Policy Journal of Social Science Review

Online ISSN 3006-4635

Print ISSN 3006-4627

Vol. 3 No. 12 (2025)

Multilingual Experience and Executive Functioning Skills among Children

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Abstract

Presently, there have been doubts raised about the relationship between multilingualism and executive functioning skills in children. The objective of this review was to identify the factors of multiple languages on executive functioning skills. Original articles from google scholar, pub med, research gate and new journals, were all gathered and researched with a cut-off date of May 2024, hereby following the protocols of systematic review and American Psychological Association citations. The experiments, non-standardized tests, non-linguistic and linguistic tasks were administered to analyze if the bilingual brains had different pathways towards executive functioning and if factors like age, gender and motivation plays any part in the process of acquisition or learning. We did find positive relationships between multilingualism and executive functioning tasks among children under the age of 14 years. To conclude, it can be best said that no researcher presented a point that has been universally accepted about multilingual brains having better executive functioning skills

Keywords: Multilingual advantage, executive functioning, children, cognitive processes, bilingualism.

Article Details:

Received on 22 Nov, 2025

Accepted on 24 Dec, 2025

Published on 25 Dec 2025

Corresponding Authors*

Policy Journal of Social Science Review

Online ISSN 3006-4635

Print ISSN 3006-4627

Vol. 3 No. 12 (2025)

Introduction

Imagine if you have to cross a street with your child and this is the first few times they have been on the road with you. How would you use your cognitive processes stored in the brain to carry out the task? How would you make the schemas stronger using your memory and attention? This is one of the examples of executive functioning skills. These tasks and other complex level tasks require the schemas made in the brain using working memory, judgment skills, impulse, self-control, flexible thinking, and most importantly, following directions or instructions.

Executive functioning, or managing different cognitive tasks at the same time, is a skill infants' start learning as soon as they are 4+ months old. Once the infant starts to respond to activities like peekaboo, it's transitioned to object permanence later, around 9+ months of age progressing towards climbing stairs, hoping on one foot, and then crossing the road with an adult and then independently. Executive functioning is of vital importance for characteristic success in all situations in life, be it a household chore or an outdoor activity, be it a group teamwork or a project to be handled alone, a speech at school, a table tennis match, any work or office-related job, relationships, or even personal growth and well-being. All of it highly depends on the capacity of your brain to connect the structures necessary for executive functions. The part of the brain that sets human beings apart from all living species, known as the prefrontal cortex, is responsible for executive functioning tasks.

Slices obtained from Magnetic Resonance Imaging show the prefrontal cortex is housed at the most anterior part of the frontal lobe in the brain. The frontal lobe is one of the four lobes in the brain and we can call it the Board of Directors of the brain (company). The frontal cortex and the parietal cortex engage with each other and send impulses via neurons so the executive functioning tasks can be achieved successfully, completing the responsibilities required to fulfill the task at hand.

This article discusses executive functioning in multilingual children. Individuals whose ages are below 14 are considered children. Being multilingual refers to an individual being able to use more than two language modalities proficiently required for functional communication. Children acquiring more than one language from birth can be categorized as bilinguals; usually, learners who acquire more than two languages are also called bilinguals in some literature contexts.

When you begin using two different languages with your child as early as possible, they are more likely to acquire the two languages proficiently. By 24 months, most children who are multilingual use two-word phrases like *my mama, want water, and more* to communicate their needs to adults in the environment. Exposure to multilinguals in the environment accelerates brain development and facilitates learning as the child can think creatively in two or more languages. This can be attained by a language-rich environment, proficient language models, practicing languages in different settings, and being able to deliver on different topics. The most important members of the environment are the family, carers, and school staff considering our topic for discussion is children.

Literature Review

The literature articles presented over the past on multilingualism and executive functioning in infants or children are interesting, deep, and multiplexed. Systematic review has been conducted primarily between the years from 2004 to 2018 primarily. If you consider the population of people speaking more than two languages in the world, it will always surpass the number of monolinguals. Pakistan, a hardcore multilingual country has exposure to about 70 languages spoken as peoples' lingua franca or first languages. In Pakistan, although the

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
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society's patterns of language acquisition are changing over time you will still find a lot of households or communities where children can either speak or understand two or more languages, qualifying them as multilingual. We can consider English and Urdu as the two top languages used in the most dominant provinces of Pakistan, given the most priority, other regional languages or dialects like Sindhi, Punjabi, Siraiki, Balochi, Pushto, Memoni can also be included as the top few languages still used very religiously in homes.

Urdu is our national language and English is the co-official language of Pakistan, most evidently used in school academics or curriculums, legislative records, judicial laws, and official businesses. When you discuss the acquisition or learning of a second language, factors like, the learner's aptitude, age, encouraging environment, exposure, use at community or society level, and acceptance at the workplace, are amongst other factors that play an important role in shaping the development of form, content, and use of both languages to be acquired or learned.

Garon et al. (2008) specified that few of the executive functioning tasks can be emotionally balanced while some can be motivational and may require self-regulation skills that develop till a later age or by early adolescence. The debate about language acquisition age and the critical period is still very dubious; the cut-off at age 7, age 3, or even age 17 is universally undecided and has been a topic of discussion to date. The cut-off for a critical period doesn't mean that an individual cannot learn another language as they age; the exposure and enthusiasm to learn more languages can be self-driven and attained with a focus on the learning process. Multilingualism has not only been found to have benefits for linguistic tasks but also for other non-linguistic domains like working memory, attention, problem-solving, troubleshooting, and other executive functioning tasks as well. In literature, it is referred to as "bilingual advantage," which means the skill areas in which bilinguals outperform individuals who are proficient in only one language or monolinguals. Children who have acquired more than two languages need to cognitively control these languages at the same time and go through multiple cross-language activations.

Poarch and Van Hell (2012a) administered two executive function tasks (the Simon task and a variant of the Flanker task). For a quarter century, the Simon task has been administered to examine the non-stimulus response rate of individuals in non-spatial skills or other various cognitive functions. Flanker task (*Eriksen & Eriksen,* 1974) examines attention, distraction, and action in the visual fields; it is also called a non-search detection task when several stimuli are presented to an individual in a free field and the task is to decide the stimuli presented centrally while ignoring the stimuli presented in the peripheral vision or vicinity. Both tasks are common tools during the study of cognitive control, response preparation processes, and attentional capture. A language-enriched environment made them better at resolving conflicts in the Flanker tasks; however, on the contrary, the results were regressive in the Simon task.

Alterations in patterns of language, variance in individuals' language backgrounds, and lifestyle variables have an essential effect on the development of executive functions in children. Jordan stands out among other countries. *Al-Khresheh* (2013) researched the link between pupils' ability to express more than one language and their success in the school environment, and productive correlations were found. Conversations in regional dialects dominant in Jordanian culture were all considered in the formulation of the test. The participants' language skills and executive functioning were tested in a relaxed, calm environment with no rush of time. Standardized testing was conducted. The multilingual speakers exhibited equal utilization of their executive functions.

Policy Journal of Social Science Review

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Bishop et al. (2014) confirms in their research that vocabulary size measured earlier can promote better comprehension, verbal skills, and word knowledge in comparison to later executive functioning development. According to *Poarch and Bialystok* (2015), variables like the learner's acquisition of a language or two languages, the age at which the language is acquired or learned, and the strength with which they are learned or acquired affect the strength of the skillset.

Not to forget that, on a day-to-day basis, the multilingual child has to perceive, process, and respond to two or more languages. This requires suppressing the non-targeted language so the information can be processed and responded effectively. In addition, the individual should be able to identify switches of language or the changes from one language to another, referred to as "code-mixing' or "code-switching" principles. The question highlighted here is whether children acquiring two or more languages have better executive functioning, or, due to better executive functioning mechanisms in the brain, they have an edge on being more proficient multilingually.

Similarly, in the research carried out by *Cox et al.* (2016) about the tale of Eggs and Hen, it was discussed if bilingual brains have better executive functioning or with better executive functioning skills, an individual is likely to become a better bilingual. This refers to the analogy of "Did the eggs come first or the hen?" and vice versa. *Vygotsky,* the famous Russian Soviet Psychologist, indicated that private speech is crucial for developing higher-level cognitive operations in childhood. Higher number of private speech functions and speech utterances has been advantageous for verbal mediation in the use of language. Two studies with Spanish-English bilingual students in the United States of America showed co-relations between bilingualism and executive functioning. The studies predict that mental processes and cognitive effort shadow executive function development, with multilingual individuals showcasing better overall performances with generalizations of the said skills. The test for Reception of Grammar, which measures receptive language proficiency, was used, and the results pointed towards larger co-relations of greater vocabulary with greater executive functioning abilities during childhood that helped the children handle self-regulation tasks better at a later stage. In addition to this, their behaviors were more processed and regulated. Children dominant in English language eligibility can be enrolled in either French-English immersion education programs or study English solely. 22 participants enrolled in bi-language or immersive programs, while 47% attended school with a different medium of language other than their first lingua franca or acquired language. It was made known that half (51.8%) of the participants acquired their L2 before three years of age. The highest score,7, was given to the participants if they attended schools where the imparted medium of instruction was different from their home language, regressing to the score of 4, given to participants attending immersive or bilingual programs and ,1, being the lowest score if the home and school language was same. The higher the score the higher the results of more dynamic usage and exposure of languages.

Discussion

The ample literature review highlights the executive functioning abilities of multilingual children. The comparisons were made using independent t-tests, which are commonly used to test any statistical differences between two groups, in this case, monolinguals and bilinguals. The t-tests disclosed a huge discrepancy in working memory scores between the multilingual and monolingual groups. In amalgamation, the findings significantly highlighted that multilinguals outperformed the monolinguals in executive functioning tasks. Previous researches also warrant that bilinguals have better cognitive functions, better working memory,

Policy Journal of Social Science Review
Online ISSN 3006-4635
Print ISSN 3006-4627
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and better problem-solving skills as they are able to creatively think in two languages or use one dominant language with another language in trying to resolve problems or tasks at hand. Multilingual children are able to go back and forth between more than two languages efficiently and faster, which improves their working memory and helps complete challenges quickly.

Different points of bilingual experiences may mark different executive functioning performances in different developmental periods. Universally, no one confirmed the relationship evidently to date that, being bilingual will always display better executive functioning, while there are hypotheses that suggest the cognitive advantages of bilinguals may be more apparent in individuals whose cognitive capacities are still in the development phase like in children.

The discussion about the enhancement of Executive Functioning skills specifies that training in working memory and attention skills may suggest better Executive Functioning skills in children, however, the drive and motivation to learn two or more two languages plays a key role in this process as well, (*Hussey & Novick, 2012*). There isn't much time in the production of a remediation tool for improving general language use, and exploring Executive function training within a "process-specific" framework (Hussey & Novick, 2012)

Conclusion

The research findings can be summarized in terms of linguistic abilities and executive functioning performance of participants using a thorough investigation of data including standard deviations, frequencies, cognitive task reports, questionnaires, checklists, and nonlinguistic experiments. The cognitive flexibility, problem-solving skills, attentional tasks, troubleshooting mechanisms, judgment skills, and other executive functioning tasks of children fluent in more than one language are proven to be progressive when compared to children being exposed to one language only. Historically, it was believed that foreign language study especially *Greek and Latin* is good for "training the mind" and that being multilingual was a trait of the individuals who were "cultured" and "educated"

Garon et al (2008) centered his research on executive function development in early childhood. He ran various assessments like the Dimensional Change Card (DCCS), Tower of Hanoi and Stroop Tasks. His main findings reflected three main components of executive functioning skills in young children, they were cognitive flexibility inhibitory control and working memory. While *Poarch and Van Hall* (2014) compared executive functioning skills in bilingual and monolingual children. They conducted *Simon and Flanker tasks* which showcase more of attentional control and inhibitory control. The suggestion of the term *"bilingual advantage",* appeared during the findings of these tasks where bilingual children outperformed their monolingual counterparts in the tasks that required inhibitory control and attentional switching.

People proficient in more than one language are required in the environment for better linguistic and cultural differences and a language-rich community. One's immediate environment plays a very important role in learning two or more languages, bilinguals have a larger working memory, larger vocabularies, greater executive functioning, and better self-regulation.

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Policy Journal of Social Science Review

Online ISSN 3006-4635

Print ISSN 3006-4627

Vol. 3 No. 12 (2025)

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