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The impact of bilingualism on psychomotor development in preschool children in Poland: unlocking unique patterns of growth and interaction*

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Abstract: This study examines bilingualism's impact on preschoolers' psychomotor development, considering parents' age, upbringing, and environment. A total of 183 surveys were administered to 183 children (95 boys and 87 girls), including 101 bilinguals and 82 monolingual Polish speakers. The data were analyzed via STATISTICA 10.0. The results indicate that monolinguals achieve speech milestones faster. Both groups vocalize before saying the first sentence. The time when children say their first word and sentence is significantly affected by the week of pregnancy when the baby is born. This correlation was found only in bilingual children.

This study underscores the importance of understanding bilingualism's effects on psychomotor development, peer interactions, and milestones.

Keywords: bilingualism, monolingualism, psychomotor development, milestones, children, siblings

Wpływ dwujęzyczności na rozwój dzieci w wieku przedszkolnym w Polsce: odkrywając unikalne wzory rozwoju i interakcji

Streszczenie: W poniższym artykule zbadano wpływ dwujęzyczności na rozwój psychomotoryczny dzieci w wieku przedszkolnym. Pod uwagę wzięto wiek rodziców, sposób wychowywania dzieci oraz środowisko w jakim dorastają. W badaniu wzięło udział 183 ankietowanych, w tym 95 dotyczyło chłopców, a 87 dziewcząt. Sto jeden ankiet zostało zebranych od rodziców dzieci dwujęzycznych, natomiast 82 od rodziców dzieci jednojęzycznych w języku polskim. Dane w badaniu były analizowane za pomocą programu STATISTICA 10.0. Wyniki wskazują, że dzieci jednojęzyczne szybciej osiągają kamienie milowe w zakresie mowy. W obu grupach występuje wokalizacja przed wypowiedzeniem pierwszego słowa. U dzieci dwujęzycznych zaobserwowano występowanie korelacji pomiędzy tygodniem urodzenia, a czasem wypowiedzenia pierwszego słowa i zdania. Przeprowadzone badanie podkreśla jak ważne jest zrozumienie tematu dwujęzyczności oraz jak wpływa ona na rozwój psychomotoryczny i osiąganie kamieni milowych u dzieci.

Słowa kluczowe: dwujęzyczność, rozwój psychomotoryczny, rozwój mowy, rodziny dwujęzyczne, kamienie milowe w mowie.

Planned bilingualism is increasingly prevalent in today's globalized world, partly due to bilingual marriages, migration, and multicultural environments. Owing to the multidimensional nature of the phenomenon and the continuous progress of scientific research, constructing a definition of bilingualism takes work. Bloomfield provided the first scientific definition of bilingualism in 1933, who described it as "native-like control of two languages". Later, in 1953, Weinreich defined it as "the practice of alternately using two languages" (Scripnic, 2021). Other researchers, such as F. Grosjean, have shown that bilinguals easily change from *the bilingual mode* to the *monolingual mode* because of the ease of switching to another linguistic system (Rocławska-Daniluk, 2020). Grosjean defines bilinguals as "not the sum of two monolinguals but rather an individual with one qualitatively different linguistic system" (Tyborowska, 2024). When defying bilingualism, it is important to distinguish between types of bilingualism based on the time of language acquisition. This includes simultaneous bilingualism, where a child acquires both languages from birth or very early childhood, typically in

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a family context where the parents speak different languages. Alternatively, there is sequential bilingualism, where one language is acquired first (usually at home), and the second is learned later, for example, at school, in the workplace, or after moving to another country (Rocławska-Daniluk, 2020).

The effects of bilingualism extend beyond speech development and can influence the development of individual brain structures and white matter maturation. Many previous studies have shown that bilingualism is related to children's psychodynamic development, creativity, and reaction time (Montgomery et al., 2022; Sampedro & Peña, 2019). The age at which the second language is introduced is important for the maturation and myelination of the corresponding white matter fibers (Mohades et al., 2015). Recent studies have shown that bilinguals typically display the first symptoms of Alzheimer's disease four years later than their monolingual counterparts do and that they are more than twice as likely to retain normal cognitive functions after an ischemic stroke, compared with patients who speak only one language. The regular use of more than one language as a constant practice for the brain, if maintained throughout the lifespan, has been shown to provide long-term health benefits for adults and elderly individuals (Paradowski & Michałowska, 2016).

Research conducted between the 1890s and 1950s revealed that learning more than one language from birth would be detrimental to both linguistic and cognitive development, leading to poorer results at school. Studies have suggested that a "language handicap" or linguistic "confusion" affects children's intellectual development. Peal and Lambert's study, which was carried out on Canadian schoolchildren, changed the view of bilingual children. This study revealed that despite common myths and misconceptions, there are numerous benefits that a child may gain from being bilingual and that bilinguals outperform monolinguals in a range of verbal and nonverbal tasks. Being bilingual can have many long-lasting personal, social, and cognitive benefits (Paradowski & Michałowska, 2016). Research on bilingualism has focused on the influence of bilingualism on inhibitory control in a group of 37 autistic and 51 nonautistic bilingual children. Bilingualism does not have a negative impact on children's development, but at the same time, they do not notice better results for any of the groups (Montgomery et al., 2022). Another study focused on bilingualism's influence on early literacy and numeracy skills in a group of 302 toddlers aged 5-6 years and reported that monolingual children achieve better results in literacy tasks and that in different types of tasks, they have as good results as their bilingual peers do (Bar & Shaul, 2021).

However, previous research focused on bilingualism has considered children's abilities at the time of the research. Few studies have focused on the influence of the bilingual environment on the early stages of children's development and the time of achieving developmental milestones in a toddler sample, as in our work.

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Speech development is a multifaceted process influenced by numerous factors.

However, it is crucial to remember that not only the factors that influence speech are important but also the functions that speech performs in development.

Research has shown that maternal factors influence early childhood speech development. Mothers' age, education level, and socioeconomic status are linearly correlated with children's speech development (Muluk et al., 2014).

Language teaching strategies are also important for speech development in children learning two languages. It has been revealed that using the OPOL (One Parent–One Language) system can help prevent a child from developing a language that combines two languages.

In this case, associating the two languages with specific people makes it easier for the child to distinguish between them.(Caporal-Ebersold, 2018. Another study of a Chinese immigrant community on the West Coast of the United States revealed that upbringing affected the retention of the native language, in this case, Mandarin. Surprisingly, although this region of the United States has been home to Chinese families for 1.5 generations, Mandarin is still spoken among Chinese families. This phenomenon is associated with intense religiosity and the practice of Chinese cultural rituals from an early age (Siiner et al., 2018).

Materials and methods

Search strategy and data collection

The paper contains the findings of surveys developed and carried out by a group of medical professionals and students from the Clinic of Developmental Neurology at the Medical University of Gdańsk. Data were gathered both manually and digitally. The surveys were hand-delivered to the preschool and posted on the social media site Facebook. The information was collected between January 4, 2021, and April 29, 2022 (479 days). There were 183 questionnaires in total. 24 of them were gathered online in English, 82 in paper form from kindergarten students, and 77 electronically in Polish. The study was a parental rapport, and the parents filled out all of the surveys. The bioethics committee approved the project before any data were collected.

Parental rapport vs. Communicative Development Inventory (CDI)

A parental report is a type of research method that involves gathering information about a child's development based on the observations and accounts provided by parents. Since parents are the primary caregivers, they can offer detailed insights into their child's daily behaviors, skills, and developmental progress. Parental reports often cover various developmental domains, including language, motor skills, social interactions, and emotional growth. They are valuable because parents can observe their child continuously in natural, everyday situations, providing a broad and nuanced view of the child's development.

The Communicative Development Inventory (CDI) is also a tool that relies on parental input, but it is more structured and scientifically validated. The CDI is a standardized questionnaire designed to systematically collect data on a child's language development, particularly during the early years of life. These inventories include lists of words, phrases, and other communicative indicators that parents check off, indicating whether their child understands or actively uses certain vocabulary and communication skills (Table 1).

Table 1
Comparison of parental rapport and Communicative Development Inventory (CDI)

Similarities	Differences
Both parental reports and CDI rely on parents' observations of their child's behavior and development.	CDI is a more structured tool with clearly defined categories and questions. In contrast, a parental report may be more open-ended and subjective, depending on what parents deem important to share.
Both approaches can cover similar areas such as language, motor skills, social and emotional development	CDI primarily focuses on language development, while a parental report can cover a broader range of developmental areas.
The information gathered in both methods comes from daily situations, making it is practical and grounded in real-life experiences	CDI is standardized and allows for comparison of child's results against developmental norms for their age. A parental report is more flexible but less precise, making it harder to compare with other children's progress.

Source: *Own elaboration.*

In summary, a parental report is a more general and flexible way of documenting a child's development, as is the communicative development inventory.

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Questions in the formula

The questions asked were divided into subgroups. The first subgroup includes questions about the child's age, gender, place of birth, number of points on the APGAR scale, and week of birth. The second part focuses on children's psychomotor development. They were questioned about the first word's language, details about walking and sitting, and problems with feeding and using the pacifier. The next section provided information about the parents. They were asked to indicate their age, their country of origin, and the language they speak. The following two sections are personalized. The first is intended for children from Polish-language kindergartens, and the second is intended for children from bilingual kindergartens (Form 1).

Form 1
The questions collected for this study

Formula's title: Psychomotor development of bilingual children against the development of children using one language.
Dear Parents,
we begin collecting data on the psychomotor development of your children. Your help will be invaluable in creating a research paper entitled „**How bilingualism affects psychomotor development in preschool children**". Please fill in the questionnaire in detail.

1. Child's age: *
2. Child's gender: *Male/ Female/ other:
3. How many points in APGAR scale did Your Child get? *
4. What week of pregnancy was the Child born in? *
5. Country of birth of the Child: * *
6. Please specify to which kindergarten your child attends: *Kindergarten with only Polish language/ Bilingual kindergarten/ Kindergarten with only one language, which is not Polish

Psychomotor development of children
In this section, we would like you to answer a few questions about speech and motor development in Your children:

1. The child's age during the first word spoken - please enter the number in months: *
2. The language in which the first word was spoken: *
3. What was your child's first word? *: mom/ dad/ yes/ no/ other:
4. Child's age during the first sentence uttered - please enter the number in months: *
5. The language in which the first sentence was spoken: *
6. Were there any feeding problems in the neonatal / infant period? *: Yes/ No
7. Has your baby used a pacifier? *: Yes/ No
8. If YES, please specify for how long: * Half a year/ 1 year/ 2 years/ 3 years/ other:
9. Did your child vocalize, for example, chatter before the first spoken word, onomatopoeic words (muu, miau, ijo ijo), „A guu" *: Yes/ No
10. When was the first time your baby sat down? (number in months) *
11. When did Your Child start walking? (number in months) *

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Information about Parents
In this part of the survey, we would like to find out some information about You Mr and Ms or Mrs.

1. Mother's age at birth of the Child: *
2. Father's age at birth of the Child: *
3. Mother's country of origin: *
4. Father's country of origin: *
5. Mother's native language: *
6. Father's native language: *
7. Please qualify the child to the given family model: *
Polish-speaking family/ One language- speaking family/ Multilingual family (more than 1 language spoken at home)/ other:

Children from bilingual kindergartens, but one language at home
We ask that this part of the questionnaire is filled in only by the parents of children from bilingual kindergartens, whose parents speak only one language at home.

1. Please indicate which language your child uses most often outside the home:
2. Do the Children have siblings?: Yes/ No
3. If in question 2 you answered YES, please specify the language in which the Children communicate with each other:
4. Please select which level corresponds to the language used by the child at home: Single words/ Single sentences/ Short statements/ Fluid compound speech
5. Please select which level corresponds to the language used by the Child outside the home: Single words/ Single sentences/ Short statements/ Fluid compound speech
6. Ability to communicate with peers:
(1)The Child cannot communicate with peers (scale 1-5) (5) The Child communicates with peers without any problems
7. Language of watched cartoons / films / games / television (multiple choice question)
The same as used by Mother/ The same as used by Father/ The same as used outside the house/ The same as used in the house/ other:

Source: *Own elaboration.*

Dividing the surveys into a control group and a research group

Of the 183 forms, 82 form a control group, in which surveys were collected from children from a Polish-language kindergarten where the families of the children are Polish. The remaining 101 surveys were collected from parents of children growing up in bilingual families or attending kindergartens where the language of speaking differs from the one heard at home. The study group consists of these 101 surveys.

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Statistical methods

Excel spreadsheets were used to collect the data. (Microsoft, USA). The STATISTICA 10.0 program was used to conduct the statistical analysis (StatSoft Inc., USA). The Kolmogorov-Smirnov test was used to determine if quantitative variables satisfied the requirements for a normal distribution. (Gaussian distribution). Later steps involved applying the appropriate statistical tests based on whether the variable satisfied the normalcy requirement. The parametric t-test or nonparametric Mann–Whitney U test was used to compare continuous variables. The contingency tables and Pearson's chi-square test were used to compare qualitative data, with the required Yates' correction for low observed frequencies. A p-value of 0.05 was used as the level of statistical significance in the calculations.

Results

Descriptive data and results from individual questions
General information about the child

An analysis of the collected data revealed that 87 girls and 95 boys took part in the study, and one person did not specify sex. Approximately 38% of the respondents were between 3 and 4 years old. Most of the children (69.39%) scored 10 on the Apgar scale. Most children were born in the 40th week of pregnancy (55 children). Concerning the country of birth of the child, 109 participants were from Poland; 20, from Great Britain; 9, from Germany; 5, from Spain; 4, from France; the Netherlands; the Czech Republic; Italy; 3, from England; 2, from Turkey; and Ukraine; and 1, from Scotland, Sweden, Denmark, Romania, Ireland, Greece, Austria, Norway, Japan, Hungary, Brazil, Qatar, and New Zealand. Two respondents did not specify the country of origin of the child. 99 children attended Polish-speaking kindergartens; 72 children attended kindergartens with one language other than Polish; and 11 children attended bilingual kindergartens.

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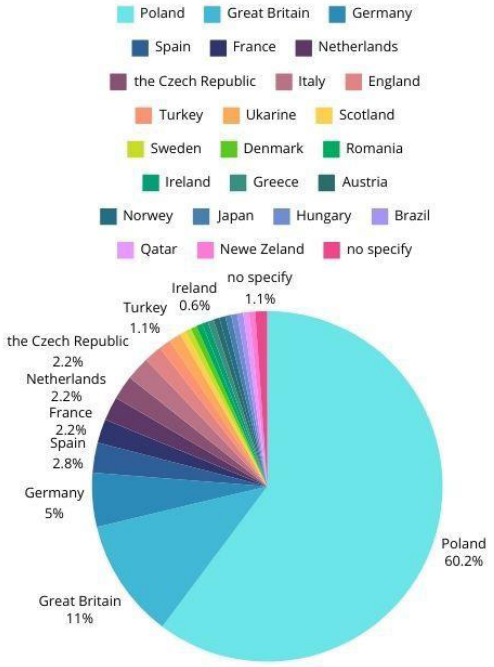
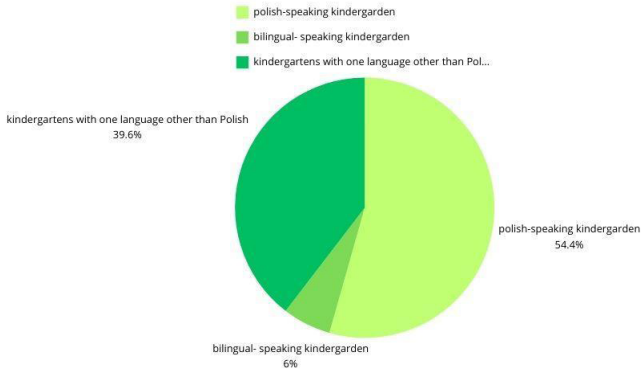
Chart 1
Country of birth of the child



Source: *Own elaboration.*

Chart 2
Attending kindergarten



Source: *Own elaboration.*

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Psychomotor development of the child

The largest group of children (26 persons) spoke their first word at the age of 12 months. Most of the respondents, approximately 70%, uttered their first words between the ages of 6 and 12 months. The first sentence appeared most often at 24 months of age (26 people). High scores also occurred in months 18 (23 people) and 20 (13 people) and in months 12 and 15 (each with 12 people). In 129 cases, there were no problems while the baby was being fed. A total of 101 babies had ever used a pacifier, and 95% vocalized before saying their first word.

Information about sitting, standing, and walking

When the age of the child when he or she sat down for the first time is analyzed, two peaks can be observed. Most children sat for the first time at 6 months of age (47.5%) and at 9 months of age (36.6%). The beginning of the walking process for the vast majority of the participants began in the 12th month of life for 66.67% of the subjects.

Table 2
General comparison of children's skills and the most common results

Skill	The most common result
First word	12 months
First sentence	24 months
Sitting down for the first time	6 months/9 months
Beginning of the walking process	12 months

Source: *Own elaboration.*

Table 3
Number of children depending on skills/events

Statement	Number of children
NO problems while feeding the baby	129
Using pacifier	101
Vocalizing before saying their first word	174

Source: *Own elaboration.*

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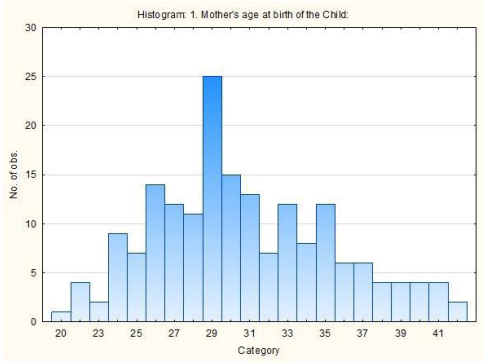
Information about parents and families

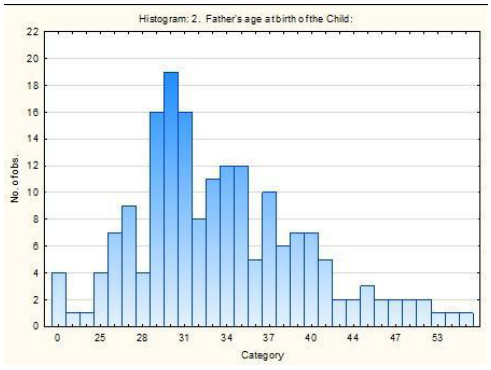
In the collected data, the majority of women, as many as 49.1%, gave birth to a child between the ages of 26 and 31, with the largest number at the age of 29 (25 people). The youngest mother was 20 years old when the child was born, and the oldest was 42 years old (Histogram 1)Among men, most became fathers aged between 29 and 35 years (51.37%), and the average age of fathers was 33 years. The youngest examined father was 23 years old at the time of the child's birth, and the oldest was 56 years old. In terms of having siblings, 54.1% of the respondents had siblings, 38.8% did not have siblings, and 7% of the respondents did not answer this question (Histogram 2).

Histogram 1
Mother's age at birth



Source: *Own elaboration.*

Histogram 2
Father's birth to the child



Source: *Own elaboration.*

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Comparison of two groups: monolingual and bilingual children

General information about the child: age, sex, and points on the Apgar scale

In our work, there were no significant differences in the columns of a child's age and Apgar score between the two groups, which let us exclude these factors' potential impact on the results. The mean child age in the study group was 4.6 years, and in the control group, it was 5.1 years. In the study group, there were more male children (58.65%), whereas in the control group, there were only 43.59% males. The number of females was similar in both groups, with 43 (41.35%) and 44 (56.41%) girls, respectively. In both groups, the Apgar score was approximately 9.5.

There was no significant difference in the week of birth; 39 Hbd for the study group, while 38 1/2 Hbd for the control group.

Table 4
Comparison of the control group and the study group in terms of the average age of the subjects, the number of boys and girls, the Apgar score, and the week of birth.

	Study group	Control group
mean child's age	4.6 y.o.	5.1 y.o.
male children	58.65%	43.59%
female children	41.35%	56.41%
Apgar score	9.5	9.5
week of birth	39 Hbd	38.5 Hbd

Source: *Own elaboration.*

Place of birth and kindergarten type

Our paper's data show that most children from the study group (32.69%) were born in Poland, similar to most children (96.15%) from the control group, who were also born in Poland. In the study group, the other most common countries in which the studied offspring were born are as follows: the United Kingdom is the second most popular place (19.23%), followed by Germany (8.65%), and Spain (4.81%).

From the figures collected, it is apparent that a significant number of children in the study group attended one-language kindergarten (all English) (69.23%). The next most popular choice was a Polish-speaking kindergarten, with 23.08% of the children attending. Only 7.69% of the children in the study group attended bilingual kindergarten. In comparison, most (96.15%) children from the control

group were drawn into monolingual (only Polish-speaking) kindergarten, and only 3.85% were drawn into bilingual kindergarten.

Language development: first words and sentences, vocalization

The figures reveal that almost all the children (95.24%) in the study group vocalized before speaking their first word, whereas only 5 of them (4.76%) did not. Similarly, in monolingual kids, most (94.87%) vocalized, whereas only 4 (5.12%) did not vocalize. According to the statistics, children in the study group uttered their first word later, at 11.59 months, than did children in the control group, at 9.9 months. In terms of speaking their first sentence, monolingual offspring did so at 18.21 months in comparison to bilingual kids, who did so at 21.40 months. The language in which bilingual children uttered their first sentence was mostly Polish (64.42%), followed by English (20.19%) and German (2.88%). A great majority (97.44%) of monolingual kids uttered their first sentence in Polish.

Table 5
Comparison of the control group and the study group on the first word and the first sentence

	Study group	Control group
vocalizing before speaking the first word	95.24%	94.87%
uttering the first word	11.59 months	9.9 months
speaking the first sentence	21.40 months	18.21 months
uttering the first sentence in the Polish language	64.42%	97.44%

Source: *Own elaboration.*

Problems with feeding and using a pacifier

According to the statistical data, out of the 183 children who participated in our study, 74 kids (71.84%) in the study group had no trouble feeding, and 29 (28.16%) did. In comparison, in the control group, 55 children (71.43%) did not have trouble feeding, whereas 22 (28.57%) did have some trouble with it. Statistically speaking, it is irrelevant.

Among the bilingual families, 57 children (54.29%) did not use a pacifier, and 48 (45.71%) did. In comparison, the situation in the control group was reversed. Only 25 (32.05%) of the children did not use a pacifier, and 53 (67.95%) did. The pacifier was used until 16.16 months in the study group and until 17.44 months in the control group.

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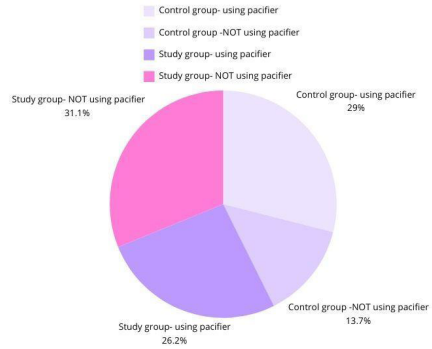
Chart 3
Comparison of the use of smack between the control group and the research group



Source: *Own elaboration.*

Psychomotor development: sitting, walking

The figures reveal that in terms of motor development, the children in the study group sat at 7.19 months, similar to the children in the control group, who sat at 7.05 months. When they started to walk, the children in the control group did so at 12.35 months, and the children in the control group did so at 12.15 months.

Information about parents and siblings

In the study group, 83.67% of the households were multilingual (using more than one language), and 14.28% of the households only used Polish as their language of communication. 100% of the control group households used the Polish language.

The figures reveal that in both the study (30.90) and control (30.40) groups, the mothers' ages were similar. However, fathers' age differences in the control group were lower (30.88) than those in the study group (35.07). The data we collected for our study show that almost all mothers' countries of origin were Poland, with 100% in the study group and 97.44% in the control group. Only two mothers in the control group originated from Ukraine. In the study group, 80% of mothers used Polish to speak to their children, and in the control group, all mothers spoke Polish to their babies. The situation is different regarding the father's native tongue. In the study group, 31 (29.81%) fathers' primary language was Polish, followed by English (12.5%), Spanish (7.69%), German (5.77%), and then Portuguese (4.81%).

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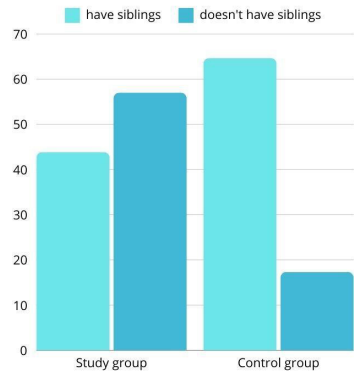
Concerning the language used in communication with the offspring in the study group, 80% of mothers used Polish, 10% used other languages, and 7% used English. The father's primary language in speaking with the child is also Polish (24.49%), followed by English (19.39%), and the third most popular language is Spanish (8.16%).

The survey also asked if the children had siblings, and in the study group, most (56.57%) did not have siblings, whereas 43.43% did. The situation was reversed in the control group. A total of 78.87% of the children had siblings, and only 21.13% did not. In the bilingual families, we asked about the most common language used in communication among the siblings, and the data showed that 44.23% used Polish, 13.46% used English, and 9.62% used German.

Chart 4
Comparison of both groups in terms of having siblings



Source: *Own elaboration.*

Ability to communicate with peers

The figures reveal that the most commonly used language in the house of bilingual families is Polish (39.80%), followed by English (29.59%). The situation is similar when taking into consideration the languages mostly spoken outside of the house, with 28.57% being Polish and 24.49% being English.

The data we collected for our paper show that in terms of the ability to communicate inside the household, children in bilingual families mainly used fluid compound speech (65.66%); the second most common form of communication was short statements (19.19%), followed by single words (9.09%), and finally, single sentences (6.06%). The situation is rather similar in monolingual families, with 85.51% of children using fluid compound speech, 7.25% using single sentences,

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5.80% using short statements, and only 1.45% using single words. The data we collected showed many similarities in terms of the ability to communicate outside of the household. The only difference is seen in the third most popular way of communicating in comparison to the ability to communicate inside the household. In bilingual families, children mainly use fluid compound speech (59.60%), and the second most common form of communication is short statements (21.21%), followed by single sentences (11.11%) and then single words (8.08%). The situation is rather similar in monolingual families, with 82.61% of children using fluid compound speech, 10.14% using short statements, 5.80% using single sentences, and only 1.45% using single words.

When parents were asked to judge their children's ability to communicate with their peers on a scale of 1-10, in the study group, parents assessed it at 4.38, and in the control group, it was 4.55.

Correlations

We looked for connections between the individual survey points and the time of the first word or sentence, depending on the group.

Correlations between motor development and first word/sentence in both groups.

Both groups had correlations between motor development and first words/sentences. In the study group, there were associations between the time when the first word was spoken and when a child started to walk (p=0.018642), and when the child first sat (p=0.004533). In the research group, there was also a correlation between the age of the child uttering the first sentence and when he sat (p=0.041888) or began walking (p=0.040431). In the control group, none of these connections were observed (table 1).

Table 6
Time to achieve developmental milestones (months)

Psychomotor development milestone	Bilingual Children	Monolingual Children
First word spoken	11.59	9.9
First sentence spoken	21.4	18.21
Sitting	7.05	7.19
Walking	12.15	12.35

Source: *Own elaboration.*

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Is the time of the first word or sentence said affected by the Hbd?

When both groups are considered, a correlation exists between the age of the first uttered word and the week of birth (p=0.001038). When the subjects were divided into control and trial groups, the control group showed no correlations. However, in the research group, there was a significant association between the age of the first uttered word and the week of birth (p=0.000102). There was also a statistically significant correlation (p=0,006174) between the time at which the first sentence was pronounced and the pregnancy week in which the birth took place.

Does the age of the parents influence when the first word or sentence is spoken?

There is no link between these two data points in any of the groups or in the statistics for all the subjects.

Does the family model affect the time of the first word or sentence?

In any of the groups, as well as in the statistics of all the studies, there was no significant correlation between these data.

Do children with siblings pronounce the first sentence or word faster?

None of the groups studied, nor did the overall statistics of all the participants reveal a significant correlation between these data.

Has feeding problems affected the age of the first word or sentence spoken?

In the control group, there was a correlation between the feeding process and the number of very first words spoken (p = 0.001688). There was no such correlation in the study group.

Has vocalization influenced the time of the first word or sentence?

Among all the subjects, there was a correlation between the occurrence of vocalizations and the first word (p= 0.043902). When we divided the subjects into two groups in the study group, we observed a connection between vocalization and the time of speech of the first phrase (p= 0.024524) and the timing of the speech (p = 0.009578). In the control group, these dependencies are statistically irrelevant.

Has the length of use of the pacifier affected the time of the first word or sentence?

In any of the groups studied, such a correlation was not statistically significant.

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Discussion

According to the results of our research, monolingual children may achieve speech development faster, but bilingual children still achieve developmental milestones within the normal range. There was a significant correlation between Hbd at birth and the time when the first word was spoken among the bilingual group. We also observed a significant correlation between the time of first words and sentences spoken and the time of sitting and walking among bilingual children. We did not notice this among the monolingual group.

In our work, we did not observe a significant correlation between the duration of use of the pacifier and the time of the first word or sentence. Similar conclusions are presented in Strutt's study. There was no significant association between the duration of pacifier use and any speech outcome measure, except for typical errors, which are not considered a concern for a child's speech development. (Strutt et al., 2021)

Time of saying the first word, the first sentence, and speech development

Our research revealed that monolingual children reach speech milestones faster. Monolinguals typically say their first word at 9.9 months and their first sentence at 18.2 months, whereas bilinguals do so at 11.6 months and 21.4 months for bilinguals. (First word: $p=0.022095$, first sentence: $p=0.087764$). These findings align with those of Calvo et al., who reported that bilingual children, regardless of socioeconomic status, perform worse on linguistic tasks than their monolingual peers do (Calvo & Bialystok, 2014). However, bilingualism does not delay speech development beyond normal developmental standards.

Socioeconomic status often correlates with speech development in bilingual children. D.D. Dolean's study revealed that socioeconomic factors, not bilingualism, impact speech development. This study compared Romanian boy development in the U.S. with that of peers from low socioeconomic backgrounds. His father supported his English learning through reading and writing activities, and the boy outperformed his classmates in reading, speaking, and writing tests (Dolean, 2022). Our findings support this, as we observed no significant differences in speech development between multilingual and monolingual children. Additionally, siblings did not significantly affect the time of the first word.

In contrast to other studies, such as Tsinivits & Unsworth (2021) and Havron et al. (2019), which suggest that siblings may influence language skills, our study did not find significant differences in language development between children with siblings and those without siblings. Previous research has shown mixed

results—some indicating better skills in children with older sisters, whereas others suggest that siblings overall may negatively impact language skills.

Sibling influence, such as socioeconomic status, has been a subject of bilingualism research. One study on Portuguese–English bilinguals in Portugal revealed that siblings play various roles in shaping the home language environment. Some younger siblings reject the language model of the older sibling, whereas in other cases, older siblings act as mediators, maintaining language balance at home. This highlights the reciprocal relationship between bilingualism and cultural identity (Obied, 2009). Our findings, along with those of previous studies, emphasize the need for future research to explore how socioeconomic status, family models, and parental support influence bilingual development.

The time when children were able to sit and walk

Our research revealed that bilingual children can sit and walk faster than their monolingual peers can. This is not a large gap, but it is statistically valid. A similar situation was observed in the research on a group of 104 bilingual children who were compared with their monolingual peers at 4 tasks (3 verbal and one nonverbal), and bilingual children achieved better results during movement and manual-focused tasks. (Barac & Bialystok, 2012)

The connection between the time of the first word and hbd of birth

In our research, we observed a significant correlation between hbd at birth and the time when the first word was spoken among the bilingual group. This corresponds with the results of research on a group of 62 children born between 23 and 41 weeks of gestational age. (Alexopoulos et al., 2021) They also noted a significant positive correlation between hbd at birth and lingual development.

This finding led us to consider the fact that hbd at birth does not affect monolingual and bilingual children's abilities to achieve psychomotor developmental milestones related to speech differently.

Limitations

During our research, we collected data about 183 children, which is a relevant representation of this group according to the topic of bilingualism. On the other

hand, we had some issues reaching parents of monolingual children who agreed to join our research.

Our other concern is the method of research. We collected our data mostly through an internet form that we created. It could lead to a situation where someone filled it out more than once, and we could not prevent that. Our work however not validated could be compared with other studies. We applied English and Polish versions of the formula, which we shared online. We believe that this approach was a good way to reach people from completely different environments and countries, which made our study sample more diverse.

The big advantage is that we collected specific data referring to developmentally important information, such as the Apgar scale. We also did not focus only on actual developmental milestones but also asked about steps that usually precede them.

Conclusions

In conclusion, this study contributes to the understanding of bilingualism and its impact on psychomotor development in preschool children. While monolingual children may exhibit slightly faster speech development, bilingual children still achieve developmental milestones within the normal range. The findings emphasize the importance of considering bilingualism as a relevant factor in child development research and highlight the need for further exploration of the diverse aspects related to bilingualism.

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