЫХ, ФИЗИЧЕСКИХ И ХУДОЖЕСТВЕННЫХ НАВЫКОВ И РЕЧЕВОГО РАЗВИТИЯ

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MASTER'S THESIS

INTERRELATIONS BETWEEN SOCIO-COMMUNICATIVE, COGNITIVE, PHYSICAL AND ARTISTIC SKILLS AND SPEECH DEVELOPMENT

for Main Educational Programme of Master's Training
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ABSTRACT

Objective: To evaluate reliability of the tool “Comprehensive assessment of the developmental trajectories of preschool children”, to investigate the correlation between subscales of the tool and to estimate the consistency between two raters using the tool. The main task is to trace the interrelations between socio-communicative, cognitive, physical and speech development in different ages.

Methods: This current study was performed with a sample of 260 children. In order to better understand the interrelations between socio-communicative, cognitive, physical and speech development, correlation analysis was conducted. This current study examined also the interactions between risk factors such as aggressive behavior, emotional difficulties and rejection by peers.

Results: Risk factors such as emotional state, aggression, and fine motor development are moderately correlated with speech development factors. These factors have a direct correlation with factors of speech development.

Conclusion: Many aspects affect the development of speech in a child; therefore, research approaches to this issue should be based on different disciplines, such as physical, genetic, emotional, brain and social development. In the future, intervention programs should be aimed at preventing the occurrence of such factors, and toward prompt intervention in order to prevent negative developmental trajectories.

1. INTRODUCTION

1.1. Background.

Early childhood (a period from a year to three years) is a special and very important period in the child’s life. At this time, rapid mental and physical development takes place; the foundation is laid for the further formation and formation n of the child as a person. The main achievements of early childhood, which determine the development of the psyche of a child, are mastery of the body, mastery of speech, development of the objective activity. The qualitative transformations that the child undergoes during the first three years are very significant.

All developmental processes in early childhood are closely related to the development of speech. Language development is a critical part of the child’s overall development. This period of child development is sensitive (most favorable) for the development of this particular mental function. Command of language is a fundamental life skill, a cornerstone of cognitive and

socioemotional development, and necessary ingredient for successful functioning in society (Bornstein et al., 2018, Levickis et al., 2017).

Human language and communication are considered unique to the human species, and include the ability to produce and arrange sequences of speech sounds into hierarchically structured patterns that refer to abstract, not immediately perceivable concepts (Gross, 2010). Being such a complex ability, language requires several lower order processes to be developed progressively, and typically, developing children need at least four to five years to acquire a basic fluent control of language (Onnis, 2017). In the first years of life, children develop a set of highly complex skills that together allow them to comprehend speakers around them and communicate actively with them.

To assess the rate of development of child's speech scientists highlight certain milestones in the development of speech in a child: 3-12 months - in this period, a baby will most likely coo and laugh, play with sounds and begin to communicate with gestures like waving. Babbling is an important developmental stage during the first year; 12-18 months - At this age, children often say their first words with meaning, for example, when a child says 'Dada'. In the next few months, a baby will keep adding more words to his vocabulary. He can understand more than he can say and can follow simple instructions too. For example, a baby can understand you when you say 'No'; 18 months to 2 years - in the second year, a toddler's vocabulary has grown and a child will start to put two words together into short 'sentences'. A child understand much of what you are talking about, and you can understand what they says to you; 2-3 years - a child can speak in longer, more complex sentences now, and is getting better at saying words correctly. They might play and talk at the same time. Strangers can probably understand most of what they says by the time he is three; 3-5 years - you can expect longer, more abstract and more complex conversations now. For example, the child might say things like, 'Will I grow into a watermelon because I swallowed the watermelon seed?'; 5-8 years - during the early school years, a child will learn more words and start to understand how the sounds within language work together. They will also become a better storyteller, as he learns to put words together in different ways and build different types of sentences. These skills also let a child share ideas and opinions. By eight years, they will be able to have adult-like conversations (raising children.net.au).

1.2. Trajectories of language development.

Language development requires both basic cognitive mechanisms for learning language and a rich social context from which learning takes off (Onnis et al., 2018). It supports a child's ability to communicate, and express and understand feelings. It also supports thinking and problem-solving, and developing and maintaining relationships. Learning to understand, use and

enjoy language is the critical first step in literacy, and the basis for learning to read and write. Child language development is related and builds foundation to long-term educational achievement, employment, health and social outcomes (Zubrick et al., 2015). Most studies confirm that early language skills merge into higher-order verbal and mental functioning and so have predictive validity for the development of speech, grammar, reading, academic achievement, intelligence and behavioral adjustment (Bornstein et al., 2018; Duncan et al., 2007; Short et al., 2019).

On the other hand, scientists note the influence of risk factors on the development of a child's speech. Poor language skills in the early years are associated with increased risk of child psychiatric, behavioral, adjustment problems, and school disengagement, and in adulthood with greater socioeconomic disadvantage, behavioral difficulties and poor educational and mental health outcomes (Schoon et al., 2010). Researches established some of the key child, maternal and environmental factors on language development in the early years, that could be both risk or protective. These include maternal factors such as education, mental health and responsivity, a family history of communication difficulties; child factors such as birth weight, toddler development and gender and environment factors such as being read to from an early age, numbers of children in the home, attending sufficient good quality childcare and socioeconomic status (SES) (Short et al., 2018; Harding et al., 2015). For this reason, language development is a focus of both public health and early childhood policy and practice.

There has been an intense effort to understand the genetic bases of language and language disorders (Onnis et al., 2018). Authors give an example one of the challenges in arriving at full picture is that language disorders come in different forms and can have different causes. Authors give an example of two different development options: at the phenotype level, as a first approximation, it can be distinguished between the set of disorders that appear to affect specific language abilities, while maintaining other cognitive and social skills relatively intact, versus broader disorders that also implicate forms of language delay or disruption (Onnis et al., 2018). In addition, the same author reported, that language impairments are not always in comorbid condition with developmental disorders, which exhibit different patterns of linguistic strength and weakness, and that different phenotypes have different genetic basis.

1.3. Risk and protective factors.

Speech as the highest mental function has not only a complex chronological formula for development in ontogenesis (with a large number of sensitive and latent periods), but also a complex hierarchically organized structure that includes many components, each of which has its own development dynamics (Grossheinrich et al.,2019).

Collison and colleagues (2016) in their study based on the data from the All Our Babies community-based prospective longitudinal cohort identified risk and protective factors for late talking in a North American community cohort of 1023 toddlers between 24 and 30 months of age. They quantify the contribution of both environmental and biological associations with early vocabulary delay. This study identified male sex and a positive family history of late talking or diagnosed speech or language delay as significant risk factors for late talking. The same results were shown by the study of Reilly and colleagues (2010) based on the data from Early Language in Victoria Study and the study of Zubrick and colleagues (2007) from the Longitudinal Study of Australian Children. The authors concluded that the dose-response effect of increased risk as a function of increased numbers of family members with a positive history is consistent with a biological predisposition perspective of language impairment.

In the same study, Collison and colleagues (2016) identified three protective factors associated with late talking: reading and sharing books with infants daily, providing informal play opportunities, and being cared for primarily in child care centers compared with all other forms of care. According to the authors these protective factors describe aspects of the environment that are conductive to modification. This is particularly evident in reading and sharing books with infants. The results of the authors showed the earlier families introduced children's literature to their infants, the greater the protection against low expressive vocabulary.

These risk and protective factors affect language development, but the main question of researchers "how". It has been found there is a compounding effect of multiple risk factors on vocabulary development (Christensen et al., 2017). As a rule though, children are not exposed piecemeal to individual or single risks but, rather, they are exposed to clusters of risk. Many of these clusters of risks are better thought of as comprising a developmental "circumstance" with a substantial duration, over which period, additional risk exposures also accumulate.

Epidemiological studies reveal remarkable variation between children in the emergence and growth of their language as measured by receptive or expressive vocabulary. Prediction of late language emergence at age 2 from information gathered at points earlier in pregnancy, birth and development is very poor (Zubrick et al., 2007, Tomblin et al., 1997). Moreover, late language emergence does not portend onward delayed development for the vast majority of these children. Many of these children simply catch-up with their peers between the ages of 2 and 4 while some who were not late talkers go on to experience later language difficulties (Reilly et al.,2010).

It might be thought that the large observable variability in language development of infants and very young children narrows as they emerge from infancy and enter preschool and primary school, thus improving predictability. Christensen et al. investigated the extent to which low receptive vocabulary ability at 4 years was associated with onward low receptive vocabulary

ability at 8 years, and estimated the predictive utility of a multivariate model that included relevant child, maternal and family risk factors measured at 4 years (Christensen et al., 2014). They concluded that the positive and negative predictive values arising from this model were too low to be of practical use in selecting children for targeted intervention opportunities.

A major issue for researchers in the last decade was how these risk and protective factors combine and affect each other in language development. Baydar and colleagues (2014) investigated the impact of a combination of multiple maternal and environmental family factors on vocabulary development in Turkish children. The responsivity of low SES mothers supported children's vocabulary development only when the mothers were not depressed.

In turn, scientists note that not all children with risks end up with language difficulties. What protects against poor language has received some limited attention and reveals some key factors. Turkish children's vocabulary development was protected in families of depressed mothers who were economically distressed if they were surrounded by a supportive family and community (Baydar et al., 2014). Other studies of population and impaired cohorts have found being regularly read to, attending early childhood education, participating in play and the child's prosocial skills at 4 years were all protective (Collison et al., 2016; Conti-Ramsden et al., 2015).

1.4. Longitudinal studies of speech development.

1.4.1. Advantages of the longitudinal studies.

The most comprehensive and informative approach to studying the problem of trajectories in speech development is a longitudinal study. Longitudinal studies employ continuous or repeated measures to follow particular individuals over prolonged periods of time which are often years or decades. They are generally observational in nature, with quantitative and/or qualitative data being collected on any combination of exposures and outcomes, without any external influenced being applied. Data from longitudinal studies have been used to track developmental changes of interest at the individual and group level and also to study change across generations (Reilly et al., 2009).

This study type is particularly useful for evaluating the relationship between risk factors and the development of disease, and the outcomes of treatments over different lengths of time. Similarly, because data is collected for given individuals within a predefined group, appropriate statistical testing may be employed to analyse change over time for the group as a whole, or for particular individuals (Van Bell et al., 2004). In contrasting longitudinal studies with other designs, the United Kingdom Longitudinal Studies Centre (ULSC) stated that ‘‘In contrast to the single snapshot they [longitudinal studies] are analogous to the photograph album, showing how individuals or families have changed over time’’ (ULSC, 2007–2009).

Longitudinal cohort studies, particularly when conducted prospectively in their pure form, offer numerous benefits. These include:

I. The ability to identify and relate events to particular exposures, and to further define these exposures with regards to presence, timing and chronicity;

II. Establishing sequence of events;

III. Following change over time in particular individuals within the cohort;

IV. Excluding recall bias in participants, by collecting data prospectively and prior to knowledge of a possible subsequent event occurring, and;

V. Ability to correct for the "cohort effect", that is allowing for analysis of the individual time components of cohort (range of birth dates), period (current time), and age (at point of measurement) - and to account for the impact of each individually (Caruana et al., 2015).

Longitudinal studies are needed to understand the trajectory of language development in at risk children compared with normally developing children, or the paths to language development separately in typical and atypical developing children. Prospective, longitudinal, population-based studies, applying consistent instruments and selection criteria, are required to characterize more fully typical and atypical variation across pivotal language dimensions as a function of age (Collisson et al., 2016).

Longitudinal studies suggest that in the pre-school years language development is highly variable, with "natural resolution" of poor language occurring spontaneously for many children (Reilly et al., 2010, Ukoumunne et al., 2012), but those children who reach 5 years with poor language are unlikely to ever catch up (Law et al., 2008). However, recent longitudinal studies of population cohorts suggest that the degree of fluidity and heterogeneity that exists in child language pathways has been underestimated (Reilly et al., 2010; Ukoumunne et al., 2012, Bayer et al., 2011).

The nature of language trajectories is poorly understood. Only five population studies of child language have considered the nature of language growth (Taylor et al., 2013; Luyten & Bruggencate 2011; Farkas & Beron 2004; Fergusson & Horwood 1993; Peisner-Feinberg et al., 2001). Two of these focused on the crucial period of transition into formal schooling between 4 and 7 years but based their investigation on receptive vocabulary (i.e. knowledge of the from and meaning of individual words) (Taylor et al., 2013; Peisner-Feinberg et al., 2001). Taylor, Christenson (2013) explored the effect of child, maternal and family risk factors on vocabulary development from 4 to 8 years. This breadth of measurement aligns with current models of

language development that acknowledge the influence of multiple and interacting influences on the language acquisition process. Similar to many other epidemiological samples, Taylor et al found that a range of child, maternal and family risks, predicted receptive vocabulary development at age 4. Vocabulary growth between 4 and 8 however was predicted by a much smaller number of factors. Speaking English as a second language (ESL), low school readiness and maternal mental health distress were all associated with lower scores at age 4 but also with 'catch-up' growth, although this was not sufficient to close the gap by 8 years. Furthermore, children living in areas of socio-economic disadvantage did not have significantly poorer vocabulary scores at age 4 but did have lower rates of vocabulary growth between 4 and 8 years than their more advantaged peers did.

Many authors agree that, individual differences are a central and manifest characteristic of child language, as children of the same chronological age vary dramatically in terms of their language skills (Hammer et al., 2017; Bornstein et al., 2017). One fundamental conceptual issue that has framed debates about individual differences in theory and research across the history of language study and developmental science is their stability (Bornstein et al., 2017). Stability is consistency in individual differences over time. Stability in language therefore occurs when some children display relatively high levels of language at one point in time vis-a-vis their peers and continue to display high levels at a later point in time, while other children display consistently lower levels. Language is among the most complex skills a child must master, and so understanding individual differences in language and their developmental stability is of compelling interest to professionals, practitioners, and parents (Bornstein et al., 2017).

This study by Bornstein and colleagues (2018) aims to advance our understanding of child language and its homotypic and heterotypic stability in several novel and substantial ways. Individual differences tell about the distribution of language skill, and their stability tells about the nature and ontogeny of that language skill. Long-term stability was obtained separate and apart from both (non-language) endogenous and exogenous covariates. The fact that stability of core language skill across so long a period began so early, was sustained so long, transcended several heterogeneous moderating factors, and was maintained over and above covariates points to a highly conserved and robust individual-differences characteristic in human beings. It further suggests that the search for mechanisms underlying stability of core language skill in children is likely to reward basic science as well as applied clinical research (Bornstein et al., 2018).

The authors confirmed that diverse indices of language deriving from different language domains, measures, methods, sources, and contexts, each of which showed individual variation, were positively associated across different ages (Bornstein et al., 2016). Authors reported the following results, the lowest observed stability coefficient occurred between 6 months and 1 year.

As children aged past 1 year, there was more stability (less inconsistency) in language; that is, stabilities from 1 to 13 years were large. A characteristic may not be stable at one age in the life course but may stabilize at a later age. Generally, infancy and early childhood are thought to be less stable (or predictive) periods in life, and people are thought to become increasingly consistent in relation to one another as they age (Bornstein et al., 2018). In general, however, the findings underscore the importance of identifying lagging language skills early in life and promoting the child's language environment well before formal schooling as a means to enhancing language skill. The authors suggest that, all stakeholders should be aware that very young children who perform poorly relative to their peers are likely to continue to perform poorly at later ages, which reinforces the desirability of early assessment of language performance and the need for early intervention (Bornstein et al., 2018).

In the current review it is planned to trace the trajectories of the interaction between of risk and protective factors in child's speech development through three longitudinal studies: The 1970 British Cohort Study, Growing up in Australia: The Longitudinal Study of Australian Children (LSAC), and The Early Language in Victoria Study.

1.4.2. British Cohort Study.

The 1970 British Cohort Study is a large-scale longitudinal study of 17000 individuals who were born in Great Britain in a week in April 1970. Over the course of cohort members' lives, BCS70 has collected information on health, physical, educational and social development, and economic circumstances among other factors. This study is one of the first to link childhood language ability to later psychological adjustment in a nationally representative sample (Schoon et al., 2010). The aim of this study was to assess the longitudinal trajectory linking childhood receptive language skills to psychosocial outcomes in later life. In this research, the authors used a large-scale longitudinal study to investigate the extent to which variations in childhood receptive language ability are linked to later psychological outcomes. Drawing on data collected for the 1970 British Cohort Study, the researches assessed family circumstances as well as psychosocial functioning of children and linked these to adult psychosocial outcomes.

First, Schoon and colleagues (2010) assessed the direct association between early language skills and adult mental health. Then the authors examined to what extent this association can be explained through family circumstances rather than the presence of language problems. They differentiated between family sociodemographic characteristics and the psychosocial family environment, following the assumption that these tap into different aspects of childhood experience (family socioeconomic resources, parent – child interactions) (Linver et al., 2002). The

authors also tested whether adult mental health is influenced by social and behavioral difficulties in childhood, through social adaptation problems in the transition to adulthood, or a combination of all of these factors. Moreover, they accounted for gender differences in long-term outcomes, because there is persistent evidence to suggest that adult psychosocial adjustment differs for men and women (Sacker et al., 2002).

Follow-up studies were conducted at ages 5, 10, 16, 26, 30 and 34. In 2004, at age 34, 9665 cohort members took part in the follow-up survey; for 6941 cohort members, the data were completed for key variables that were collected at ages 5 and 34 (72% of those who completed the questionnaire at age 34).

The authors chose as the measured variables receptive language at age 5, family demographics, psychosocial family environment during childhood, own psychosocial adjustment during childhood, social adaptation in the transition to adulthood, adult mental health and control variables: indicators of biological risk (birth weight and gestation).

The findings of the research suggest that boys and girls with poor receptive language are more likely to grow up in relatively disadvantaged family circumstances than children with normal language skills and are more likely to show problematic behavior and social adaptation problems. The authors compare the characteristics and background data for men and women separately. The odds for poor mental health among women with poor early language skills were -2 times higher than those among women with normal language skills. In addition, the authors found an independent significant effect from maternal depression, lack of parental interest in the child's education, conduct disorder, low self-esteem, and indicators of social adaptation in the transition to adulthood, such as teenage parenthood, living with parents, and experience of unstable employment, suggesting that these are key factors that undermine positive mental health among women with poor early language skills (Schoon et al., 2010). Among men, the researchers found a significant association between early receptive language problems and adult mental health. The results showed that positive mental health can be promoted by improving the psychosocial characteristics of the early family environment and by supporting social adaptation during young adulthood, in particular through prevention of long-term unemployment and facilitation of independent living.

The main conclusion of the authors was that early receptive language problems area significant risk factor for adult mental health and well-being, and the psychosocial consequences of early receptive language problems are pervasive and continue into adult life. The findings suggest different mechanisms in the psychosocial adaptation of men and women with early

receptive language problems. There is a stronger association between early language problems and adult mental health among men than among women, suggesting that men with poor receptive language skills are relatively more at risk for mental health problems than women (Schoon et al., 2010).

The authors concluded, that the needs of children with early language problems are complex, and increased awareness should be paid to the persisting social and psychological difficulties that these children may go on to experience. The data in this research identify characteristics of the family and the individual, such as lack of parental interest in the child's education and low self-esteem that could be addressed to promote positive mental health among those with poor early language skills.

1.4.3. Growing up in Australia: The Longitudinal Study of Australian Children (LSAC).

Another important longitudinal study to be considered is Growing up in Australia: The Longitudinal Study of Australian Children (LSAC) is a major study following the development of 10,000 children and families across Australia. The study tracks children's development and life course trajectories in today's economic, social and political environment. A major aim of the project is to identify policy opportunities for improving support for children and their families, and identifying opportunities for early intervention. The study investigates the effect of children's social, economic and cultural environments on their wellbeing over the life course. It has a broad multi-disciplinary base and examines policy-relevant questions about development and wellbeing. The research questions span parenting, family relationships, education, child care and health. By tracking children over time, the study will be able to determine the factors associated with consistency and change in developmental pathways.

LSAC commenced in 2004 with two cohorts of 5,000 children each, aged 4 - 5 and 0 - 1 years. Participants are a representative sample of children of these ages across Australia at the time. Data is collected every two years. Study participants include the child (when of an appropriate age) and parents (both resident and non-resident), carers and teachers. Data taken from the official site of Australian Government The Department of social services (*www.dss.gov.au*).

One of the areas of research was speech development. The large observable variability in language development of infants and very young children narrows as they emerge from infancy and enter preschool and primary school, thus improving predictability. Christensen et al. (2014) investigated the extent to which low receptive vocabulary ability at 4 years was associated with onward low receptive vocabulary ability at 8 years, and estimated the predictive utility of a multivariate model that included relevant child, maternal and family risk factors measured at 4 years.

In this research (Christensen et al., 2017) the authors contemplate that there are clusters or classes of risk exposures that, when define, would give rise to better universal targeting of language development interventions for young children. The study uses a cross-sequential design of biennial face-to-face visits with the family and study child. In this study, the authors used data from the child cohort collected across three waves. The ages of the children at each wave were: 1 wave 57 months (median), 2 wave 82 months (median) and 3 wave 105 months (median). The initial study sample was designed to be representative of Australian children within the selected age cohort, proportional to the regional distribution of children in the Australian population (Soloff et al., 2006).

In this research (Christensen et al., 2017) authors use 16 single risk factors. These risk factors were established as having a substantive association with intercept or slope of receptive vocabulary from ages four to eight in a growth curve model, based on a Cohen's d of 0.30. The risk factors comprised five child factors (Study Child Indigenous status, low birthweight, low school readiness, low child persistence, and high child reactivity); five maternal factors (teenage mother at birth of study child, maternal psychological distress, low maternal education, maternal unemployment, and low parenting consistency); and six family factors (Mother non-English speaking background, four or more siblings, lowest family income, healthcare card, neighborhood disadvantage, and no reading to the study child in previous week).

The findings show that developmental risk circumstances can differ substantively from one another (Christensen et al., 2017). Sixteen risk factors representing a mix of child, maternal and family factors were modelled via latent class analysis and six distinct groups of risk circumstances were identified. The average number and type of risks experienced by children in these groups differed considerably and no group was defined exclusively by the presence or absence of a single risk factor.

According to the results of the study nearly one-half (46%) of the children could be characterized as developmentally enabled. These children are in families which can be described as having a reserve capacity or "generalized psychosocial capacities" that can be used to buffer the child against risk, directly ameliorate the effects of exposure or prevent the exposure all-together.

The next most common developmental risk circumstance is that of the working poor family making up 20% of the sample. They are on average exposed to 2.8 risks when first seen at age 4. These children are in families that face higher risks and they do so with a lower level of reserve capacity. Over the four year period these children consistently remained six months behind their developmentally enabled peers. Owing to their work commitments, parents of these children are

likely to have less time for the care of their children; they are less likely to be eligible for, or receive a lower level of, income support; and they have less disposable income to divert to child care and developmental resources and opportunities.

Also, these results showed that there is a group of children who are exposed to multiple risks. These families (10%) are in the overwhelmed group. Families of these children commonly and prominently feature in the policy interests of governments. Low maternal education, unemployment, lowest income and particularly, area disadvantage, set the context for very poor child development in this group with high proportions of children receiving inconsistent parenting and lower levels of parental reading.

Sharing the equal lowest position in terms of child development are the 9% of families in which, the principal characteristic is the developmental delay of the child. Children in these circumstances are likely to appear across a range of medical, other health services, early childcare and education settings and may not be identified until formal enrolment in education.

About 8% of children lived in circumstances with the presence of higher proportions of young mothers in this group invites interventions that change both parental capacities as well as those of the children themselves, and enable this across different settings.

Finally, the risk circumstances of 7% of the remaining children are notable for the presence of maternal non-English speaking status in the presence of very high maternal mental health distress, inconsistent parenting style, and low hours of employment, larger family size, low income, neighborhood disadvantage and infrequent parental reading. On average, children in these families were exposed to 4.7 risks at age 4.

In conclusion, the authors argue about the importance of identifying risk factors for more effective intervention. The previous work of Christensen (2014) has shown that a well-fitted multivariate model does not necessarily predict child language outcomes across time with even reasonable predictive utility. The approach that authors present in the current research (Christensen et al., 2017) moves away from a concern with individual prediction, instead, conceptualizing human circumstances that might be considered in the development of policies effecting whole populations. Improving developmental resources and opportunities in disadvantaged areas is also supported by these data. Low school readiness, on the other hand, offers opportunities for more targeted approaches among the circumstances in disadvantaged areas. The findings do invite more considered population approaches, and broader vigour in implementing public policies and strategies to address deepening inequalities in the financial and material circumstances of families and their children. These approaches will need to operate over extended periods with more coordinated and navigable pathways that intersect with family and child development opportunities (Christensen et al., 2017).

Another important study in the Longitudinal Study of Australian Children is a research of Zubrick (2015) about the predictors of language and literacy abilities in children at age 4 to 10. The underlying assumption is that children's progress along the oral to literate continuum is stable and predictable, such that low language ability foretells low literacy ability. This study investigated patterns and predictors of children's oral language and literacy abilities at 4, 6, 8 and 10 years. The study sample comprised 2,316 to 2,792 children from the first nationally representative Longitudinal Study of Australian Children (LSAC).

Authors chose a biological model of child development (Bronfenbrenner, 2005) guide the selection of measures for the LSAC. Among these domains are characteristics related to the child, the mother, and the family home environment. Multivariate logistic regression was used to investigate risks for low literacy ability at 10years and sensitivity-specificity analysis was used to examine the predictive utility of the multivariate model. For child characteristics, the authors used gender, ethnicity, birthweight, ear infection, school readiness and temperament. For maternal characteristics, the authors used age at the birth of the child, problematic alcohol use, smoking, mental health distress, education, hours of paid employment and parenting. For the characteristics of the family home environment, the authors used maternal non-English speaking background (NESB), family structure, sibship size, income, health care card, financial hardship, socioeconomic disadvantage, reading to the study child, playgroup and child care.

In examining early predictors for low literacy ability at age 10 the authors identified three substantial contributors with adjusted effects meeting our criterion: Low school readiness at age 4, Aboriginal and/or Torres Strait Islander status and low vocabulary ability at age 8. High child temperamental reactivity had a moderate predictive relationship with low literacy at age 10 as did low Vocabulary at ages 4 and 6. The highest risk for low literacy ability at age 10 was low school readiness as measured at age 4. The second substantial risk for low literacy performance was carried by children of Aboriginal and Torres Strait Islander descent. The third substantial predictor of literacy at age 10 was vocabulary ability at age 8. While the age 4 and age 6 measures of vocabulary showed moderate and progressively weaker associations with literacy relative to the more proximal age 8 measure of vocabulary, all retained significance in the multivariate model. The final remaining predictor of any significance was temperamental reactivity. In this model, early temperament predicts onward low literacy, but only in so far as this pertains to reactivity (sitting still, paying attention, etc.) rather than persistence (focusing and working on one thing). The effect of temperament on language development has a mixed career with some researchers finding higher rates of temperamental problems in children with language delay (Irwin et al., 2002) and others not (Zubrick et al., 2007).

In summary, in the multivariate model, the authors found that substantial risks for low literacy ability at 10 years, in order of descending magnitude, were: low school readiness, Aboriginal and/or Torres Strait Islander status and low language ability at 8 years. Moderate risks were high temperamental reactivity, low language ability at 4 years, and low language ability at 6years. The following risk factors were not statistically significant in the multivariate model: Low maternal consistency, low family income, health care card, child not read to at home, maternal smoking, maternal education, family structure, temperamental persistence, and socioeconomic area disadvantage. The results of the sensitivity-specificity analysis showed that a well-fitted multivariate model featuring risks of substantive magnitude did not do particularly well in predicting low literacy ability at 10 years.

1.4.4. The Early Language in Victoria Study (ELVS).

Another large-scale, prospective, longitudinal study dedicated to speech directly is The Early Language in Victoria Study (ELVS). The Early Language in Victoria Study (ELVS) began in September 2003, and more than 1900 families joined ELVS when their children were eight to ten months old. The Early Language in Victoria Study (ELVS) aims to learn more about how language develops from infancy (eight months) to adolescence and in particular, why language development is more difficult for some children. There were 11 waves from the age of 8 months, until the age of 13 years every year from 2003 until 2016.

ELVS continued following the children until September 2007, when they had all turned four. In 2008, ELVS families were invited to participate in a new and exciting phase of the study. The aim was to understand language and reading development in the early school years. In 2012, the ELVS team were successful in receiving funding to follow up all the children now they are adolescents. Almost 1000 children were close to their 11th birthday, and parents and teachers provided data via questionnaires about communication and literacy skills. In 2016, researchers continued to collect data as the ELVS participants turned 13 years old. This has been helping provide some of the most comprehensive data ever gathered to examine how language continues to develop as children move into adolescence and settle in to secondary school.

Comparing with the Longitudinal Study of Australian Children, which allows language to be considered in the context of a much broader range of constructs; but their language measures are necessarily brief, infrequent and typically parent or teacher report rather than direct assessment. ELVS is the only longitudinal, population-based cohort study that comprehensively tracks language development from infancy (8 months) through to adolescence (age 13 years), via multi-source informants, direct assessment and linkage to nationally acquired academic achievement

data (Reilly et al., 2018). ELVS was designed to fill knowledge gaps about language development and factors that predict later outcomes, including service costs and health-related quality of life.

The authors of the project identify the following overall aims, these are: 1) describe the natural history and clinical course of childhood language disorders; 2) determine the extent to which language trajectories are fluid, and identify developmental pathways to good versus low language; 3) identify which environmental, social and family factors predict variation in these language pathways; 4) examine how language pathways are associated with children's social, behavioral and education outcomes; 5) quantify the costs of service for low language across the first 13 years of life, as well as the broader costs and burdens (including health-related quality of life) to individuals, families, health care and educational system; 6) examine the prevalence, predictors and correlates of low literacy.

The authors highlighted several key aspects of measurement, these are: family environment and parent characteristics (family socioeconomic status, parent marital status, family composition, languages spoken in the home, frequency the child is read to, number of books in the home, computer usage and family history of speech and/or language problems); child development, behavior and cognition (physical and motor development, temperament and personality, phonological memory, child behavior problems, emotional symptoms and relationships with peers, school readiness and engagement, non-verbal skills); child communication, language and literacy (speech and symbolic behaviors, receptive and expressive vocabulary, grammatical development, letter sound naming, rhyming, phonemic awareness, sound production); health-related quality of life (physical, emotional, social and school functioning); help-seeking behaviour (help-seeking behaviour and service use for any speech or language problem of the child); physiological data (saliva and functional Magnetic Resonance Imaging).

The following there are key findings based on recent publications from the ELVS. Reilly and colleagues (2006) report that at 8 months, children showed a wide range of communication strategies, including eye gazing (75%), making purposeful sounds (80%) and using gestures (5.5–46%). Social communication increased rapidly between 8 and 12months, and by 24 months most children were combining words. Children's overall vocabulary skills dramatically increased between 12 and 24 months, with a mean expressive vocabulary of six words [standard deviation (SD=9) at 12 months and 260 words (SD=162) at 24 months. At 12 and 24 months, respectively, 26.4% and 0.6% of children used no words, indicating wide individual variability (Reilly et al., 2009).

At 2 years, 19.7% were classified as 'late talkers' (Reilly et al., 2007). The authors examined potential risk factors for late talking status and established that a family history of speech and/or language difficulties, a non-English speaking background (NESB) and low maternal education together explained 4% of variation in the model. By 4 years of age, approximately 20% of the sample met criteria for low language status, 3.4% had a speech sound disorder (SSD) and 1.4% had combined speech and language problems (Reilly et al., 2010). Nguyen and colleagues (2018) concluded that almost 70% of those considered late talkers at 2 years had typical language development by 4 years (resolved late talkers). Conversely, around 8% of those with typical language at 2 years had low language scores at 4 years (Reilly et al., 2014). Late talking at 2 years is not a reliable predictor of ongoing language difficulties, supporting other recent research (Bavin et al., 2013).

Petruccelli and colleagues (2012) found that, at age 5, resolved late talkers had 'caught up' with their peers, with no substantial differences on mean scores or non-verbal ability, and they performed within age expectations on phonological memory. Late talkers at 2 years, who were language impaired at age 5, were found to have limited phonological working memory.

Risk factors for late talking status at 2 years included being of non-English speaking background (NESB), a family history of speech/language difficulties and low maternal education. However, a number of base-line variables together explained only a small amount of variance, suggesting that risk factors for early language development (i.e. through infancy) may be biologically programmed and only modestly influenced by environmental factors (Reilly et al., 2006; 2007). The authors concluded that both biological and environmental factors impact on language development, with the environmental impacts becoming greater, or possibly accumulating, over time.

McKean and colleagues (2015) categorized the factors, contributing to variance in language outcomes from 4 to 7, according to whether they were least-mutable (difficult to modify, e.g. non-verbal IQ, English as a second language, family history of speech and language difficulties), mutable-distal (have an indirect effect that could only be changed through population-level intervention, e.g. family income, literacy, social disadvantage) or mutable-proximal (can be modified through intervention with the child or family, e.g. number of books in the home and frequency of reading to the child). Children with NESB were likely to catch up with their peers by7 years, but those of lower birthweight were likely to fall behind. Children with fewer than 10 books in the homemade substantial progress towards catching up with their peers at age seven, although they did not quite recover from their disadvantage and those watching more than 3 h of TV per day fell behind their peers. Mutable-proximal factors explained 23% of variance in

language outcomes, and these factors might be modifiable via intervention (McKean et al., 2015). These findings confirm earlier research that language ability re-mains somewhat fluid between 4 and 7 years (Reilly et al., 2017).

Bretherton and colleagues (2013) found that, language impairment tends to co-occur with other problems such as hyperactivity, peer problems and greater risk for other behaviour problems, as well as conduct problems and greater total difficulties (at age 4). These children were usually less school-ready, with poorer working memory at age 5. Approximately 40% of those with speech sound disorder (SSD) have comorbid expressive and/or receptive language impairment, and these children often had poor pre-literacy skills (Eadie et al., 2014).

Longitudinal data from community-ascertained cohorts is particularly important for research into child language development and the evolution of language impairment. It provides a unique opportunity, not available in cross-sectional data or in the study of clinical samples, to examine the growth and evolution of language skills over time and to determine whether it is possible to identify key risk factors for, or predictors of, language impairment that could be used in screening or early identification. Ultimately, such data might also be valuable in identifying factors amenable to change that could be incorporated into the development of early prevention and intervention programs (Reilly et al., 2009, Prior et al., 2011).

From the above studies, we see that the language development is the result of a complex interaction between child's biological make-up and environmental factors. We can observe that the development of speech in the period from a year to three years is less stable, and it is assumed that stability increases with the person's age. Significant and cumulative effect of reading books point to the promotion of a set of parenting behaviours, which could facilitate language and literacy development. Since the parental model of behavior is of great importance for child development, this fact should be taken into account when designing interventions.

1.5. Parents and teachers competencies.

Parents play major role in the development of children's speech. Parental language input is one of the best predictors of children's language achievement. In the 1960s, anthropologists and linguists documenting speaking patterns across diverse languages noted an unusual speech "register" when adults addressed their young children (Ferguson, 1964). Originally termed "baby talk," this pattern of speaking had a simpler phonology and grammar, fewer and simpler lexical items, a higher pitch, unusual intonation contours (Ferguson, 1964), and was observed being used by mothers, fathers, and siblings across many cultures, in both spoken and signed languages. Later research on infant-directed speech, then termed "motherese" and eventually "parentese" because

both genders used it, revealed a unique acoustic signature. Adults speaking parentese used a nearly octave increase in habitual pitch, spoke with exaggerated pitch contours, and used a significantly slower tempo with elongated vowels (Grieser & Kuhl, 1988).

Parentese, a near-universal speaking style distinguished by higher pitch, slower tempo, and exaggerated intonation, has been documented in speech directed toward young children in many countries. Previous research shows that the use of parentese and parent–child turn taking are both associated with advances in children's language learning (Frank et al., 2017).

Ramirez and colleagues (2020) conducted a randomized controlled trial to determine whether a parent coaching intervention delivered when the infants are 6, 10, and 14 months of age can enhance parental language input and whether this, in turn, changes the trajectory of child language development between 6 and 18 months of age. Families of typically developing 6-months-old infants (n=71) were randomly assigned to intervention and control groups. Naturalistic first-person audio recordings of the infants' home language environment and vocalizations were recorded when the infants were 6, 10, 14, and 18 months of age. After the 6-, 10-, and 14-months recordings, intervention, but not control parents attended individual coaching appointments to receive linguistic feedback, listen to language input in their own recordings, and discuss age-appropriate activities that promote language growth.

The authors reported that, parents who received coaching increased their use of parentese and were engaged with their child in more conversational turns compared to parents who did not receive coaching. Their children, in turn, increased their production of speech-related vocalizations significantly more between 6 and 18 months, and produced more words at 18 months. Importantly, the growth in parentese and turn-taking between 6 and 18 months was positively correlated with the growth in children's vocalizations during the same time period and with children's 18-months language outcomes, suggesting that parental and child language behaviors coevolved. The authors conclude that, using parentese, a socially and linguistically enhanced speaking style, improves children's social language turn-taking and language skills. Research-based interventions targeting social aspects of parent–child interactions can enhance language outcomes (Ramirez et al.,2020).

Another important aspect of expanding vocabulary in children is reading books. Book reading is widely identified as an important activity in the development of children's oral language and vocabulary skills (Marulis & Neuman, 2010). Mol and Neuman (2014) conducted a study to explore how features of parent-child extra-textual talk during information book-sharing might vary across different socioeconomic background, and to determine if certain interactional patterns might mediate their effects on children's receptive and expressive vocabulary development. Sixty parents and their 5-year-old children were audio-recorded reading an unfamiliar information book in their home. Holistic coding on six parent and two child engagement scales, examining low to

high cognitive demanding talk was conducted. Results indicated that lexical richness and contingent responsiveness positively predicted receptive and expressive vocabulary. Further, contingent responsiveness appeared to mediate the influence of socioeconomic status on children's receptive and expressive vocabulary, suggesting that positive environmental contexts and supportive parent–child interactions can have a powerful influence on children's development (Liu et al., 2018).

In sum, the research highlights the importance of parent–child extra-textual talk and children's language development and the potential of the information book as a context for reading. Among its most important features authors reported that parents who engaged children in contingently responsive talk appeared to support both receptive and expressive language. Further, this type of talk appeared to mediate the effects of socioeconomic status, suggesting that positive environmental contexts and supportive parent–child interactions can have a powerful alterable influence on children's development (Mol & Neuman, 2014).

Another important role in the development of children's speech is assigned to teachers, so a large number of studies are devoted to them. A key aspect regarding the issue of educators is professional development and professional competencies. The aim of professional development is to improve educator knowledge, skills, and beliefs to meet a common goal. Coaching has been described as a social process comprised of supporting educators in recognizing what they know and can do, and assisting them to strengthen their abilities to make more effective use of what they know and do (Berg & Karlsen, 2007).

Some studies have found positive impacts of coaching on both educators and children. Powell and colleagues (2010) found that educators receiving professional development that included coaching scored significantly higher on the General Classroom environment and the Language, Literacy, and Curriculum subscales of the Early Language, Literacy Classroom Observation (ELLCO; Smith et al., 2008) than those who were in the control condition. Children enrolled in these classrooms also scored higher on various emergent literacy outcomes.

As Markussen-Brown and colleagues reported (2017) professional development is increasingly used to improve early childhood educators' skills and knowledge in providing quality language and emergent literacy environments for children. However the authors claimed that the literature does not clearly indicate the extent to which such efforts reach their goals, or whether improvements in educator outcomes translate to learning gains for children (Markussen-Brown et al., 2017). They conducted meta-analyses to evaluate the effects of language- and literacy-focused professional development on process quality, structural quality, and educator knowledge as primary outcomes. Furthermore, the authors estimated effects for three child outcomes: receptive vocabulary, phonological awareness, and alphabet knowledge. As the authors found out

professional development produced a medium effect for process quality and a large effect for structural quality but no effect for educator knowledge. Authors reported that professional development also produced a small to medium effect for phonological awareness and a small effect for alphabet knowledge, but these were not predicted by gains in educator outcomes. Although course and coaching intensity and duration were related to effect sizes, the total number of professional development components was the strongest predictor of process quality. The results suggested that professional development is a viable method of improving language and literacy processes and structures in preschools, but effects may need to be substantial if they are to translate into higher child outcomes (Markussen-Brown et al., 2017).

Findings of Cabell and colleagues(2015) indicated that professional development increased teacher–child engagement in multi-turn conversations, child-initiated conversations, and teachers' strategy use. In addition, authors claimed that teacher–child conversations with a high concentration of teacher elicitations and extensions were positively associated with children's vocabulary gains. This study increases the understanding of what teacher–child conversations look like in preschool settings, and helps to advance the field in terms of identifying features of conversations that may promote children's language growth (Whorral et al., 2015).

2. CURRENT RESEARCH

2.1 Ethical statement

Current research gained ethical approval from Ethics Committee on Interdisciplinary Research. Prior to completion of the tool "Complex assessment of the developmental trajectories in preschool children" kindergarten administration and pre-school teachers were informed about the aims, content and procedure. Completion of the tool is done using anonymized codes both for pre-school educators and children. Current stage of the tool administration is at the pilot stage. Data analysed in this study is a part of a large project on development and validation of the tool.

2.2 Participants

Participants were kindergarten children from four different kindergartens in two cities in Russia. The present study involved 260 children of three age groups; the junior group of 3-4 years old includes in total 87 (33,5%) children: 80 children of 2016 (93,1%), 6 children 2017 (6,9%), among whom were boys 50 (57,5%) and 37 girls (42,5%); the middle group of 4-5 years old includes in total 95 (36,5%) children; 5 children 2014 (5,2%), 87 children 2015 (91,6%), 3 children 2016 (3,2%), among whom were 45 boys (47,4%) and 50 girls (52,6%); the senior group of 5-6 years old includes in total 78 (30%) children, 3 children 2013 (3,8%), 70 children 2014 (89,7%), and 5 children 2015 (6,5%), among them were 36 boys (46,2%) and 42 girls (53,8%) (Table 1).

Table 1.

Basic demographics of participants (age and group)

Birth year	Junior group	Middle group	Senior group	Total
2013	**0**	**0**	**3**	**3**
2014	**0**	**5**	**70**	**75**
2015	**0**	**87**	**5**	**92**
2016	**81**	**3**	**0**	**83**
2017	**6**	**0**	**0**	**6**
Total	**87**	**95**	**78**	**260**

The pilot project involved participation of 22 educators. Two educators for each group; in the groups where we have two observations for each child, the educators independently filled out questionnaires. There are also groups where there is only one observation for each child as only one pre-school educator works full-time with the group.

As a result, the distribution into groups is as follows: the junior group (3-4years old) - 1 group with observations from two teachers, 3 groups with the supervision of one teacher; middle group (4-5 years old) - 3 groups with observations of two teachers, 1 group with the supervision

of one teacher; the senior group (5-6 years old) - 2 groups with observations of two teachers, 1 group with the supervision of one teacher. The total number of observations was 384, of which 63 were excluded at this stage due to the frequent absence of children.

2.3. Procedure

Before filling out the on-line version of the tool, the educators had been watching the children for two weeks and only then began to fill out the tool based on the available pedagogical observations and children portfolios.

2.4. Materials

This current study is a part of the pilot project "Complex assessment of the developmental trajectories in preschool children". The pilot project aims to verify the reliability of the proposed tool in assessing the developmental trajectories in preschool children. The main purpose of the tool is to assess the developmental trajectories of a child in preschool age, to identify the strong and weak aspects of this development as the basis for the development of individualized developmental or intervention programs. Each child develops in accordance with their individual characteristics; the dynamics of this development depends on many factors. The educator can contribute to the development of the child by providing appropriate conditions and formative support through the formulation of educational tasks in the zone of proximal development. To achieve this goal, the teacher needs a reliable and easy-to-implement tool that allows you to capture various aspects of the development of the child in accordance with educational areas indicated in the Federal State Educational Standards (FSES) for Preschool Education.

The tool "Complex assessment of the developmental trajectories in preschool children" can be used in the implementation of any basic and partial educational programs, since the indicators of child development presented in it correspond to the value-oriented guidelines of the Federal State Educational Standard for preschool education and do not depend on the thematic content of the implemented educational programs. The universal nature of this tool makes it possible to ensure the continuity of information about various aspects of the development of the child throughout the entire period of preschool education, when a child switches from one educational program to another, or changes their educational organization.

This tool can be used to compare and evaluate the effectiveness of various educational programs and methods of preschool education in order to improve them, as well as to build individual educational routes. The tool can be used to conduct large-scale research in order to monitor the development of the preschool education system. The tool "Complex assessment of the

developmental trajectories in preschool children" is not intended to evaluate the activities of a particular teacher or educational organization. The tool is implemented in on-line format with limited access through the use of logins and passwords and is in Russian language. Administration of the tool is planned on a regular basis twice a year (in October and May) according to the common well-established practice of monitoring at the kindergartens.

The tool includes five areas of development: socio-communicative, cognitive, artistic and aesthetic, speech and physical.

1. Socio-communicative development includes four blocks: 1.1 "Autonomy" (self-acceptance, awareness and expression of one's own desires, aspirations, interests, ability to communicate this to others, ability to choose, express one's own attitude to something, ability to independently engage in any activity) ; 1.2 "Interaction with others" (the ability to collaborate with others, the acceptance of diversity, the ability to take into account the interests and needs of others, to work in a team); 1.3 "Self-regulation and self-control" (emotional self-regulation using the simplest techniques, the choice of culture-like ways to meet needs, express emotions, solve problems and resolve conflicts); 1.4 "Social and emotional well-being" (confidence and trust in the world around us, safe attachment to a significant adult, acceptance by other children and the ability to cope with situations of uncertainty and resolution of conflicts without manifesting aggression).

2. Cognitive development includes three blocks: 2.1 "Motivation for cognitive activity" (involvement and concentration of attention, persistence in achieving a result, pleasure in achieving a goal); 2.2 "Strategies of cognitive activity" (putting forward one's own ideas, researching the environment, choosing a way to solve a problem, willingness to take the initiative); 2.3 "Mathematics" (using the simplest mathematical concepts, numbers in everyday speech and to describe the properties of objects, the process and the results of cognitive activity, understanding spatial relationships).

3. Artistic and aesthetic development includes four blocks: 3.1 "Attitude towards creative activity" (getting pleasure from art, music and movement; development of the need for creative expression); 3.2 "Music and movements" (recognition of rhythm, sounds of the surrounding world and musical instruments, reproduction of dance movements); 3.3 "Fine art and artistic design" (the use of various lines, colors, shapes and textures to create creative works, the skillful use of various tools and plastic materials to create creative works, the development of independence in the embodiment of their own ideas in the products of creative activity); 3.4 "Socio-dramatic games and theatrical productions" (using voice means, facial expressions, movements to convey the

character or mood of the character being played, taking initiative in determining their role in theatrical production, actively including role-playing games with other children).

4. Physical development includes four blocks: 4.1 “Attitude to physical activity” (getting pleasure from physical activity, success in mastering motor skills, participating in sports games and competitions); 4.2 “Control and coordination of gross and fine motor skills” (spatial orientation, maintaining balance in outdoor games, mastering complex movements, skillful and proper use of cutlery, pencils, brushes, scissors, etc.); 4.3 “Responsibility for one’s own health” (ability to assess one’s own physical abilities, observing personal hygiene rules and regime when staying in kindergarten, observing the requirements for safe behavior in various situations: when working with scissors, while walking, playing situations, etc.); 4.4 “Physical well-being” (the ability to assess one’s physical condition and seek help if necessary, moderate activity and energy during the day).

5. Speech development includes three blocks: 5.1 “Speech interaction” (designing speech messages for a specific purpose, understanding the meaning of speech utterances, the correct use of oral speech in communication with other children and for solving various problems); 5.2 “Attitude to speech activity” (getting pleasure from games with words, listening to texts, drawing characters, memorizing poems, participating in discussions and stories); 5.3 “Literacy” (interest in reading, reading technique, semantic interpretation of the text, writing, phonemic hearing, correct sound and word pronunciation, listening and understanding).

6. The diagnostic tool contains statements describing various aspects of the child’s behavior during various types of activities (playing, artistic and aesthetic, cognitive, etc.), communication with other children and the teacher; features of child observance of daily routine moments, etc.

The teacher evaluates the frequency of manifestation of the described behavior of the child, choosing one of the answer options “almost never”, “sometimes” or “almost ever” based on generalized observations of the child within two weeks before the start of the assessment. When working with the tool it is recommended to take into account the child's portfolio, diary entries of pedagogical observations to summarize pedagogical observations.

If the choice of an option for any of the indicators is difficult, the teacher chooses the most suitable option and supplements the comments in the answer option “comment”. Also in the field “comment” a preschool teacher can offer clarification of the wording of the statement. This is a very important stage of the teacher’s work at the stage of pilot testing the tool. Each teacher working for a group of children carries out a comprehensive assessment of the development path

of each child independently, without discussing or consulting with another teacher working in the same group, or with specialized specialists (a teacher of fine arts, a music worker, speech therapist, physical education instructor).

3. RESULTS

3.1. Cronbach's alpha analyzing of internal consistency.

Current section reports Cronbach's alpha analyzing of internal consistency for all the variables used at different stages of analyses. The Cronbach's alpha coefficient was calculated separately for scales and subscales. The tool includes six scales:

1. Socio-communicative development scale includes four subscales of 49 items (α=.93): 1.1 Autonomy consists of 8 items (α=.86); 1.2 Interaction with others consists of 14 items (α=.92); 1.3 Self-regulation and self-control consist of 12 items (α=.76); 1.4 Social and emotional well-being consist of 15 items (α=.67).

2. Cognitive development scale includes three subscales of 40 items (α=.97: 2.1 Motivation for cognitive activity consists of 12 items (α=.91); 2.2 Strategies of cognitive activity consists of 19 items (α=.94); 2.3 Mathematics consists of 9 items (α=.92).

3. Artistic and aesthetic development includes four subscales of 40 items (α=.97): 3.1 Attitude towards creative activity consists of 7 items (α=.89); 3.2 Music and movements consist of 11 items (α=.92); 3.3 Fine art and artistic design consist of 14 items (α=.94); 3.4 Socio-dramatic games and theatrical productions consist of 8 items (α=.90).

4. Physical development scale includes four subscales of 24 items (α=.90): 4.1 Attitude to physical activity consists of 4 items (α= .89); 4.2 Control and coordination of gross and fine motor skills consist of 8 items (α=.87); 4.3 Responsibility for one's own health consists of 6 items (α=.79); 4.4 Physical well-being consists of 6 items (α=.62).

5. Speech development scale includes three subscales of 39 items (α=.94): 5.1 Speech interaction consists of 8 items (α=.79); 5.2 Attitude to speech activity consists of 6 items (α=.86); 5.3 Literacy consists of 25 items (α=.90).

6. The 6 scale includes eight subscales of different key types of activities (playing, sport activities, experimenting with objects, constructing from different materials, fine arts activities, mastering of movements) of 72 items (α=.94). Cronbach's alpha coefficients of the subscales are presented separately in the table below (Table 2.).

Separately, the Cronbach's alpha coefficient was calculated for the selected risk factors variables consisting of 15 items and combined in a scale (α=.72. For the next step of the correlation analysis it was selected 15 items (variables) that can be interpreted as risk and protective factors. These variables are: 1.2.2 Playing with other children, 1.3.2 Expressing own emotions with the

help of facial expressions, gestures, movements, screams, 1.3.6 Deals with negative emotions using simple examples (e.g. breathing exercises), 1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, 1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, 1.4.1 Demonstrate confidence and trust in the surrounding world (for example, begin to establish contact with a previously unfamiliar child or an adult (parent of other children, a kindergarten employee) in the kindergarten territory), 1.4.7 Show the elements of anxiety in behavior, 1.4.8 Show inadequate physical aggression against other children, 1.4.9 Show inadequate verbal aggression against other children, 1.4.14 Rejected by other children in various interaction situations, 4.2.1 Well orientated in space in outdoor games, 4.2.2 Skillfully and correctly holds and uses cutlery, 4.2.3 Skillfully and correctly holds and uses writing instruments (pencil, brush, crayon), 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, 4.2.6 Trained in motor skills following verbal instructions. The distinguished variables can be simultaneously interpreted by both risk factors and protective factors. For example, if the educator put the child a mark of 3 (almost ever) in question 1.4.8 (Shows inadequate physical aggression against other children), then we can talk about the aggressive behavior of the child and evaluate this as a risk factor in the development of speech, and vice versa. This interpretation can be applied to all 15 selected items (variables).

In general, from the main conclusions it turns out that all the scales (1-6) demonstrate high reliability (Cronbach's alpha coefficients all above 0.9), and if we look at the indicators of internal consistency in each group, it turns out that all the scales included in groups (except 6) are also quite reliable. In subscales of the scale 6, the coefficients turned out to be at the level of 0.6 (average degree of consistency), most likely this happens because all questions are repeated in content for different types of activities or it might be related to the nature of the behaviour in focus of observation.

Table 2

Reliability statistics of Cronbach's alpha coefficient for the questionnaire scales

Reliability Statistics	Reliability Statistics	Reliability Statistics	Reliability Statistics	Reliability Statistics	Reliability Statistics
Cronbach's Alpha	Cronbach's Alpha	Cronbach's Alpha	Cronbach's Alpha	Cronbach's Alpha	Cronbach's Alpha
Total scale 1	**Total scale 2**	**Total scale 3**	**Total scale 4**	**Total scale 5**	**Total scale 6**
0,933	0,966	0,967	0,906	0,937	0,942
Subscale 1.1	**Subscale 2.1**	**Subscale 3.1**	**Subscale 4.1**	**Subscale 5.1**	**Subscale 6.1**
0,861	0,910	0,887	0,906	0,787	0,645
Subscale 1.2	**Subscale 2.2**	**Subscale 3.2**	**Subscale 4.2**	**Subscale 5.2**	**Subscale 6.2**
0,919	0,942	0,920	0,875	0,857	0,629
Subscale 1.3	**Subscale 2.3**	**Subscale 3.3**	**Subscale 4.3**	**Subscale 5.3**	**Subscale 6.3**
0,759	0,924	0,936	0,788	0,904	0,620
Subscale 1.4		**Subscale 3.4**	**Subscale 4.4**		**Subscale 6.4**
0,670		0,904	0,618		0,623
					Subscale 6.5
					0,631
					Subscale 6.6
					0,643
					Subscale 6.7
					0,634
					Subscale 6.8
					0,619

3.2. Correlations

The Pearson correlation coefficient, also referred to as Pearson's *r*, the Pearson product-moment correlation coefficient (PPMCC) or the bivariate correlation is a statistic that measures linear correlation between two variables *X* and *Y*. It has a value between +1 and −1, where 1 is total positive linear correlation, 0 is no linear correlation, and −1 is total negative linear correlation (that the value lies between -1 and 1 is a consequence of the Cauchy–Schwarz inequality). It is widely used in the sciences.

Current section reports correlation coefficients (The Pearson correlation coefficient) between all the variables. In this study, several approaches calculating the coefficient of variables were applied. The first step is to calculate the correlation coefficient between the five main sections of the questionnaire (1. Socio-communicative development, 2. Cognitive development, 3. Art-aesthetic development, 4. Physical development, 5. Speech development and 6. Activity related behaviour. The results are presented in Table 3 where we see high coefficients with a high degree of significance ($r \geqslant 0.7$, $p < .01$) (Table 3).

Table 3

Descriptive statistics and Pearson inter-correlations for questionnaire main sections (N=321).

	SocComDev	CognitiveDev	ArtEstheticDev	PhysicalDev	SpeechDev
SocComDev	1	**,802****	**,789****	**,759****	**,770****
CognitiveDev		1	**,851****	**,750****	**,841****
ArtEstheticDev			1	**,782****	**,844****
PhysicalDev				1	**,758****
SpeechDev					1

Note. SocComDev - Socio-communicative development, CognitiveDev - Cognitive development, ArtEstheticDev - Artistic and aesthetic development, PhysicalDev -Physical development, SpeechDev -Speech development.

The next step was to calculate the correlation coefficients for the individual subscales of each main section for each age group separately. Table 4 presents the correlation coefficients for the junior group (3-4 years old) N=81, where we see positive moderate and high indicators for almost all variables, the exception is the variable Attitude to physical activity, where most of the coefficients are $r \leqslant 0.3$.

Table 4
Descriptive statistics and Pearson inter-correlations for questionnaire subscales in junior group (3-4 years old) (N=81)

	Autonomy	Interaction	Selfregulation	Socemotwellbeing	Motivation	CognitiveStrategies	Mathematic	ArtAttitude	MusicMovement	FineArts	SocioDramaticGame	PhysicalActivAttitude	FineGrossMotorSkills	HealthResponsibility	PhysicalWellbeing	SpeechInteraction	SpeechAttitude	Literacy
Autonomy	1	**,691****	**,526****	**,482****	**,600****	**,746****	**,536****	**,432****	**,570****	**,502****	**,465****	,244*	**,520****	**,500****	**,593****	**,684****	**,605****	**,614****
Interaction		1	**,724****	**,399****	**,600****	**,665****	**,552****	**,465****	**,500****	**,430****	**,523****	**,384****	**,582****	**,739****	**,617****	**,586****	**,588****	**,579****
Selfregulation			1	0,187	**,642****	**,579****	**,497****	**,466****	**,477****	**,411****	**,458****	,239*	**,640****	**,713****	**,562****	**,509****	**,580****	**,581****
Socemotwellbeing				1	,233*	**,387****	**,303****	**,336****	**,380****	**,301****	**,509****	**,354****	**,362****	,235*	**,327****	**,352****	**,411****	**,363****
Motivation					1	**,704****	**,694****	**,413****	**,478****	**,607****	**,514****	0,119	**,574****	**,559****	**,493****	**,562****	**,592****	**,664****
CognitiveStrategies						1	**,647****	**,428****	**,571****	**,662****	**,583****	,253*	**,532****	**,542****	**,642****	**,683****	**,608****	**,706****
Mathematic							1	**,452****	**,529****	**,744****	**,506****	0,172	**,580****	**,464****	**,538****	**,526****	**,469****	**,722****
ArtAttitude								1	**,671****	**,430****	**,587****	**,429****	**,586****	**,464****	**,386****	**,472****	**,545****	**,510****
MusicMovement									1	**,526****	**,714****	0,154	**,500****	**,521****	**,440****	**,639****	**,660****	**,687****
FineArts										1	**,526****	0,207	**,571****	**,419****	**,520****	**,511****	**,437****	**,741****
SocioDramaticGame											1	**,359****	**,515****	**,486****	**,481****	**,506****	**,541****	**,614****
PhysicalActivAttitude												1	**,476****	,280*	,293**	0,207	**,319****	0,197
FineGrossMotorSkills													1	**,654****	**,501****	**,600****	**,641****	**,651****
HealthResponsibility														1	**,519****	**,545****	**,572****	**,566****
PhysicalWellbeing															1	**,516****	**,493****	**,660****
SpeechInteraction																1	**,697****	**,710****
SpeechAttitude																	1	**,642****
Literacy																		1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5 presents the results of correlation analyzes between subscales for the middle group (4-5years old) N=129. Where we see that the number of coefficients with moderate and strong relationships has increased.

Table 6 represents that most of the correlation coefficients for senior group (5-6 years old) N=111 between the subscales of the questionnaire were positive and significant, ranging from moderate to strong.

We can see the general trend in the tables, where the coefficients increase from the junior group and in the middle are maximum, and also retain the cumulative effect to the senior group. It can be assumed that by a certain age the child accumulates a sufficient number of skills, and subsequently saves and develops them.

For the next step of the correlation analysis it was used 15 items (variables) that can be interpreted as risk and protective factors. Hereinafter in the text, the variables of risk factors (RFV).

In order to analyze correlations with the sub-scales of the questionnaire, it needs to combine these variables into one called Risk Factors. A separate table is presented for each age group, where the correlation coefficients were positive and significant, and moderate (Tables 7, 8, 9).

Table 5

Descriptive statistics and Pearson inter-correlations for questionnaire subscales in middle group (4-5 years old) (N=129)

	Autonomy	Interaction	Selfregulation	Socemotwellbeing	Motivation	CognitiveStrategies	Mathematic	ArtAttitude	MusicMovement	FineArts	SocioDramaticGame	PhysicalActivAttitude	FineGrossMotorSkills	HealthResponsibility	PhysicalWellbeing	SpeechInteraction	SpeechAttitude	Literacy
Autonomy	1	**,721****	**,703****	**,786****	**,761****	**,825****	**,717****	**,662****	**,717****	**,755****	**,733****	**,402****	**,537****	**,366****	**,649****	**,827****	**,767****	**,674****
Interaction		1	**,776****	**,669****	**,630****	**,700****	**,566****	**,527****	**,572****	**,598****	**,621****	**,335****	**,582****	**,448****	**,458****	**,659****	**,540****	**,468****
Selfregulation			1	**,572****	**,604****	**,649****	**,518****	**,559****	**,555****	**,584****	**,530****	,298**	**,505****	**,437****	**,463****	**,616****	**,572****	**,491****
Socemotwellbeing				1	**,642****	**,680****	**,659****	**,521****	**,597****	**,615****	**,639****	**,342****	**,453****	,264**	**,502****	**,654****	**,594****	**,508****
Motivation					1	**,721****	**,676****	**,688****	**,776****	**,796****	**,633****	**,418****	**,692****	**,334****	**,460****	**,628****	**,643****	**,534****
CognitiveStrategies						1	**,766****	**,571****	**,772****	**,781****	**,799****	**,360****	**,612****	**,386****	**,603****	**,830****	**,651****	**,673****
Mathematic							1	**,554****	**,691****	**,807****	**,639****	**,442****	**,624****	**,362****	**,561****	**,668****	**,691****	**,709****
ArtAttitude								1	**,765****	**,690****	**,644****	**,454****	**,582****	**,414****	**,370****	**,543****	**,728****	**,551****
MusicMovement									1	**,806****	**,740****	**,388****	**,685****	**,404****	**,460****	**,689****	**,677****	**,576****
FineArts										1	**,686****	**,360****	**,713****	**,474****	**,514****	**,642****	**,733****	**,708****
SocioDramaticGame											1	**,432****	**,532****	**,349****	**,484****	**,700****	**,617****	**,555****
PhysicalActivAttitude												1	**,331****	0,134	,235**	,285**	**,342****	,258**
FineGrossMotorSkills													1	**,469****	**,402****	**,498****	**,595****	**,437****
HealthResponsibility														1	**,323****	**,339****	**,438****	**,398****
PhysicalWellbeing															1	**,738****	**,494****	**,519****
SpeechInteraction																1	**,635****	**,623****
SpeechAttitude																	1	**,709****
Literacy																		1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6

Descriptive statistics and Pearson inter-correlations for questionnaire subscales in senior group (5-6 years old) (N=111).

	Autonomy	Motivation	CognitiveStrategies	Mathematic	ArtAttitude	MusicMovement	FineArts	SocioDramaticGame	PhysicalActivAttitude	HealthResponsibility	PhysicalWellbeing	SpeechInteraction	SpeechAttitude	Literacy	Interaction	Selfregulation	Socemotwellbeing	FineGrossMotorSkills
Autonomy	1	**,599****	**,751****	**,516****	**,494****	**,590****	**,715****	**,657****	**,421****	**,424****	**,481****	**,748****	**,703****	**,666****	**,739****	**,623****	**,543****	**,605****
Motivation		1	**,725****	**,641****	**,322****	**,441****	**,666****	**,354****	,250**	**,429****	,258**	**,509****	**,569****	**,681****	**,472****	**,402****	**,435****	**,601****
CognitiveStrategies			1	**,709****	**,416****	**,600****	**,751****	**,562****	**,310****	**,406****	**,415****	**,735****	**,661****	**,678****	**,584****	**,484****	**,554****	**,635****
Mathematic				1	**,342****	**,630****	**,726****	**,362****	**,190***	**,517****	**,473****	**,614****	**,452****	**,679****	**,338****	**,329****	**,385****	**,703****
ArtAttitude					1	**,669****	**,490****	**,612****	**,708****	**,618****	**,401****	**,521****	**,671****	**,575****	**,644****	**,608****	**,480****	**,681****
MusicMovement						1	**,640****	**,710****	**,465****	**,593****	**,430****	**,630****	**,640****	**,692****	**,604****	**,462****	**,492****	**,728****
FineArts							1	**,576****	,230*	**,488****	**,483****	**,688****	**,671****	**,741****	**,559****	**,501****	**,373****	**,700****
SocioDramaticGame								1	**,449****	**,344****	**,448****	**,625****	**,616****	**,552****	**,665****	**,565****	**,588****	**,532****
PhysicalActivAttitude									1	**,489****	,261**	**,348****	**,527****	**,448****	**,559****	**,498****	**,398****	**,531****
HealthResponsibility										1	**,462****	**,491****	**,561****	**,625****	**,537****	**,523****	,218*	**,729****
PhysicalWellbeing											1	**,576****	**,390****	**,489****	**,397****	**,483****	**,369****	**,539****
SpeechInteraction												1	**,602****	**,657****	**,606****	**,559****	**,474****	**,626****
SpeechAttitude													1	**,749****	**,704****	**,640****	**,466****	**,618****
Literacy														1	**,605****	**,612****	**,433****	**,724****
Interaction															1	**,696****	**,438****	**,582****
Selfregulation																1	**,474****	**,504****
Socemotwellbeing																	1	**,462****
FineGrossMotorSkills																		1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7

Descriptive statistics and Pearson inter-correlations for questionnaire subscales and Risk Factors in junior group (N=81)

	RiskFactors	Autonomy	InteractionEx	SelfregulationEx	SocemotwellbeingEx	Motivation	CognitiveStrategies	Mathematic	ArtAttitude	MusicMovement	FineArts	HealthResponsibility	SocioDramaticGame	PhysicalActivAttitude	FineGrossMotorSkillsEx	PhysicalWellbeing	SpeechInteraction	SpeechAttitude	Literacy
RiskFactors	1	**,503****	**,519****	**,437****	**,418****	**,409****	**,445****	**,370****	**,400****	**,411****	**,388****	**,448****	**,466****	**,426****	**,585****	**,449****	**,544****	**,605****	**,472****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 8

Descriptive statistics and Pearson inter-correlations for questionnaire subscales and Risk Factors in middle group (N=129)

	RiskFactors	Autonomy	Motivation	CognitiveStrategies	Mathematic	ArtAttitude	MusicMovement	FineArts	SocioDramaticGame	PhysicalActivAttitude	HealthResponsibility	PhysicalWellbeing	SpeechInteraction	SpeechAttitude	Literacy	InteractionEx	SelfregulationEx	SocemotwellbeingEx	FineGrossMotorSkillsEx
RiskFactors	1	**,670****	**,693****	**,658****	**,680****	**,575****	**,676****	**,678****	**,578****	**,408****	**,356****	**,383****	**,564****	**,613****	**,488****	**,670****	**,542****	**,655****	**,552****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 9

Descriptive statistics and Pearson inter-correlations for questionnaire subscales and Risk Factors in senior group (N=111).

	RiskFactors	Autonomy	Motivation	CognitiveStrategies	Mathematic	ArtAttitude	MusicMovement	FineArts	SocioDramaticGame	PhysicalActivAttitude	HealthResponsibility	PhysicalWellbeing	SpeechInteraction	SpeechAttitude	Literacy	InteractionEx	SelfregulationEx	SocemotwellbeingEx	FineGrossMotorSkillsEx
RiskFactors	1	**,537****	**,467****	**,622****	**,652****	**,522****	**,556****	**,605****	**,458****	**,339****	**,462****	**,493****	**,628****	**,458****	**,514****	**,433****	**,365****	**,490****	**,555****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

To analyze correlations as control variables, speech development variables were isolated from the first subscale. These variables are: 5.1.1 Construct a speech message for a specific purpose (motivated statement), 5.1.2 Understand the meaning of the educator's questions and answers them correctly, 5.1.3 Ask clarifying questions to the educator to solve a specific problem, 5.1.4 Understand the meaning of other children's questions and answers them correctly, 5.1.5 Use more spoken language in the process of communicating with other children, 5.1.6 Use gestures, facial expressions and non-speech sounds to a greater extent when communicating with other children, 5.1.7 Justify with the help of words his choice of activities, materials and other preferences, 5.1.8 Support communication with other children, freely talks about himself, his family, shares his experience.

Based on this, the hypothesis of current the study is that the better the indicators of socio-communicative, cognitive and physical development, the higher the indicators of speech development.

There are three aims of the study: 1) to evaluate the questionnaire reliability; 2) assess the correlations of socio-communicative, cognitive, physical developmental skills with speech development; 3) assess the inter-rater reliability tests to estimate the consistency between educators.

To test the hypothesis, it was conducted six separate analyzes from a common sample of observations, separately for each age group and for the senior age group with literacy indicators (scale 5.3).

Pearson's correlation coefficient (r) can take values from -1 to 1. Accordingly, the closer the indicator is to -1 or to 1, the stronger the connection. Positive values indicate a direct connection, negative values indicate an inverse.

In the junior age group, correlations between the development of speech skills and risk factors are slightly weaker (Table 10). The strongest dependencies are also visible between the group of variables associated with the development of fine motor skills: The ability to properly hold cutlery (4.2.2) moderately correlates with Justifying his choice with words (5.1.7) $r=.45$, $p<.01$; the ability to use scissors, glue (4.2.4) moderately correlates with Use spoken language in the communication process (5.1.5) $r=.46$, $p<.01$; Change behavior depending on the situation (1.3.12) moderately correlates with Justify with the help of words his choice of activities (5.1.7) $r=.46$, $p<.01$. Thus, we can talk about the direct moderate strength of the connection between these factors.

We can also note a statistically significant moderate negative correlation between the manifestation of aggressiveness and understanding of verbal issues: Rejected by other children (1.4.14) moderately correlated with Understand the meaning of the educator's questions (5.1.2) r=.-37, p<.01. It can be concluded that the less other children reject the child, the better he understands the educator’s questions.

Table 10

Correlation matrix between speech factors and risk factors (junior age group N=81)

		V1.2.2	V1.3.2	V1.3.6	V1.3.11	V1.3.12	V1.4.1	V1.4.7	V1.4.8	V1.4.9	V1.4.14	V4.2.1	V4.2.2	V4.2.3	V4.2.4	V4.2.6
V5.1.1	Pearson Correlation	0,142	**-,305****	0,185	**,292****	**,286****	0,144	0,003	-0,011	-0,022	0,032	0,203	**,259***	0,196	**,339****	0,183
V5.1.2	Pearson Correlation	**,233***	**-,269***	**,276***	**,256***	**,239***	0,008	-0,105	**-,300****	-0,172	**-,368****	0,216	**,289****	0,170	**,266***	**,295****
V5.1.3	Pearson Correlation	0,158	-0,190	0,163	**,340****	**,363****	0,021	0,074	-0,057	-0,026	-0,200	**,313****	**,336****	**,347****	**,451****	**,381****
V5.1.4	Pearson Correlation	0,210	**-,247***	**,370****	**,275***	**,270***	0,053	-0,014	-0,175	-0,101	-0,111	**,318****	**,300****	0,215	**,345****	**,265***
V5.1.5	Pearson Correlation	**,398****	**-,250***	**,357****	**,228***	**,249***	0,130	-0,068	-0,186	-0,022	0,003	**,281***	**,430****	**,306****	**,464****	**,454****
V5.1.6	Pearson Correlation	-0,200	**,380****	-0,180	-0,151	-0,193	-0,115	0,113	**,244***	0,114	0,170	0,079	-0,111	-0,016	-0,211	-0,212
V5.1.7	Pearson Correlation	**,257***	**-,243***	0,171	**,287****	**,460****	0,119	-0,103	**-,245***	**-,229***	-0,182	**,294****	**,446****	**,410****	**,446****	**,374****
V5.1.8	Pearson Correlation	**,334****	**-,225***	0,090	0,169	**,445****	**,305****	0,051	-0,159	-0,041	-0,102	**,271***	**,323****	**,229***	**,374****	**,338****

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Note. V1.2.2 Playing with children, V 1.3.2 Expressing emotions via facial expressions, gestures, movements, screams, V 1.3.6 Deals with negative emotions, V 1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, 1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, V 1.4.1 Demonstrate confidence and trust in the surrounding world), V 1.4.7 Show the elements of anxiety in behavior, V 1.4.8 Show inadequate physical aggression against other children, V 1.4.9 Show inadequate verbal aggression against other children, V 1.4.14 Rejected by other children, V 4.2.1 Well orientated in space in outdoor games, V 4.2.2 Skillfully and correctly holds and uses cutlery, V 4.2.3 Skillfully and correctly holds and uses writing instruments, V 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, V 4.2.6 Trained in motor skills following verbal instructions 5.1.1 Construct a speech message for a specific purpose, V 5.1.2 Understand the meaning of the educator's questions and answers them correctly, V 5.1.3 Ask clarifying questions to the educator to solve a specific problem, V 5.1.4 Understand the meaning of other children's questions and answers them correctly, V 5.1.5 Use more spoken language in the process of communicating with other children, V 5.1.6 Use gestures, facial expressions when communicating with other children, V 5.1.7 Justify with the help of words his choice of activities, materials and other preferences, V 5.1.8 Support communication with other children, freely talks about himself, his family, shares his experience. Significant coefficients highlighted in bold type.

The logic of description and interpretation of correlations of other variables in general terms corresponds to considered examples.

As for the middle age group of children, here we can observe a weaker degree of correlation between speech factors and risk factors (Table 11).

The most significant are the dependences between the variable Trained in motor skills following verbal instructions 4.2.6 and speech factors (correlation coefficients above 0.4): this factor moderately correlates with Understand the meaning of other children's questions (5.1 4) r=.45, p<.01, Ask clarifying questions to the educator to solve a specific problem (5.1.3) r=.46, p<.01, Support communication with other children (5.1.8) r=.41, p<.01.

We see a significant correlation between factors 1.3.2 and 5.1.6 (r=.51, p<.01) since both variables directly duplicate the question of using facial expressions instead of spoken language.

We can also pay attention to the fact that the more often a child plays with other children (1.2.2), copes with negative emotions using simple techniques (1.3.6), restrains his own actions if they do not comply with accepted social norms (1.3.11), demonstrates trust and confidence in the surrounding world (1.4.1), and also more often confidently shows the development of fine motor skills (4.2.2, 4.2.3, 4.2.4, 4.2.6) the more open a child is for interaction and communication, freer and easier communicate with other children (5.1.8) all the correlation coefficients are higher than r=.40 (Table 11).

The logic of description and interpretation of correlations of other variables in general terms corresponds to considered examples.

In the senior age group, the most pronounced direct relationship is between the skills of fine motor development (variables 4.2.1-4.2.6) and the understanding of the meaning of the teacher's questions, and the correct answer to them (variable 5.1.2), the correlation coefficients take values from r=.56, p<.01, r=.47, p<.01, r=.43, p<.01, r=.49, r=.63, p<.01 respectively. The strongest correlation is observed between learning motor skills, following verbal instructions (4.2.6) and the ability to understand questions and correctly answer them (5.1.2) r=.63, p<.01 (Table 12).

The strongest correlation is observed between the development factors of fine motor skills (4.2.2-4.2.4), the manifestation of trust and the expression of one's own emotions through facial

Table 11

Correlation matrix between speech factors and risk factors (middle age group N=129)

		V1.2.2	V1.3.2	V1.3.6	V1.3.11	V1.3.12	V1.4.1	V1.4.7	V1.4.8	V1.4.9	V1.4.14	V4.2.2	V4.2.3	V4.2.4	V4.2.6
V5.1.1	Pearson Correlation	**,227****	-0,113	**,240****	0,158	0,169	**,192***	-0,114	-0,036	0,070	-0,148	**,178***	0,044	0,049	**,215***
V5.1.2	Pearson Correlation	**,196***	0,033	**,384****	**,294****	**,287****	**,267****	0,061	0,144	0,110	0,099	**,237****	**,299****	**,205***	**,409****
V5.1.3	Pearson Correlation	**,311****	-0,049	**,422****	**,344****	**,318****	**,407****	-0,070	0,093	0,064	-0,063	**,293****	**,316****	**,325****	**,461****
V5.1.4	Pearson Correlation	**,216***	0,006	**,331****	**,370****	0,167	**,224***	0,045	0,120	0,117	-0,051	**,215***	**,236****	0,145	**,450****
V5.1.5	Pearson Correlation	**,278****	**-,226***	**,213***	**,239****	**,288****	**,320****	-0,077	0,091	0,090	**-,226***	**,229****	**,214***	0,172	**,267****
V5.1.6	Pearson Correlation	0,116	**,509****	0,118	0,016	**-,212***	0,066	0,130	-0,025	-0,016	**,263****	0,029	-0,041	-0,041	0,064
V5.1.7	Pearson Correlation	**,290****	-0,143	**,205***	**,234****	**,241****	**,349****	-0,071	0,096	0,102	**-,232****	**,217***	0,169	**,175***	**,302****
V5.1.8	Pearson Correlation	**,465****	-0,134	**,481****	**,382****	**,296****	**,489****	-0,110	0,033	0,059	-0,105	**,348****	**,416****	**,401****	**,413****

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Note. V1.2.2 Playing with children, V 1.3.2 Expressing emotions via facial expressions, gestures, movements, screams, V 1.3.6 Deals with negative emotions, V 1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, 1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, V 1.4.1 Demonstrate confidence and trust in the surrounding world), V 1.4.7 Show the elements of anxiety in behavior, V 1.4.8 Show inadequate physical aggression against other children, V 1.4.9 Show inadequate verbal aggression against other children, V 1.4.14 Rejected by other children, V 4.2.1 Well orientated in space in outdoor games, V 4.2.2 Skillfully and correctly holds and uses cutlery, V 4.2.3 Skillfully and correctly holds and uses writing instruments, V 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, V 4.2.6 Trained in motor skills following verbal instructions 5.1.1 Construct a speech message for a specific purpose, V 5.1.2 Understand the meaning of the educator's questions and answers them correctly, V 5.1.3 Ask clarifying questions to the educator to solve a specific problem, V 5.1.4 Understand the meaning of other children's questions and answers them correctly, V 5.1.5 Use more spoken language in the process of communicating with other children, V 5.1.6 Use gestures, facial expressions when communicating with other children, V 5.1.7 Justify with the help of words his choice of activities, materials and other preferences, V 5.1.8 Support communication with other children, freely talks about himself, his family, shares his experience. Significant coefficients highlighted in bold type.

Table 12.

Correlation matrix between speech factors and risk factors (senior age group N=107)

		V1.2.2	V1.3.2	V1.3.6	V1.3.11	V1.3.12	V1.4.1	V1.4.7	V1.4.8	V1.4.9	V1.4.14	V4.2.1	V4.2.2	V4.2.3	V4.2.4	V4.2.6
V5.1.1	Pearson Correlation	**,261****	**,285****	**,243***	0,042	0,025	0,183	-0,031	0,012	0,024	-0,093	**,449****	**,289****	**,339****	**,366****	**,453****
V5.1.2	Pearson Correlation	**,243***	0,088	**,275****	**,324****	0,155	**,196***	-0,087	-0,103	-0,127	**-,194***	**,562****	**,468****	**,429****	**,488****	**,635****
V5.1.3	Pearson Correlation	**,290****	0,139	0,026	0,118	**,365****	**,328****	**-,205***	-0,062	-0,068	-0,154	**,360****	**,284****	**,227***	**,284****	**,463****
V5.1.4	Pearson Correlation	**,275****	0,071	**,303****	**,294****	0,185	**,256****	-0,139	-0,055	-0,080	**-,228***	**,321****	**,389****	**,321****	**,351****	**,591****
V5.1.5	Pearson Correlation	**,203***	-0,086	**,213***	**,286****	**,239***	**,281****	-0,152	-0,150	-0,160	**-,302****	**,200***	**,307****	**,296****	**,317****	**,330****
V5.1.6	Pearson Correlation	-0,043	**,509****	0,049	**-,257****	0,013	0,016	-0,141	0,139	0,163	**,260****	0,051	-0,080	-0,051	-0,044	0,009
V5.1.7	Pearson Correlation	0,148	-0,005	0,111	0,090	0,152	**,330****	-0,096	0,033	0,100	-0,091	**,225***	**,232***	**,214***	**,195***	**,377****
V5.1.8	Pearson Correlation	**,423****	-0,120	0,107	0,172	**,360****	**,607****	**-,225***	-0,095	-0,116	**-,250****	**,233***	**,360****	**,228***	**,259****	**,310****

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Note. V1.2.2 Playing with children, V 1.3.2 Expressing emotions via facial expressions, gestures, movements, screams, V 1.3.6 Deals with negative emotions, V 1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, 1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, V 1.4.1 Demonstrate confidence and trust in the surrounding world), V 1.4.7 Show the elements of anxiety in behavior, V 1.4.8 Show inadequate physical aggression against other children, V 1.4.9 Show inadequate verbal aggression against other children, V 1.4.14 Rejected by other children, V 4.2.1 Well orientated in space in outdoor games, V 4.2.2 Skillfully and correctly holds and uses cutlery, V 4.2.3 Skillfully and correctly holds and uses writing instruments, V 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, V 4.2.6 Trained in motor skills following verbal instructions 5.1.1 Construct a speech message for a specific purpose, V 5.1.2 Understand the meaning of the educator's questions and answers them correctly, V 5.1.3 Ask clarifying questions to the educator to solve a specific problem, V 5.1.4 Understand the meaning of other children's questions and answers them correctly, V 5.1.5 Use more spoken language in the process of communicating with other children, V 5.1.6 Use gestures, facial expressions when communicating with other children, V 5.1.7 Justify with the help of words his choice of activities, materials and other preferences, V 5.1.8 Support communication with other children, freely talks about himself, his family, shares his experience. Significant coefficients highlighted in bold type.

expressions, movements, screams (1.3.2) and the ability to maintain communication with other children (5.1.8) and understanding of verbal questions (5.1.2, 5.1.4).

The development of speech factors among the junior age group is largely influenced by factors associated with fine motor skills (4.2.2-4.2.4); among the middle age group - the ability to express emotions, as well as the ability to cope with negative emotions (1.3.6) and restraining one's own actions if they do not meet social standards (1.3.11); among the senior age group - factors associated with the development of fine motor skills, as well as motor skills training (4.2.2-4.2.6), following verbal instructions. Correlation analysis showed a positive moderate and in some cases a high correlation between the variables of Physical development (4.2) and the variables of Speech development for all age groups.

For the senior age group it was conducted a separate correlation analysis with variables of risk factors (RFV) and variables of speech development Literacy (5.3: Reading, Writing, Speaking).

Correlation analysis of variables risk factors (RFV) with variables of Reading factors showed a small number of correlations with a high degree of significance (.005-.001) and with weak and moderate positive and negative relationships (Table 13).

The highest correlation coefficient between the factors of fine motor skills (4.2.2-4.2.4) and attention while reading fairy tales, stories (5.3.2) $r=.55$, $p<.01$, $r=.54$, $p<.01$, $r=.57$, $p<.01$ respectively, and between the development factor of fine motor skills (4.2.4) and the factor of knowledge of the letters of the alphabet (5.3.3) $r=.59$, $p<.01$. According to the results, it can be concluded that the better the fine motor skills of a child are developed, the better the concentration of attention and knowledge of the letters of the alphabet.

There is also a moderate negative relationship between the variables of aggression (1.4.8-1.4.9) and knowledge of the letters of the alphabet (5.3.3) $r=-.32$, $p<.01$, $r=-.42$, $p<.01$ respectively, and between the same variables (1.4.9) and the variable concentration of attention during reading (5.3.2) $r=-.28$, $p<.01$.

The logic of description and interpretation of correlations of other variables in general terms corresponds to considered examples.

Table 13

Correlations of risk factors with Reading factors in the senior age group (N=107)

		V1.2.2	V1.3.2	V1.3.6	V1.3.11	V1.3.12	V1.4.1	V1.4.7	V1.4.8	V1.4.9	V1.4.14	V4.2.1	V4.2.2	V4.2.3	V4.2.4	V4.2.6
V5.3.1	Pearson Correlation	0,137	-0,112	0,023	**,269****	**,224***	0,130	-0,036	-0,118	-0,117	**-,230***	**,434****	**,288****	**,303****	**,292****	**,426****
V5.3.2	Pearson Correlation	0,095	-0,119	**,262****	**,412****	0,158	0,106	-0,176	**-,270****	**-,283****	-0,156	**,240***	**,549****	**,539****	**,574****	**,295****
V5.3.3	Pearson Correlation	0,098	-0,095	**,279****	**,314****	0,157	0,062	**-,225***	**-,322****	**-,423****	**-,264****	**,223***	**,298****	**,503****	**,590****	**,286****
V5.3.4	Pearson Correlation	0,116	0,135	0,086	**,193***	0,049	0,147	-0,168	**-,215***	**-,230***	-0,182	0,147	0,115	**,223***	**,286****	**,202***
V5.3.5	Pearson Correlation	0,114	**,190***	0,122	0,143	0,085	0,129	**-,248***	-0,112	-0,148	-0,093	0,095	0,128	0,169	0,183	0,154
V5.3.6	Pearson Correlation	0,019	**,244***	0,035	0,029	0,082	0,090	**-,217***	-0,148	-0,133	-0,128	0,122	0,115	0,152	0,165	0,182

Note. V1.2.2 Playing with children, V 1.3.2 Expressing emotions via facial expressions, gestures, movements, screams, V 1.3.6 Deals with negative emotions, V 1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, 1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, V 1.4.1 Demonstrate confidence and trust in the surrounding world), V 1.4.7 Show the elements of anxiety in behavior, V 1.4.8 Show inadequate physical aggression against other children, V 1.4.9 Show inadequate verbal aggression against other children, V 1.4.14 Rejected by other children, V 4.2.1 Well orientated in space in outdoor games, V 4.2.2 Skillfully and correctly holds and uses cutlery, V 4.2.3 Skillfully and correctly holds and uses writing instruments, V 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, V 4.2.6 Trained in motor skills following verbal instructions, V5.3.1 Correctly point to the author and title of the book, V 5.3.2 Listen carefully to reading stories, V 5.3.3 Know the alphabet, V 5.3.4 Read printed texts, V 5.3.5 Read text on the screen, V 5.3.6 Read the text and correctly answer questions. Significant coefficients highlighted in bold type.

Correlation analysis of variables risk factors (RFV) with variables of Writing factors showed also a small number of correlations with a high degree of significance (.005-.001) and with weak and moderate positive and negative relationships (Table 14).

We see moderate positive correlation coefficients between fine motor variables (4.2.4) and variables of interest in writing (5.3.7) r=.46, p<.01, spelling of words in block letters (5.3.8) r=.37, p<.01 and the correct orientation of letters (5.3.12) r=.40, p<.01 respectively.

Again we see a moderate negative relationship between the variables of aggression (1.4.8-1.4.9) and the variable interest in writing (5.3.7) r=-.31, p<.01, r=-.37, p<.01 respectively; and between the variable is rejected by other children (1.4.14) and the variable interest in writing (5.3.7) r=-.31, p<.01.

Based on this analysis, there is a visible relationship between the variables of aggression and fine motor skills with the variables of Writing, which shows a positive relationship between the development of fine motor skills and writing, as well as a negative between aggressive behavior and writing.

The logic of description and interpretation of correlations of other variables in general terms corresponds to considered examples.

As for Speaking factors, in the analysis we see a larger number of coefficients with a high level of significance (Table 15). The highest correlation coefficients are presented between the variables of Physical Development (4.2) and almost all Speech variables, the coefficients are ranked from r=.32, p<.01 to r=.54, p<.01.

We also see a moderate correlation between the variable Ability to restrain their actions (1.3.11) and the variables listen to other children (5.3.22), listen to the teacher (5.3.23) and understand and follow the instructions of the teacher (5.3.24) r=.51, p<.01, r=.51, p<.01, r=.50, p<.01 respectively.

Again, we see a negative relationship between the variables of aggression (1.4.8-1.4.9) and speech variables, listens to other children (5.3.22), listens to the teacher (5.3.23) and understands and follows the instructions (5.3.24) where the coefficient ranked from r=-.40, p<.01 to r=-.54, p<.01.

Based on the analysis, we see the relationship between the variables responsible for controlling emotions and the adequate and attentive perception of oral speech. The more

Table 14

Correlations of risk factors with Writing factors in the senior age group (N=107)

		V1.2.2	V1.3.2	V1.3.6	V1.3.11	V1.3.12	V1.4.1	V1.4.7	V1.4.8	V1.4.9	V1.4.14	V4.2.1	V4.2.2	V4.2.3	V4.2.4	V4.2.6
V5.3.7	Pearson Correlation	0,080	-,192*	**,292****	**,349****	**,213***	0,179	-0,184	**-,313****	**-,370****	**-,309****	0,113	**,295****	**,363****	**,460****	**,211***
V5.3.8	Pearson Correlation	0,147	-0,178	0,111	**,324****	**,225***	**,267****	-0,152	-0,162	**-,247***	**-,291****	0,170	**,268****	**,357****	**,369****	**,191***
V5.3.9	Pearson Correlation	-0,181	-0,021	-0,129	-0,117	0,020	0,123	-0,003	0,083	0,087	0,083	-0,062	-0,103	-0,079	-0,068	**-,195***
V5.3.10	Pearson Correlation	0,059	0,002	0,029	0,054	0,119	-0,082	-0,009	0,044	0,059	0,013	0,175	0,049	0,100	0,163	0,016
V5.3.11	Pearson Correlation	0,075	0,061	0,072	0,028	0,132	0,134	-0,189	-0,108	-0,097	-0,093	0,036	0,084	0,111	0,121	0,133
V5.3.12	Pearson Correlation	0,151	0,164	**,358****	0,144	-0,095	0,060	-0,118	-0,061	-0,144	-0,138	0,141	0,165	**,320****	**,403****	0,182
V5.3.13	Pearson Correlation	0,032	-,255**	-0,132	-0,031	**,211***	0,004	-0,123	-0,002	0,042	0,014	**-,190***	0,009	-0,004	0,034	-0,146

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Note. V1.2.2 Playing with children, V 1.3.2 Expressing emotions via facial expressions, gestures, movements, screams, V 1.3.6 Deals with negative emotions, V 1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, 1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, V 1.4.1 Demonstrate confidence and trust in the surrounding world), V 1.4.7 Show the elements of anxiety in behavior, V 1.4.8 Show inadequate physical aggression against other children, V 1.4.9 Show inadequate verbal aggression against other children, V 1.4.14 Rejected by other children, V 4.2.1 Well orientated in space in outdoor games, V 4.2.2 Skillfully and correctly holds and uses cutlery, V 4.2.3 Skillfully and correctly holds and uses writing instruments, V 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, V 4.2.6 Trained in motor skills following verbal instructions. V5.3.7 Interested in writing, V 5.3.8 Write words in block letters, V 5.3.9 Write in words, V 5.3.10 Write in small print, V.3.11 Write simple sentences, V 5.3.12 Correct orientation of letters, V 5.3.13 Quickly get tired when writing. Significant coefficients highlighted in bold type.

Table 15

Correlations of risk factors with Speaking factors in the senior age group (N=107)

		V1.2.2	V1.3.2	V1.3.6	V1.3.11	V1.3.12	V1.4.1	V1.4.7	V1.4.8	V1.4.9	V1.4.14	V4.2.1	V4.2.2	V4.2.3	V4.2.4	V4.2.6
V5.3.14	Pearson Correlation	0,023	-0,049	**,196***	**,243***	0,082	0,137	-0,158	-0,069	-0,062	-0,152	**,295****	**,290****	**,248***	**,233***	**,356****
V5.3.15	Pearson Correlation	**,291****	0,030	**,251****	**,287****	0,158	0,092	-0,171	-0,036	-0,114	**-,236***	**,498****	**,427****	**,425****	**,456****	**,415****
V5.3.16	Pearson Correlation	0,187	0,180	**,345****	0,129	0,022	0,063	-0,136	0,067	0,045	-0,049	**,379****	**,403****	**,452****	**,454****	**,533****
V5.3.17	Pearson Correlation	0,095	0,151	**,224***	0,057	0,015	0,084	-0,023	**,229***	**,202***	-0,029	**,433****	**,277****	**,371****	**,281****	**,536****
V5.3.18	Pearson Correlation	0,151	-0,115	0,177	**,280****	**,207***	,282**	**-0,170**	-0,181	**-,195***	**-,373****	**,380****	**,325****	**,404****	**,441****	**,430****
V5.3.19	Pearson Correlation	0,148	-0,009	0,118	**,226***	0,152	**,399****	**-,253****	-0,170	**-,191***	**-,294****	**,200***	**,335****	**,348****	**,339****	**,390****
V5.3.20	Pearson Correlation	**,215***	0,072	0,094	0,153	**,219***	**,499****	-0,170	-0,068	-0,058	**-,268****	0,124	**,199***	**,276****	**,226***	**,304****
V5.3.21	Pearson Correlation	**,374****	0,051	0,076	**,194***	**,310****	**,327****	**-,204***	-0,165	-0,188	**-,209***	0,137	**,286****	**,270****	**,339****	**,334****
V5.3.22	Pearson Correlation	**,234***	**-,339****	**,246***	**,509****	**,192***	0,127	**-,359****	**-,414****	**-,421****	**-,404****	0,118	**,541****	**,341****	**,308****	**,268****
V5.3.23	Pearson Correlation	0,126	**-,223***	**,362****	**,507****	0,121	0,063	-0,185	**-,488****	**-,545****	**-,319****	0,146	**,448****	**,385****	**,421****	**,322****
V5.3.24	Pearson Correlation	0,079	-0,061	**,318****	**,505****	0,104	0,044	-0,163	**-,403****	**-,420****	**-,272****	**,224***	**,446****	**,432****	**,428****	**,326****
V5.3.25	Pearson Correlation	**,285****	-0,077	0,187	**,404****	**,241***	0,178	-0,175	**-,221***	**-,283****	**-,271****	**,312****	**,346****	**,472****	**,467****	**,369****

**. Correlation is significant at the 0.01 level (2-tailed). Significant coefficients highlighted in bold type.

*. Correlation is significant at the 0.05 level (2-tailed). Significant coefficients highlighted in bold type.

Note. V1.2.2 Playing with children, V1.3.2 Expressing emotions via facial expressions, gestures, movements, screams, V1.3.6 Deals with negative emotions, V1.3.11 Restraining their own actions if it does not comply with accepted social norms or kindergarten rules, V1.3.12 Change their behavior depending on changes in the situation, conditions of activity, the behavior of the other children or the teacher, V1.4.1 Demonstrate confidence and trust in the surrounding world), V1.4.7 Show the elements of anxiety in behavior, V1.4.8 Show inadequate physical aggression against other children, V1.4.9 Show inadequate verbal aggression against other children, V1.4.14 Rejected by other children, V4.2.1 Well orientated in space in outdoor games, V4.2.2 Skillfully and correctly holds and uses cutlery, V 4.2.3 Skillfully and correctly holds and uses writing instruments, V 4.2.4 Skillfully and correctly use scissors, glue and other tools, materials in the process of creating creative works, V4.2.6 Trained in motor skills following verbal instructions, V5.3.14 Interest in writing, V5.3.15 Name pictures correctly, V5.3.16 Use pronouns correctly, V5.3.17 Use tenses correctly, V5.3.18 Learn quatrain easily, V5.3.19 Tell a story, V5.3.20 Create a story, V5.3.21 Perceives texts, V5.3.22 Listen to other children, V5.3.23 Listen to educator, V5.2.24 Make instructions, V5.3.25 Answer “How” and “Why”

pronounced the indicators of aggressive and uncontrolled behavior in a child, the lower the perception of oral speech, and, respectively vice versa. We again see a positive relationship between the development of fine motor skills and an adequate perception of oral speech.

3.3 Inter-rater reliability.

Since in the pilot project there are groups that have two observations from different teachers, it is appropriate to conduct a test for the consistency of observation estimates. Due to the fact that the study has a large number of variables, it will be more convenient to interpret the results by presenting them in groups (6 groups which have double observations, and age group range). Cohen's kappa coefficient (κ) is a statistic that is used to measure inter-rater reliability (and also Intra-rater reliability) for qualitative (categorical) items (McHugh, 2012). It is generally thought to be a more robust measure than simple percent agreement calculation, as κ takes into account the possibility of the agreement occurring by chance. Cohen's kappa measures the agreement between two raters who each classify *N* items into *C* mutually exclusive categories. P-value for kappa is rarely reported, probably because even relatively low values of kappa can nonetheless be significantly different from zero but not of sufficient magnitude to satisfy investigators (Bakeman, 1997).

The tables show the Kappa Cohen coefficients between all 264 variables, where ED001 and ED002 are identifiers of educators who conducted observations independently.

This analysis used a sample of only those observations where 2 educators observed the children. The sample consisted of 76 participants, one junior group, three middle ones, and two senior groups.

Cohen suggested the Kappa result be interpreted as follows: values $\leq$ 0 as indicating no agreement and 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41– 0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement.

Table 16

Cohen Kappa coefficient for 6 group (total N=76)

Group	1 group (Junior)	2 group (middle 1)	3 group (middle 2)	4 group (middle 3)	5 group (senior 1)	6 group (senior 2)
N (participants)	11	4	12	20	15	14
Total items	264	264	264	264	264	264
Number of items	36	20	48	22	39	57
with sig. coef/%	(13,6)	(7.6%)	(18,2%)	(8,3%)	(14,8%)	(21,6%)
Range of coef.	.329 to 1	-.333 to 1	0.314 to 1	-.327 to .649	.237 to 1	.192 to .837
Mean of the coef.	0.58	0.6	0.6	.37	.53	.48

Table 16 presents the data obtained after analysis of consistency. Consider each group separately. The analysis presents one junior group (Group 1), N=11, the number of significant coefficients was 36 indicators, which is 13.6% of the total number of items (n=264). The value of the coefficients ranged from *k*= 0.329 to 1, most of which were moderate, the Mean=0.58.

The analysis presents 3 middle groups. It should be noted that the first (Group 2) middle group consists of 4 participants, so the results are not representative.

The second middle group (Group 3), N=12, the number of significant coefficients was 48 indicators, which is 18,2 % of the total number of items (n=264). The value of the coefficients ranged from *k*= 0,314 to 1, most of which were moderate, the Mean=0,6.

The third middle group (Group 4), N=20, the number of significant coefficient was 22 indicators, which is 8,3% of the total number of items (n=264). The value of the coefficients ranged from *k*= -0,327 to 0,649, most of which were weak and moderate, the Mean=0,37.

The analysis presents two senior groups. The first senior group (Group 5), N=15, the number of significant coefficient was 39 which is 14,8% of the total number of items (n=264). The value of the coefficients ranged from *k*= 0,237 to 1, most of which were moderate, the Mean=0,53.

The second senior group (Group 6), N=14, the number of significant coefficient was 57 which is 21,6% of the total number of items (n=264). The value of the coefficients ranged from *k*= 0,192 to 0,837, most of which were weak and moderate, the Mean=0,48.

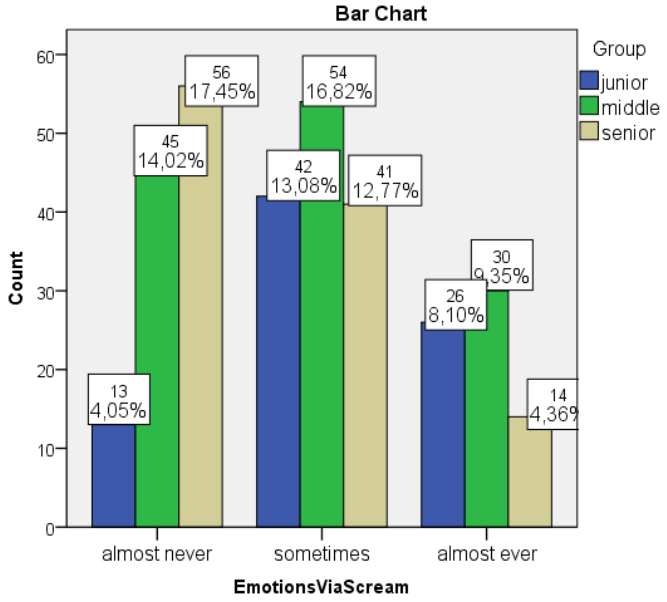
In general, we can conclude that the consistency of child observation between different educators is for the most part low and moderate; the rest part did not show significant results. For a more detailed analysis, see Appendix A, Table of consistency.

3.4 Descriptive statistics.

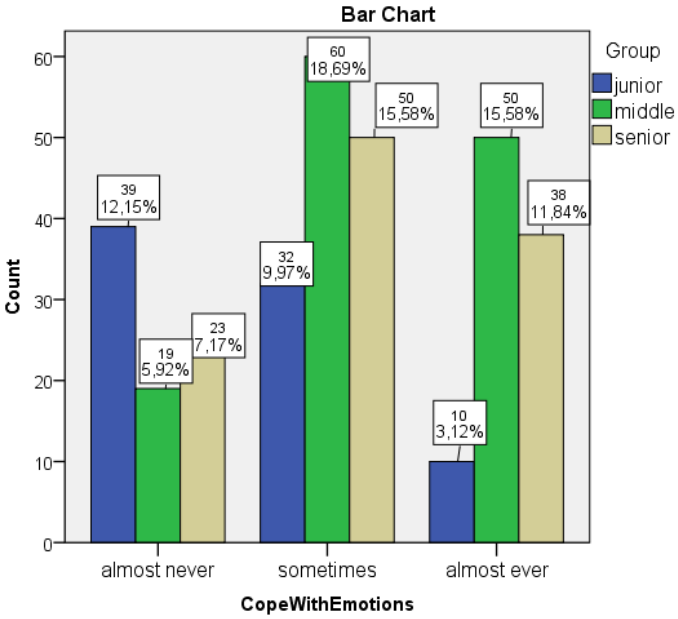
In addition, it was conducted descriptive statistics for a number of variables to see the percentage of responses with a certain subtext. For step 1, it was chosen 6 variables that correspond to certain characteristics associated with speech development and can be characterized as risk factors. It was conditionally named these variables as follows: 1.3.2 – emotions via scream, 1.3.6 – cope with emotions, 1.4.8 – aggression, 1.4.14 – rejected by children, 4.2.4 – fine motor skills, 5.1.1 – speaking. The sample for this analysis included 321 observations. This chart shows the percentage and quantitative ratio of answers to question mentioned above among three age groups.

Figure 1

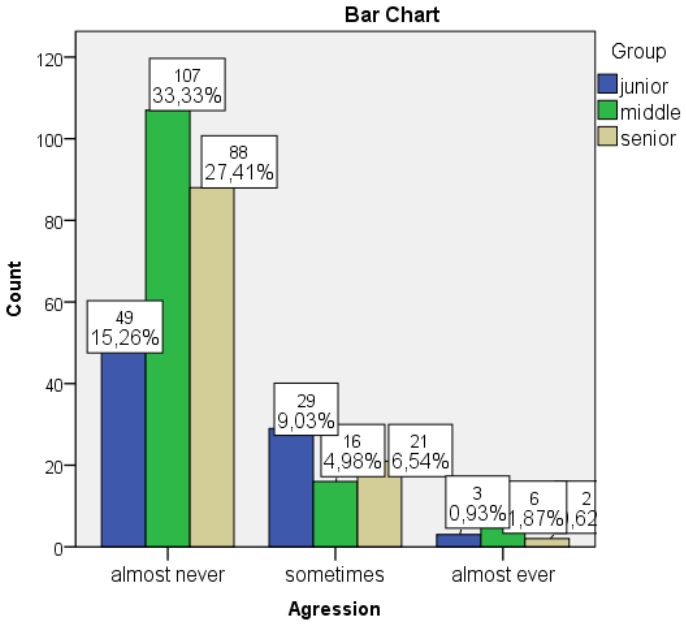
Histograms of distribution of answers among three age groups.



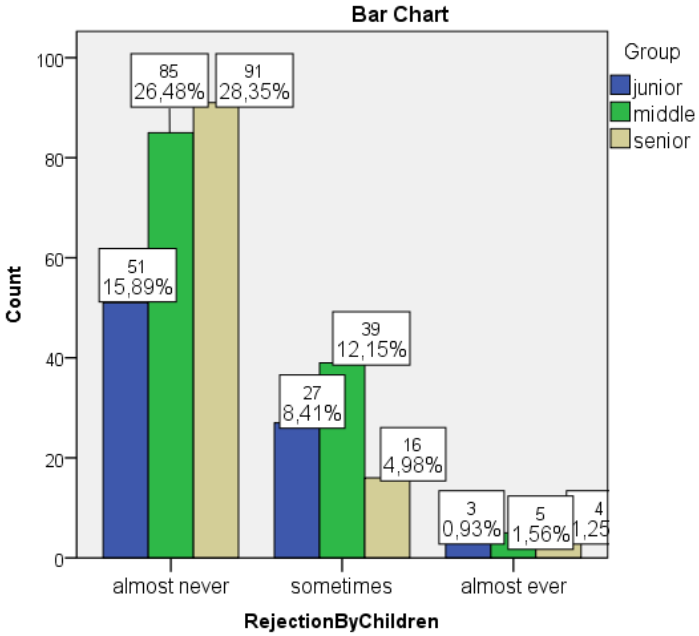
In the first diagram, we see that children of the middle and junior groups more often express emotions through a screaming (1.3.2).



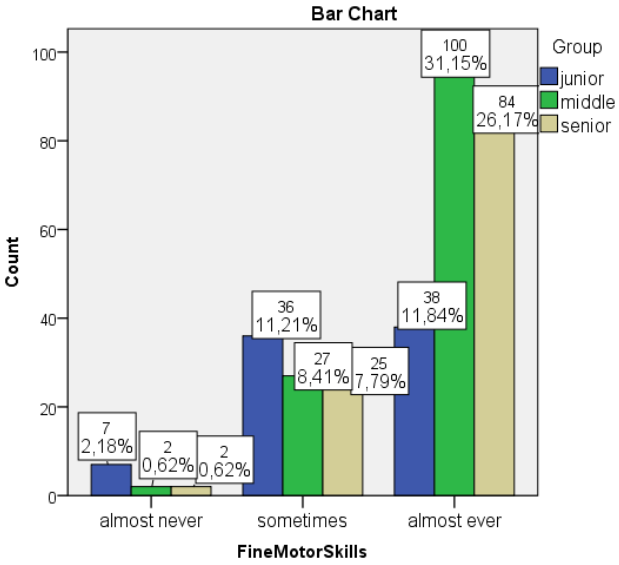
The second diagram shows that children of the middle and senior group as a whole better cope with emotions (1.3.6).



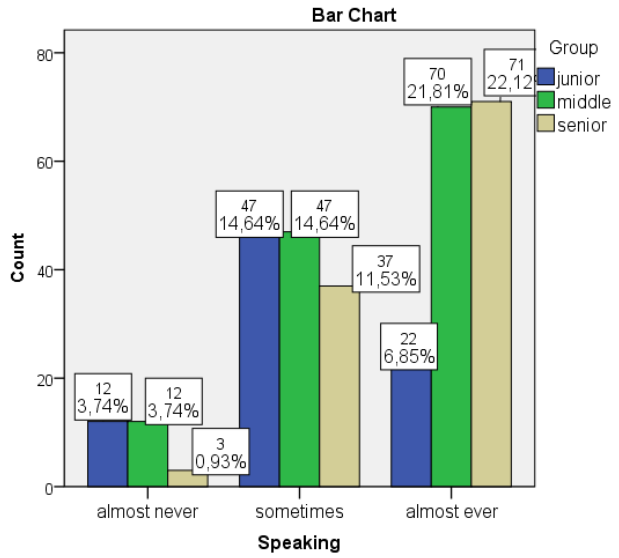
The third diagram shows approximately the same distribution of the expression of aggression with a slight excess for the middle group, but in general, a larger number of children do not express aggression almost never (1.4.8).



The same goes for the fourth diagram of the issue of rejection by children (1.4.14) a larger number of children do not express rejection almost never.



The fifth diagram shows the mastery of fine motor skills, where the middle and senior groups have the age appropriate results, which corresponds to age skills (4.2.4).

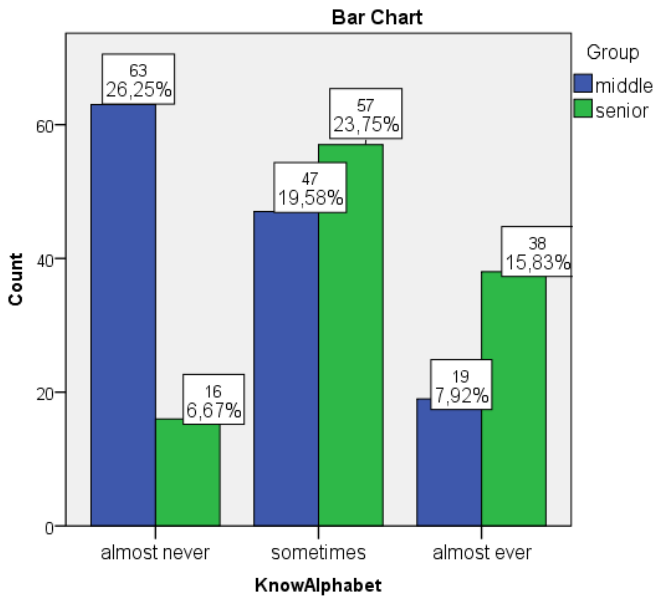


The same applies to speaking skills, where the junior group shows a lower age appropriate result compared to older peers (5.1.1).

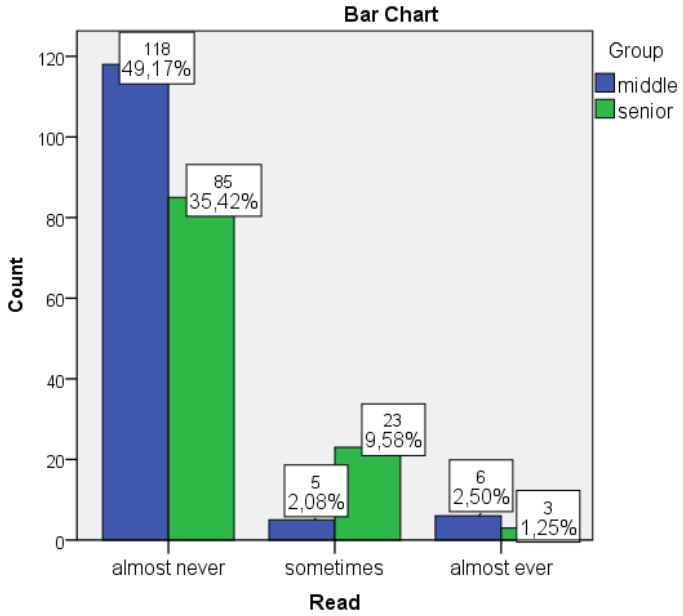
For step 2, it was distinguished 4 variables such as Know alphabet (5.3.3), Can read texts (5.3.4), Write simple words (5.3.8), Make up a story (5.3.19) to see the percentage and quality ratio of the presence of these skills in children of the middle (4-5 years old) and senior (5-6 years old) groups N=240.

Figure 2

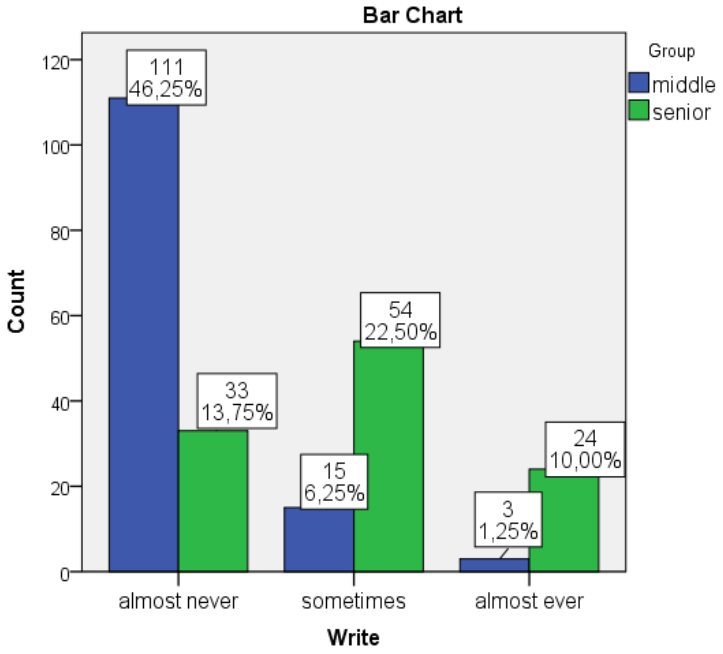
Histograms of distributions of answers among middle and senior groups.



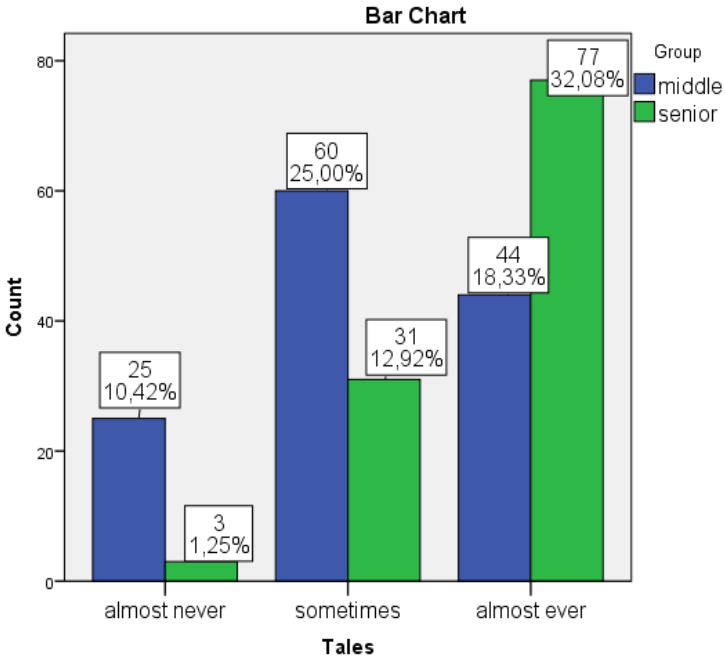
In the first diagram, we see how many children of the middle and senior groups have the particular skill. We see that most children of the middle group do not know the alphabet or know, but not all. Conversely, in the senior group, most children know the alphabet or partially know it.



In the second diagram, we observe that a large number of children of the middle and senior groups do not yet read.



In the third diagram, we observe that the children of the middle group for the most part do not write yet, the children of the senior group write sometimes or always in most of the observations.



The fourth diagram demonstrates that children of the middle and senior groups in most cases are able to compose stories from pictures.

4. DISCUSSION

4.1. Current findings

This study sought to examine the relationships between variable of the subscales of the questionnaire, and besides variables of risk factors for speech development (RFV) directly with variables of speech development. The focus was on the 15 factors identified as risk factors with blocks of variables identified as accepted norms of speech development. This work also examined the reliability aspects of the questionnaire tool used in the pilot project. Hypotheses of the patterns in the relationship between risk factors and speech development were derived from previous studies and theories.

Statistical analyses of the current research were proceeded in four steps. First, Reliability analysis was applied to explore Cronbach's alpha coefficient to investigate the reliability of the tool, including common blocks and individual blocks combined in subscales. Second, correlation analyses were performed to look at the relationships between the subscale of the tool and between distinguished risk factors variables included 15 items and speech development variables. Third, to assess the consistency between educators, Inter-rater reliability analysis was conducted. Fourth step, a descriptive analysis was conducted through contingency tables to track percentage and quantitative ratios in variables that interest us.

As mentioned above, the first step of current research focused on Reliability analysis to evaluate the reliability of the observation tool used. Analyzes of each scale as a whole showed significant results, all indicators of 6 coefficients were above 0.9. Also, individual scales of each section showed high reliability factors in most cases 0.8 to 0.9. The exception was the sixth section, where questions were drawn up to describe various aspects of behavior during various types of activities, indicators ranged from 0.56 to 0.6. This section needs further exploration and modification as it is based on the behavioural manifestations of the underlying neuropsychological mechanisms that might be challenging to capture via observation method.

In general, the results of the Reliability analysis can be described as very high and indicate the high reliability of the tool based on the pilot data analysed.

Correlation analyses was performed for each age group separately for the whole sample. Correlation analysis between the sub-scales of the questionnaire showed significant coefficients of moderate and high degree. The greatest number of moderate and strong coefficients is observed in the middle group of children. It can be assumed that by the age of 4-5 years, the basic amount of skills is accumulated throughout developmental paths.

Selecting of the variables in the relationship between risk factors and speech development were derived from previous studies and theories. The findings of Libertus and Violi (2016) highlight the importance of early motor skills as an agent of change over time and suggest that the acquisition of a new motor skill may initiate developmental cascades that can influence subsequent language learning in typically developing infants (Choi et al., 2018). Based on this, it is considered that poorly developed fine motor skills as a risk factor in the development of speech.

Levickis and colleagues (2017) found a clear cross-sectional association between language disorder and overall socio-emotional and behavior difficulties, as well as hyperactivity/inattention at the 3 time-points spanning the preschool and early primary school years. Based on these data, it is considered that aggressive, inappropriate behavior for certain situations as a risk factor for the development of speech.

Based on the performed correlation analyzes, it can be concluded that risk factors such as emotional state, aggression, and fine motor development are moderately correlated with speech development factors. The largest number of coefficients with a high degree of significance account for just these factors. Although the indicators were not high (maximum $r = .50$, $p < .01$), it can be concluded that factors of socio-communicative development, such as self-regulation and emotional well-being, and factors of physical development, such as the development of fine motor skills, have a direct correlation with factors of speech development. The findings of Samson and colleagues (2020) confirmed that prevention and intervention programs focusing on increasing emotion awareness may be beneficial for individuals with developmental language disorder (DLD) to the same extent as for children without DLD.

An analysis of Inter-rater reliability between educators was carried out in order to see the consistency of their assessments for children observed by them independently from each other at the same time. Coefficients with a high degree of significance accounted for each group of age ranged from 8.3% to 21.6% consistency between teachers in the groups. Based on the results, we can conclude that the degree of consistency between teachers for some items is not high. It can be assumed that such results were due to a small sample, since in one group there were only 4 children, in the rest from 12 to 20 children. It can be assumed that such results were obtained because the measurement scale consists of only three answers (1-almost never, 2-sometimes, 3-almost ever), if the scale included a scatter from one to five, the results would probably be higher. These results provide the basis for discussing the issue of teacher competence, since the child may not behave the same with one or the other educator. Further detailed analysis of the inter-rater reliability will inform further work with the tool.

A descriptive analysis of the variables was carried out in order to see what percentage of children in each group possess these skills. In general, the results showed the appropriate proportions for each age group. In addition, these results can be used for further research, if it is the goal to track the progress of children over time.

In general, we can conclude that the pilot study results can be considered quite valid and applicable to the main theories regarding the development of speech and the factors that affect it. One of the important conclusions is that the tool overall meets a high degree of reliability.

4.2 Limitations

The present study is one of the first studies to look at risk factors that are linked to speech development skills based on the pilot study of the approbation of the tool of "Complex assessment of the developmental trajectories in preschool children". However, there are a few limitations of the current study.

When analyzing the consistency of responses between educators, one sample included only 4 children. It needs to exclude children who did not have completed answers, and those children for whom only one teacher was given data. Perhaps that is why the coefficients of consistency were not high enough.

Another limitation may be the fact that in the answers in the questionnaire vary from only one to three, that may be why the consistency coefficients were not high enough. Future study would probably benefit from using extended grading scale from one to five.

Particular attention should be paid to the sixth block of questions, which showed reliability results in the range of 0,6. May be it happens because of the same questions in the subscales.

Finally, longitudinal studies in junior age group would help to gain a better understanding of casual effects of risk factors on the development of speech skills in children.

4.3 Conclusions

Speech development of children is recognized as one of the key skills influencing subsequent results, such as school readiness, academic achievement, employment and the socio-economic situation in society. Therefore, the issue of awareness and competencies for parents and teachers is a priority in this area. It can also be concluded that factors such as emotional well-being and the development of fine motor skills can be protective factors in the development of speech skills. A growing body of research show facilitative effect of books reading, play opportunities, and formal child care experience on vocabulary development under specific conditions. The link

between overall child well-being and early language development at the population level is a relatively new alliance (Law et al., 2017). The studies demonstrate that late talkers can catch up, with language skills at age five similar to those of children who produced more words at age two. And those late talkers who continued to have difficulties with language at age five were likely to have memory skills that were less advanced (Reilly et al., 2018; Zubrick et al., 2015). In implementing public policies and strategies to address the issue of speech development is a necessary measure.

Many aspects affect the development of speech in a child; therefore, research approaches to this issue should be based on different disciplines, such as physical, genetic, emotional, brain and social development. The findings of Reilly and colleagues (2010) suggest that the biological influences on language outcomes at 2 years of age are still strong at age 4 but social disadvantage becomes increasingly important. In the future, intervention programs should be aimed at preventing the occurrence of such factors, and toward prompt intervention in order to prevent neglect. Understanding that the sooner the problem is identified and the sooner the intervention begins the more significant and positive results it will be possible to achieve.

The best conclusion that I fully support was made by McKean and colleagues (2015) who concluded that: 1) potential levers for language interventions lie in the child's home learning environment from birth to age four; 2) the role of family's material and cultural capital must not be ignored, nor should the potential for growth into the school years; 3) early years services should acknowledge the effects of multiple, cascading and cumulative risks and seek to promote child language development through the aggregation of marginal gains in the preschool years and beyond.

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APPENDIX A

Table of consistency

Educator 1	Educator 2	1 group (Junior)	2 group (middle 1)	3 group (middle 2)	4 group (middle 3)	5 group (senior 1)	6 group (senior 2)
V1.1.1	B1.1.1				0,444		
V.1.1.2	B.1.1.2		1				
V1.1.3	B1.1.3						
V1.1.4	B1.1.4			0,692			
V1.1.5	B1.1.5	0,329					
V1.1.6	B1.1.6						
V1.1.7	B1.1.7						0,571
V1.1.8	B1.1.8	0,529					
V1.2.1	B1.2.1						
V1.2.2	B1.2.2	0,621		0,75			
V1.2.3	B1.2.3						
V1.2.4	B1.2.4		1	0,514			
V1.2.5	B1.2.5						0,548
V1.2.6	B1.2.6						
V1.2.7	B1.2.7						
V1.2.8	B1.2.8	0,45					
V1.2.9	B1.2.9				-0,327		
V1.2.10	B1.2.10			0,385			0,273
V1.2.11	B1.2.11						
V1.2.12	B1.2.12						
V1.2.13	B1.2.13						
V1.2.14	B1.2.14		1		0,18		
V1.3.1	B1.3.1						
V1.3.2	B1.3.2						
V1.3.3	B1.3.3						
V1.3.4	B1.3.4						

V1.3.5	B1.3.5		1					
V1.3.6	B1.3.6							0,466
V1.3.7	B1.3.7							
V1.3.8	B1.3.8							
V1.3.9	B1.3.9	0,722						
V1.3.10	B1.3.10							0,378
V1.3.11	B1.3.11							
V1.3.12	B1.3.12					0,543		
V1.4.1	B1.4.1							
V1.4.2	B1.4.2							
V1.4.3	B1.4.3					0,643	1	
V1.4.4	B1.4.4			0,636				
V1.4.5	B1.4.5	0,353		0,596				
V1.4.6	B1.4.6			0,824				
V1.4.7	B1.4.7						0,512	
V1.4.8	B1.4.8							
V1.4.9	B1.4.9							
V1.4.10	B1.4.10						0,384	
V1.4.11	B1.4.11	1	1					
V1.4.12	B1.4.12							
V1.4.13	B1.4.13	0,522		0,473				0,548
V1.4.14	B1.4.14	0,645						0,506
V1.4.15	B1.4.15	0,421	1					0,444
V2.1.1	B2.1.1							0,641
V2.1.2	B2.1.2			0,571				0,417
V2.1.3	B2.1.3						0,691	0,671
V2.1.4	B2.1.4							
V2.1.5	B2.1.5						0,44	0,571
V2.1.6	B2.1.6						0,457	
V2.1.7	B2.1.7							
V2.1.8	B2.1.8						0,545	

V2.1.9	B2.1.9	0,607		0,478				
V2.1.10	B2.1.10			0,478				
V2.1.11	B2.1.11							
V2.1.12	B2.1.12						0,405	
V2.2.1	B2.2.1							0,491
V2.2.2	B2.2.2							
V2.2.3	B2.2.3					0,364		
V2.2.4	B2.2.4	0,468						
V2.2.5	B2.2.5							
V2.2.6	B2.2.6							
V2.2.7	B2.2.7					0,279		
V2.2.8	B2.2.8							
V2.2.9	B2.2.9							
V2.2.10	B2.2.10			0,455				
V2.2.11	B2.2.11					0,289		0,44
V2.2.12	B2.2.12							
V2.2.13	B2.2.13							
V2.2.14	B2.2.14							
V2.2.15	B2.2.15						0,444	
V2.2.16	B2.2.16	0,476						
V2.2.17	B2.2.17							
V2.2.18	B2.2.18			0,394				0,533
V2.2.19	B2.2.19							0,625
V2.3.1	B2.3.1							
V2.3.2	B2.3.2							
V2.3.3	B2.3.3			0,526				
V2.3.4	B2.3.4						0,483	
V2.3.5	B2.3.5							
V2.3.6	B2.3.6		-0,333	0,6				0,837
V2.3.7	B2.3.7		-0,333	0,6				0,811
V2.3.8	B2.3.8			1				

V2.3.9	B2.3.9					
V3.1.1	B3.1.1					
V3.1.2	B3.1.2		1			0,346
V3.1.3	B3.1.3		1	0,4		0,397
V3.1.4	B3.1.4			0,571		
V3.1.5	B3.1.5					
V3.1.6	B3.1.6		1			0,468
V3.1.7	B3.1.7	0,515			0,583	0,354
V3.2.1	B3.2.1				1	
V3.2.2	B3.2.2				1	
V3.2.3	B3.2.3					
V3.2.4	B3.2.4					
V3.2.5	B3.2.5		0,6			
V3.2.6	B3.2.6					
V3.2.7	B3.2.7			0,625		0,222
V3.2.8	B3.2.8					
V3.2.9	B3.2.9	0,368		0,625		
V3.2.10	B3.2.10					
V3.2.11	B3.2.11			0,375		
V3.3.1	B3.3.1	0,585			0,471	
V3.3.2	B3.3.2					
V3.3.3	B3.3.3			0,824		
V3.3.4	B3.3.4	0,56		0,526		
V3.3.5	B3.3.5					
V3.3.6	B3.3.6		1			
V3.3.7	B3.3.7	0,833				
V3.3.8	B3.3.8	0,82				
V3.3.9	B3.3.9				0,371	
V3.3.10	B3.3.10			0,532		
V3.3.11	B3.3.11	0,621		0,571		
V3.3.12	B3.3.12					

V3.3.13	B3.3.13						0,348	
V3.3.14	B3.3.14							
V3.4.1	B3.4.1		-0,6					
V3.4.2	B3.4.2							
V3.4.3	B3.4.3							
V3.4.4	B3.4.4	0,436						
V3.4.5	B3.4.5							
V3.4.6	B3.4.6							
V3.4.7	B3.4.7							0,391
V3.4.8	B3.4.8	0,542		0,314				0,563
V4.1.1	B4.1.1			0,625				0,354
V4.1.2	B4.1.2			0,625				0,344
V4.1.3	B4.1.3			0,625				
V4.1.4	B4.1.4							
V4.2.1	B4.2.1			1				
V4.2.2	B4.2.2							
V4.2.3	B4.2.3							
V4.2.4	B4.2.4			0,625				
V4.2.5	B4.2.5							0,354
V4.2.6	B4.2.6	0,792						0,354
V4.2.7	B4.2.7							
V4.2.8	B4.2.8							
V4.3.1	B4.3.1			0,625	0,438			
V4.3.2	B4.3.2							
V4.3.3	B4.3.3							
V4.3.4	B4.3.4							
V4.3.5	B4.3.5							
V4.3.6	B4.3.6	1						
V4.4.1	B4.4.1							
V4.4.2	B4.4.2				0,467			
V4.4.3	B4.4.3							

V4.4.4	B4.4.4						
V4.4.5	B4.4.5						
V4.4.6	B4.4.6		-1				
V5.1.1	B5.1.1						0,44
V5.1.2	B5.1.2						
V5.1.3	B5.1.3			0,613			0,523
V5.1.4	B5.1.4			0,586			
V5.1.5	B5.1.5						
V5.1.6	B5.1.6						
V5.1.7	B5.1.7					0,423	
V5.1.8	B5.1.8					0,423	
V5.2.1	B5.2.1						
V5.2.2	B5.2.2						
V5.2.3	B5.2.3						
V5.2.4	B5.2.4			0,493			
V5.2.5	B5.2.5						0,506
V5.2.6	B5.2.6						
V5.3.1	B5.3.1			0,75	0,556		
V5.3.2	B5.3.2						
V5.3.3	B5.3.3						
V5.3.4	B5.3.4				0,649		
V5.3.5	B5.3.5				0,649		
V5.3.6	B5.3.6						
V5.3.7	B5.3.7						0,525
V5.3.8	B5.3.8				0,459	0,455	0,368
V5.3.9	B5.3.9						
V5.3.10	B5.3.10						
V5.3.11	B5.3.11						
V5.3.12	B5.3.12						
V5.3.13	B5.3.13						
V5.3.14	B5.3.14	0,371		0,591			

V5.3.15	B5.3.15						
V5.3.16	B5.3.16						
V5.3.17	B5.3.17		1				
V5.3.18	B5.3.18			0,815			0,611
V5.3.19	B5.3.19			0,733	-0,197		0,455
V5.3.20	B5.3.20			0,529			0,455
V5.3.21	B5.3.21				0,42		
V5.3.22	B5.3.22						
V5.3.23	B5.3.23	0,621				0,429	
V5.3.24	B5.3.24					0,706	
V5.3.25	B5.3.25			0,478		0,409	
V6.1.1	B6.1.1			0,625			0,533
V6.1.2	B6.1.2						0,689
V6.1.3	B6.1.3						
V6.1.4	B6.1.4						0,576
V6.1.5	B6.1.5						
V6.1.6	B6.1.6	0,436					0,512
V6.1.7	B6.1.7						
V6.1.8	B6.1.8						
V6.1.9	B6.1.9						
V6.2.1	B6.2.1						0,44
V6.2.2	B6.2.2	0,389					
V6.2.3	B6.2.3						
V6.2.4	B6.2.4						
V6.2.5	B6.2.5		1				
V6.2.6	B6.2.6	0,413			0,435		0,429
V6.2.7	B6.2.7					0,722	
V6.2.8	B6.2.8						
V6.2.9	B6.2.9						
V6.3.1	B6.3.1					0,538	
V6.3.2	B6.3.2						0,553

V6.3.3	B6.3.3							
V6.3.4	B6.3.4							
V6.3.5	B6.3.5	0,337						
V6.3.6	B6.3.6							
V6.3.7	B6.3.7						0,571	
V6.3.8	B6.3.8							
V6.3.9	B6.3.9							0,386
V6.4.1	B6.4.1			0,625				
V6.4.2	B6.4.2				0,313		0,396	0,481
V6.4.3	B6.4.3						0,331	
V6.4.4	B6.4.4							
V6.4.5	B6.4.5						0,44	
V6.4.6	B6.4.6						0,38	0,714
V6.4.7	B6.4.7						0,864	
V6.4.8	B6.4.8							
V6.4.9	B6.4.9	0,371			0,419			
V6.5.1	B6.5.1							
V6.5.2	B6.5.2		1					
V6.5.3	B6.5.3							0,553
V6.5.4	B6.5.4							
V6.5.5	B6.5.5	0,566					0,409	
V6.5.6	B6.5.6							0,659
V6.5.7	B6.5.7			0,625			0,64	
V6.5.8	B6.5.8							
V6.5.9	B6.5.9							
V6.6.1	B6.6.1		1				0,634	
V6.6.2	B6.6.2	0,515						
V6.6.3	B6.6.3						0,286	
V6.6.4	B6.6.4						0,237	0,333
V6.6.5	B6.6.5							
V6.6.6	B6.6.6				0,468			0,429

V6.6.7	B6.6.7			0,625		0,717	0,429
V6.6.8	B6.6.8					0,595	
V6.6.9	B6.6.9				0,351		
V6.7.1	B6.7.1						0,494
V6.7.2	B6.7.2				0,308		
V6.7.3	B6.7.3						
V6.7.4	B6.7.4						
V6.7.5	B6.7.5					0,508	
V6.7.6	B6.7.6						0,451
V6.7.7	B6.7.7			0,625		0,512	0,429
V6.7.8	B6.7.8						
V6.7.9	B6.7.9						
V6.8.1	B6.8.1	0,744	1				0,192
V6.8.2	B6.8.2						0,481
V6.8.3	B6.8.3						
V6.8.4	B6.8.4						
V6.8.5	B6.8.5						
V6.8.6	B6.8.6						
V6.8.7	B6.8.7	0,639		0,625			
V6.8.8	B6.8.8						
V6.8.9	B6.8.9						

The table shows only those coefficients that had a high degree of significance $p<0.05$. Values ≤ 0 as indicating no agreement and 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement.

A negative kappa represents agreement worse than expected, or disagreement. Low negative values (0 to −0.10) may generally be interpreted as "no agreement".

In the first group, we see 36 significant coefficients from 0.329 to 1, more in the first and third blocks. Coefficients equal to one *k*=1 we see in items V1.4.11.and V4.3.6, in items V3.3.7 and V3.3.8 *k*=0.833/0.82 respectively. Other indicators vary from moderate to minimal.

In the second group, due to the small sample (N=4), we can talk about the results that were obtained by chance.

In the third group, we see 48 significant coefficients from 0.314 to 1, indicators were distributed evenly from 8 to 10 in each block. Coefficients equal to one *k*=1 we see in items V2.3.8 and V4.2.1, in items V3.3.3 and V5.3.18 *k*=0.824/0.815 respectively. Other indicators vary from moderate to minimal.

In the fourth group, we see 22 significant coefficients from -0.327 to 0.649, here we do not see strong and almost perfect coefficients, just moderate and lower.

In the fifth group, we see 39 significant coefficients from 0.237 to 1, indicators were concentrated in 6 block. Coefficients equal to one *k*=1 we see in items V1.4.3 and V3.2.2, in item V6.4.7 *k*=0.864. Other indicators vary from moderate to minimal.

In the sixth group we see the greatest amount of significant coefficients of 57 from indicators were concentrated in2, 5 and 6 blocks. Items V2.3.6 and V2.3.7 k=0.837/0.811 respectively.

АНТИПЛАГИАТ
ТВОРИТЕ СОБСТВЕННЫМ УМОМ

Отчет о проверке на заимствования №1

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Отчет предоставлен сервисом «Антиплагиат» - https://users.antiplagiat.ru

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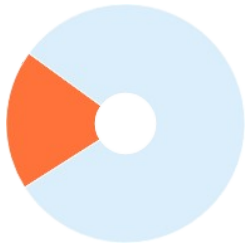

ЗАИМСТВОВАНИЯ	САМОЦИТИРОВАНИЯ	ЦИТИРОВАНИЯ	ОРИГИНАЛЬНОСТЬ
18,86%	0%	0%	81,14%

Заимствования — доля всех найденных текстовых пересечений, за исключением тех, которые система отнесла к цитированиям, по отношению к общему объему документа.
Самоцитирования — доля фрагментов текста проверяемого документа, совпадающий или почти совпадающий с фрагментом текста источника, автором или соавтором которого является автор проверяемого документа, по отношению к общему объему документа.
Цитирования — доля текстовых пересечений, которые не являются авторскими, но система посчитала их использование корректным, по отношению к общему объему документа. Сюда относятся оформленные по ГОСТу цитаты; общеупотребительные выражения; фрагменты текста, найденные в источниках из коллекций нормативно-правовой документации.
Текстовое пересечение — фрагмент текста проверяемого документа, совпадающий или почти совпадающий с фрагментом текста источника.
Источник — документ, проиндексированный в системе и содержащийся в модуле поиска, по которому проводится проверка.
Оригинальность — доля фрагментов текста проверяемого документа, не обнаруженных ни в одном источнике, по которым шла проверка, по отношению к общему объему документа.
Заимствования, самоцитирования, цитирования и оригинальность являются отдельными показателями и в сумме дают 100%, что соответствует всему тексту проверяемого документа.
Обращаем Ваше внимание, что система находит текстовые пересечения проверяемого документа с проиндексированными в системе текстовыми источниками. При этом система является вспомогательным инструментом, определение корректности и правомерности заимствований или цитирований, а также авторства текстовых фрагментов проверяемого документа остается в компетенции проверяющего.

№	Доля в отчете	Источник	Ссылка	Актуален на	Модуль поиска
[01]	4,26%	https://kpfu.ru//staff_files/F1165354588/BOOK_3_SCIENCE_AND_SOCIETY_VOL_2__1_.pdf	https://kpfu.ru	14 Сен 2018	Модуль поиска Интернет
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[10]	0,84%	Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC)	Departm..	https://dss.gov.au	26 Июн 2018	Модуль поиска Интернет
[11]	1,06%	Language development: children 0-8 years	Raising Children Network	https://raisingchildren.net.au	21 Мая 2020	Модуль поиска Интернет
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[13]	1,05%	Longitudinal studies	https://ncbi.nlm.nih.gov	06 Мар 2019	Модуль поиска Интернет
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[15]	1%	Patterns and Predictors of Language and Literacy Abilities 4-10 Years in the Longitudinal...	http://connection.ebscohost.com	30 Июл 2018	Модуль поиска Интернет
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[17]	0,37%	Draft:Growing Up in Australia	http://en.wikipedia.org	27 Мар 2017	Модуль поиска Интернет

[18]	0,63%	HERE (1/4)	http://ddl.ish-lyon.cnrs.fr	22 Мар 2018	Модуль поиска Интернет
[19]	0,18%	here	https://eprint.ncl.ac.uk	14 Апр 2020	Модуль поиска Интернет
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