



TEACHERS' PERCEPTIONS ABOUT THE IMPACT OF MOTOR DEVELOPMENT ON STUDENTS' LANGUAGE AND SPEECH DEVELOPMENT

Miranda BARUTI-SYLEJMANI

PhD candidate at University "Ss. Cyril and Methodius", Faculty of Philosophy in Skopje

Department of Special education and rehabilitation, Skopje, N. Macedonia

ORCID: <https://orcid.org/0000-0003-0574-161X>

barutimiranda@gmail.com

Olivera RASHIKJ-CANEVSKA

Assoc. Professor at University "Ss. Cyril and Methodius", Faculty of Philosophy in Skopje

Institute of special education and rehabilitation, Skopje, N. Macedonia

ORCID: <https://orcid.org/0000-0003-2385-5450>

oliverarasic@fzf.ukim.edu.mk

Received: September 20, 2023 **Accepted:** November 16, 2023 **Published:** December 31, 2023

Suggested Citation:

Baruti-Sylejmani, M., & Rashikj-Canevska, O. (2023). Teachers' perceptions about the impact of motor development on students' language and speech development. *Turkish International Journal of Special Education and Guidance & Counselling (TIJSEG)*, 12(2), 121-127.



Copyright © 2023 by author(s). This is an open access article under the [CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/).

Abstract

The purpose of this research was to understand the perceptions of teachers about the impact that motor development has on the development of language and speech in school-aged children. In this research we had 70 participants, where 97% of them were women and 3% of them were men. The instrument used for this research was a questionnaire which contained 5 demographic questions and 37 questions related to motor, language, and speech development. SPSS was used to analyze the results, where frequency analysis, Cronbach's alpha, correlation analysis and regression analysis were used. Based on the correlational analysis, we understood that the higher the motor development, the higher the speech development. We also understand that the higher the motor development in children, the higher is language development in children. Also, no less important, it should be noted that the higher the children's intelligibility, the higher the language development. At the same time, based on the regression analysis, we understand that motor development affects the positive development of language and speech.

Keywords: Teachers' perceptions, development, motor skills, language, speech.

INTRODUCTION

Language development in children begins before birth. The parent, especially the mother, must commit to a large extent to talk to her embryo during pregnancy. The embryo, even though it is in the mother's womb, is able to hear and respond to all signals or stimuli from the external environment. Motor development also begins from the birth of children, when parents commit themselves to children doing various activities that increase the possibility of developing fine, oral, and global motor skills.

Different authors (Hotulainen et al., 2010; Dodd & McIntosh, 2010; Nip, et al., 2011) have presented the importance of language and speech development based on verbal-motor development. However, the importance of understanding the connection between full motor development and the development of language and speech has been used in different literature, where the authors present a deeper understanding of this part (Son & Meisels, 2006; Iverson, 2010; Leonard & Hill, 2014).

Iverson (2010) comes to the conclusion that the idea which is about the connection between motor development and language development has to do with the advanced motor skills that babies have and gives them the opportunity to experience the world around them. Even Behrens & Hauch (2011) in their research emphasize that the development of children in the physical aspect such as; changing



their position, then their movement helps them to experience and deal with the first things in their environment, and with these skills children also improve their basic skills in the development of language and speech.

It is worth noting that we have a number of theories that talk about the topic in question. For example, the theory on the development of gestures (Iverson & Goldin-Meadow, 2005; Zambrana et al., 2012) talks about motor skills, which can be said to influence the performance or development of gestures, and various studies have shown us that children who have language and speech delays also have problems with gestures. Even from the earliest years, authors have aimed to discover the connection between these two factors (motor and speech), so Rizzolatti & Arbib (1998) have stated in cognitive motor theories, that knowledge is embedded in actions, and in this case, perception and action share common codes from the basic neural aspect. Thus, it has been suggested that the neuron is the basic neural mechanism that affects the development of language, and this system presents us with a strong connection between language and the actions that children do. The latest theory about sympathetic cognition argues that motor resonance increases language comprehension (Glenberg & Kaschak, 2002; Fischer & Zwaan, 2008).

It is indisputable that the production of speech is a motor act, and in this case the connections between oral-motor physiology and the acquisition of oral language skills are also described in articles by different authors (Thelen, 1991; Green & Wilson, 2006; Nip, Green & Marx, 2009), in this case it is understood that children who, as they learn to coordinate and control the articulation of speech, positively affect language development (Iverson, 2010).

Karasik and co-authors (2011) emphasized that children's interaction with the environment requires sensory, physical, and motor skills, which develop continuously during early childhood. For example, at the moment when children develop walking, the way in which they will share objects during the game with the mother and the verbal responses given to the children, in this aspect, is also determined. Meanwhile, Thelen (1979), did a longitudinal study, in which he reported that in babies with typical development, during the first year of life, they have a very high achievement in the frequency of rhythmic movements of the arms, such as shaking, moving, etc. While other authors (Koopmans-can Beinum & Van der Stelt, 1986; Oller & Eilers, 1988) emphasized during different years that during the first year of life, children with typical development produce repeated noises, vocalizations in which well-informed syllables are organized in an organized sequence, in regular and rhythmic time, for example "bababa".

Kuder (2012) in his research emphasized that speaking is a neuromuscular act which helps in the production of sounds, to use the language. He also pointed out that through language we communicate thoughts, ideas and meanings, but we don't always need speech to do this. Example, American Sign Language, is a language that uses different gestures that help deaf people to communicate with each other, this language can be learned even by those who are not deaf.

Kuhn et al. (2014) in a longitudinal study of 1066 children from low-income families, in the USA, with children between the ages of 15 months and 3 years, found that the increase in the use of gestures and language at a younger age was related to the most developed executive function at the age of four, although the effect was mediated through later language development (2-3 years of age). This study in a word revealed that early language development had significant positive direct and indirect effects on the later development of children's executive function.

As mentioned above, the possible effects of motor skills on language development have not yet been properly researched. Different authors tell us that the connections between motor skills and language development have been investigated when there was an existing pathology from one of these areas (Hohm et al., 2007; Rechetnikov et al., 2009; Hartman et al., 2010; Visscher et al., 2010; Westendorp et al., 2011; Iverson & Braddock, 2011; Mürsepp et al., 2012; Rintala & Loovis, 2013; Westendorp et al., 2014; Mürsepp et al., 2014).



Mulé et al. (2022) in their research excluded children with speech impediments and other medical impairments. They emphasized that inactive children had weaker results in all language development subtests, compared to children who spent more time in different activities in sports clubs during the week. It is worth noting that in this study, unstructured activities, attendance at kindergartens and sports clubs had a positive effect on language subtests that were conducted with children such as "Formation of morphological rules" and "Phonological memory for non-words".

Then, Wang and co-authors (2014) in their research found a possible positive relationship between language performance at an early age and the development of fine and global motor skills. In this research, 11,999 children between the ages of three and five were tested.

METHOD

The research approach of the paper is quantitative, where the data is obtained through surveys. If we talk about the type of research, it is of a pure research type, as it is being developed to explore an issue, and will be completed with the aim of gaining a better understanding of the general concepts. Also, based on the division of the time period, it is a cross-sectional or representative study, as it includes finding data from selected respondents due to their interest in the topic, at a certain point in time.

Research participants

The first table shows that in this research we had 70 participants, where 97% of them were women and 3% of them were men.

Table 1. Data about the gender of the respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	3	3	3	3
Female	67	97	97	100.0
Total	70	100.0	100.0	

Also, the second table shows that 15% of the respondents lived in the countryside, while 85% of them lived in the city.

Table 2. Data about the residence of the respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Rural	10	15	15	15
City	60	85	85	100.0
Total	70	100.0	100.0	

The instrument used for this research

The instrument used for this research was "Five-To-Fifteen-Revised (5-15R) (Kadesjö et al., 2017). This questionnaire contains a large number of questions, but the questions that have been necessary for this research have been used. It is worth noting that this questionnaire contained 5 demographic questions and 37 questions related to motor development, language, and speech. The questionnaire is adapted to the Albanian language.

Also, SPSS was used to analyze the results, where frequency analysis (for respondents' data), Cronbach's alpha, correlation analysis and regression analysis were used. The data of the respondents remain anonymous and confidential, also their participation in this research was voluntary.

RESULTS

Cronbach's Alpha

The reliability analysis helps us to understand that we have very high reliability of the questionnaire, based on the quality of the variables used, where Cronbach's alpha is .963.

**Table 3.** Reliability analysis based on questionnaire variables

Cronbach's Alpha	N of Items
.963	36

Correlation analysis

Based on the fourth table, with the help of correlational analysis we can understand the connection between motor development, language and speech.

Thus, there is a significant positive correlation between "Motor Development" and "Speech Development", $r=.848^{**}$, $p<.01$. There is also a significant positive correlation between "Motor Development" and "Language Development", $r=.826^{**}$, $p<.01$.

Table 4. The relationship between motor development, language and speech

		1	2	3
Motor Development (1)	Pearson Correlation	1	.848**	.826
	Sig. (2-tailed)		.000	.000
	N	70	70	70
Speech Development (2)	Pearson Correlation	.848**	1	.828**
	Sig. (2-tailed)	.000		.000
	N	70	70	70
Language Development (3)	Pearson Correlation	.826**	.828**	1
	Sig. (2-tailed)	.000	.000	
	N	70	70	70

We also have a significant correlation between "Speech Development" and "Language Development", $r=.828^{**}$, $p<.01$.

Regression analysis

Linear regression was used to test if motor development affects children's speech development. Thus, the results presented in table 5 show us that motor development has an impact on speech development, which is also explained by the model, $F(1/68) = 3.82895$, $sig. = .000$.

Table 5. The influence of motor development on speech development

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
1	.848 ^a	.718	.714	3.82895	173.444	.000

a. Dependent Variable: Speech Development

b. Predictors: (Constant), Motor Development

The results presented in table 6 show us that motor development has an impact on language development, which is also explained by the model, $F(1/68) = 2.17802$, $sig. = .000$.

Table 6. The influence of motor development on language development

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig
1	.826 ^a	.682	.678	2.17802	145.983	.000

a. Dependent Variable: Language Development

b. Predictors: (Constant), Motor Development

DISCUSSION, CONCLUSION and SUGGESTIONS

The purpose of this research was to understand the perceptions of teachers about the impact that motor development has on the development of language and speech in school-aged children. Based on this purpose, the variables were also analyzed, where it was understood that the higher the motor development, the higher the children's speech development. Also, based on this analysis (correlation analysis), we also understand that the higher the motor development in children, the higher the language development in children. Also, no less important, it should be noted that the higher the children's intelligibility, the higher the language development and vice versa.

Also, based on the regression analysis, we understand that motor development affects the positive development of language and speech. These analyzes are reliable, based on the result of cronbach's alpha .963, where we have high reliability of the variables used in this questionnaire.

Iverson (2010) tells us that the acquisition of motor skills in babies offers opportunities to practice skills related to language acquisition. The rhythmic movements of the arm, which babies make, enable them to perform actions organized in a rhythmic way, which later affect the development of language and speech. Thus, according to this research, before and during the period of saying the first word, babies practice different actions; they play, manipulate and act with toys in a progressive and specific way. They progressively name and assign more specific meanings by extending the common meaning to a variety of referents. In a word, all these forms of action are closely related to the appearance of the early moments of language, which depends on the progress in motor skills.

Bishop (2002) has argued that co-occurring motor and language difficulties may have a genetic basis, with genes that put a child at risk for communication impairment also affecting motor development.

Thus, it is worth noting that Bishop's viewpoint is supported by a large number of authors from their prospective studies of infants at risk for a range of communication disorders, including autism spectrum disorder (Iverson & Wozniak, 2007) and dyslexia (Viholainen, Ahonen, Cantell, Lyytinen & Lyytinen, 2002; Viholaneny, Ahonen, Cantell, Tolvanen, & Lyytinen, 2006), for whom the achievement of early motor milestones (e.g. independent sitting) lags behind that of infants of risk-free comparison.

Based on the findings of the research, the following conclusions emerge:

- ✓ the higher the motor development, the higher the speech development of the children,
- ✓ the higher the motor development in children, the higher the language development in children,
- ✓ the higher the children's intelligibility, the higher the language development and vice versa, motor affects the positive development of language and speech.

Ethics and Conflict of Interest

As the authors of this article, we have acted in accordance with ethical rules at all stages of the research. We also declare that there is no conflict of interest among the authors.

REFERENCES

- Behrens, M., & Hauch, J. (2011). *Motor development influence language development*. Marquette University.
- Bishop, D. V. M. (2002). Motor immaturity and specific speech and language impairment: Evidence for a common genetic basis. *American Journal of Medical Genetics (Neuropsychiatric Genetics)*, 8(114), 56–63. doi: 10.1002/ajmg.1630
- Dodd, B., & McIntosh, B. (2010). Two-year-old phonology: impact of input, motor and cognitive abilities on development. *Journal of Child Language*, 37(5), 1027–1046. <https://doi.org/10.1017/S0305000909990171>
- Fischer, M. H., & Zwaan, R. A. (2008). Embodied language: a review of the role of the motor system in language comprehension. *The Quarterly Journal of Experimental Psychology*, 61(6), 825–850. 10.1080/17470210701623605.
- Green, J. R., & Wilson, E. M. (2006). Spontaneous facial motility in infancy: A 3D kinematic analysis. *Developmental Psychobiology*, 48(1), 16–28. doi: 10.1002/dev.20112
- Hartman, E., Houwen, S., Scherder, E., & Visscher, C. (2010). On the relationship between motor performance and executive functioning in children with intellectual disabilities. *J. Intellect. Disabil. Res.* 54(5), 468–477. doi: 10.1111/j.1365-2788.2010.01284.x
- Hohm, E., Jennen-Steinmetz, C., Schmidt, M. H., & Laucht, M. (2007). Language development at ten months. Predictive of language outcome and school achievement ten years later? *Eur. Child Adolesc. Psychiatry*, 16(3), 149–156. doi: 10.1007/s00787-006-0567-y
- Hotulainen, R., Lappalainen, K., Ruoho, K., & Savolainen, H. (2010). Pre-school verbosensory motor status as a predictor of educational life-courses and self-perceptions of young adults. *International Journal of Disability, Development and Education*, 57(3), 299–314. <https://doi.org/10.1080/1034912X.2010.501205>

- Iverson, J. M., & Braddock, B. A. (2011). Gesture and motor skill in relation to language in children with language impairment. *Journal of Speech, Language, and Hearing Research*, 54(1), 72-86. doi: 10.1044/1092-4388(2010)08-0197)
- Iverson, J. M., & Wozniak, R. H. (2007). Variation in vocal-motor development in infant siblings of children with autism. *Journal of Autism and Developmental Disorders*, 37(1), 158-170. doi: 10.1007/s10803-006-0339-z
- Iverson, J. M., & Goldin-Meadow, S. (2005). Gesture paves the way for language development. *Psychological Science*, 16(5), 367-371. doi: 10.1111/j.0956-7976.2005.01542.x
- Kadesjö, B., Janols, L.-O., Korkman, M., Mickelsson, K., Strand, G., Trillingsgaard, A., Lambek, R., Øgrim, G., Bredesen, A. M., & Gillberg, C. (2017). Five-To-Fifteen-Revised (5-15R). Available at www.5-15.org
- Karasik, L. B., Tamis-LeMonda, C. S., & Adolph, K. E. (2011). Transition from crawling to walking affects infants' social actions with objects. *Child Development*, 82(4), 1199-209. doi: 10.1111/j.1467-8624.2011.01595.x
- Koopmans-van Beinum, F. J., & van der Stelt, J. M. (1986). Early stages in the development of speech movements. In: Lindbom, B., Zetterstrom, R., editors. *Precursors of early speech*. New York: Stockton Press; p. 37-50.
- Kuder, S. J. (2012). *Teaching students with language and communication disabilities*. (4 th ed.) New York: Pearson.
- Kuhn, L. J., Willoughby, M. T., Wilbourn, M. P., Vernon-Feagans, L., & Blair, C. B. (2014). Early communicative gestures prospectively predict language development and executive function in early childhood. *Child Development*, 85(5), 1898-1914. doi: 10.1111/cdev.12249
- Leonard, H. C., & Hill, E. L. (2014). Review: The impact of motor development on typical and atypical social cognition and language: A systematic review. *Child and Adolescent Mental Health*, 19(3), 163-170. <https://doi.org/10.1111/camh.12055>
- Müürsepp, I., Aibast, H., Gapeyeva, H., & Pääsuke, M. (2014). Sensorimotor function in preschool-aged children with expressive language disorder. *Res. Dev. Disabil.* 35(6), 1237-1243. doi: 10.1016/j.ridd.2014.03.007
- Müürsepp, I., Aibast, H., Gapeyeva, H., & Pääsuke, M. (2012). Motor skills, haptic perception and social abilities in children with mild speech disorders. *Brain Dev.* 34(2), 128-132. <https://doi.org/10.1016/j.braindev.2011.02.002>
- Nip, I. S., Green, J. R., & Marx, D. B. (2011). The co-emergence of cognition, language, and speech motor control in early development: A longitudinal correlation study. *Journal of Communication Disorders*, 44(2), 149-160. <https://doi.org/10.1016/j.jcomdis.2010.08.002>
- Oller, D. K., & Eilers, R. E. (1988). The role of audition in infant babbling. *Child Development*, 59(2), 441-466.
- Rintala, P., & Loovis, E.M. (2013). Measuring motor skills in Finnish children with intellectual disabilities. *Percept. Mot. Ski.* 116(1), 294-303. doi: 10.2466/25.10.PMS.116.1.294-303
- Rizzolatti, G., & Arbib, M. A. (1998). Language within our grasp. *Trends in Neurosciences*, 21(5), 188-194. Doi:10.1016/S0166-2236(98)01260-0.
- Son, S. H., & Meisels, S. J. (2006). The relationship of young children's motor skills to later reading and math achievement. *Merrill-Palmer Quarterly*, 52(4), 755-778. <https://doi.org/10.1353/mpq.2006.0033>
- Thelen, E. (1991). *Motor aspects of emergent speech: A dynamic approach*. In: Krasnegor, N., editor. *Biobehavioral foundations of language*. Hillsdale, NJ: Erlbaum. p. 339-362.
- Thelen, E. (1979). Rhythmical stereotypies in normal human infants. *Animal Behaviour*, 27(3), 699-715. doi: 10.1016/0003-3472(79)90006-x
- Visscher, C., Houwen, S., Moolenaar, B., Lyons, J., Scherder, E. J. A., & Hartman, E. (2010). Motor proficiency of 6- to 9-year-old children with speech and language problems. *Dev. Med. Child Neurol.* 52(11), e254-e258. <https://doi.org/10.1111/j.1469-8749.2010.03774.x>
- Viholainen, H., Ahonen, T., Cantell, M., Lyytinen, P., & Lyytinen, H. (2002). Development of early motor skills and language in children at risk for familial dyslexia. *Developmental Medicine & Child Neurology*, 44(11), 761-769. doi: 10.1017/s0012162201002894
- Viholainen, H., Ahonen, T., Lyytinen, P., Cantell, M., Tolvanen, A., & Lyytinen, H. (2006). Early motor development and later language and reading skills in children at risk of familial dyslexia. *Developmental Medicine & Child Neurology*, 48(5), 367-373. doi: 10.1017/S001216220600079X
- Wang, M. V., Lekhal, R., Aaro, L. E., Holte, A., & Schjolberg, S. (2014). The developmental relationship between language and motor performance from 3 to 5 years of age: A prospective longitudinal population study. *BMC Psychol*, 2(34), 1-10, <https://doi.org/10.1186/s40359-014-0034-3>



Westendorp, M., Hartman, E., Houwen, S., Huijgen, B. C. H., Smith, J., & Visscher, C. (2014). A longitudinal study on gross motor development in children with learning disorders. *Res. Dev. Disabil.* 35(2), 357-363. doi: 10.1016/j.ridd.2013.11.018.

Westendorp, M., Houwen, S., Hartman, E., & Visscher, C. (2011). Are gross motor skills and sports participation related in children with intellectual disabilities? *Res. Dev. Disabil.* 32(3), 1147-1153. doi: 10.1016/j.ridd.2011.01.009.

Zambrana, I. M., Ystrom, E., & Pons, F. (2012). Impact of gender, maternal education, and birth order on the development of language comprehension: a longitudinal study from 18 to 36 months of age. *Journal of Developmental and Behavioral Pediatrics*, 33(2), 146-155. doi: 10.1097/DBP.0b013e31823d4f83.

TIJSEG