



Pragmatic abilities of persons with down syndrome

Bojana Arsic^{a*}, University of Belgrade, Studentski trg 1, 11000 Belgrade, Serbia, bojana.arsic57@gmail.com, +381 62 55 74 66, <https://orcid.org/0000-0001-6728-3779>

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Abstract

Pragmatic competence is fundamental to effective social communication, yet individuals with Down Syndrome often experience persistent language-related challenges that affect social participation and quality of life. Although numerous studies have examined structural language deficits, limited synthesis has focused specifically on recent evidence concerning pragmatic abilities and their cognitive correlates. This review addresses this gap by systematically examining empirical studies published in English over the past five years and indexed in PubMed and Web of Science. Across the selected studies, a total of 239 individuals with Down Syndrome were included, comprising 112 males and 127 females, with a mean age ranging from 9.7 to 28.2 years. The findings indicate consistent difficulties in grammatical and morphosyntactic development, as well as challenges in interpreting internal emotional states from vocal prosody, particularly when prosodic cues are minimal. Nonverbal intelligence and executive functioning emerged as significant predictors of pragmatic development. The review underscores the need for comprehensive intervention models that integrate language therapy with cognitive skill development to enhance pragmatic competence and promote more effective social communication outcomes in individuals with Down Syndrome.

Keywords: Cognitive development; Down Syndrome; executive functions; pragmatic competence; social communication.

* ADDRESS FOR CORRESPONDENCE: Bojana Arsic , University of Belgrade, Studentski trg 1, 11000 Belgrade, Serbia. *E-mail address:* bojana.arsic57@gmail.com

1. INTRODUCTION

The existence of pragmatic abilities is necessary for successful communication (Marek et al., 2018). Pragmatic abilities imply the capacity of an individual to use language in different social contexts and include the ability to initiate and maintain communication, the correct use of gestures, and facial expressions and understand the meaning conveyed in spoken or written language, the proper use and understanding of non-verbal signals, the intentions of others and the adaptation of language to different situations (Norbury & Bishop, 2003).

Due to the large number of skills that are covered by pragmatics, there is no single definition of it (Ariel, 2010), and depending on which research direction the different authors who study this field belong to, there are also various definitions of pragmatics (Gluckman et al., 2017). In the broadest sense, it can be defined as a scientific discipline that studies the rules of linguistic competence in interpersonal relationships (Đorđević et al., 2017), that is, the application of language rules in a concrete social situation (Đorđević, 2015). Many developmental, genetic, and neurological conditions involve deficits in the domains of pragmatics (Lai et al., 2014; Ye & Reeves, 2025). One of the most common genetic disorders is Down syndrome (DS), which occurs in one in 400-500 newborns, in the form of trisomy of the 21st chromosome (Kazemi et al., 2016).

People with DS most often function at the level of moderate intellectual disability (MID) (Carvajal et al., 2012), which implies the existence of deficits in the domains of adaptive behavior (Chapman & Hesketh, 2000; Dykens et al., 2006). When it comes to conceptual skills as part of adaptive behavior, people with DS manifest these deficits in the form of problems with reading and reading comprehension (Næss et al., 2012; Hom et al., 2024), as well as understanding the concept of numbers (Faragher, 2013). In the context of the degree of development of adaptive social skills, research shows that people with DS have sufficiently developed socialization skills (Van Duijn et al., 2010; Will et al., 2018). In the domains of practical skills, they have deficits (Krell et al., 2021), which are manifested through insufficient independence in performing them (Nunes & Dupas, 2011), which may be a consequence of motor problems that they have in the form of postural control deficits (Galli et al., 2008), balance (Malak et al., 2013) or limb movement (Chapman, 1996).

People with DS can also exhibit different forms of maladaptive behavior, the most common of which are externalizing behavioral problems that manifest as rule-breaking and defiance (Esbensen et al., 2021), aggression toward others and inattention (Will et al., 2016), while when it comes to internalized forms of maladaptive behavior, people with DS most often manifest them in the form of social withdrawal (Dykens et al., 2002) and somatization (Will et al., 2016).

Research shows that people with DS have pronounced pragmatic difficulties in understanding and using non-verbal signals, such as facial expression and tone of voice, and that they have problems changing interlocutors during communication and maintaining eye contact (Chapman & Hesketh, 2000), as well as in understanding more complex linguistic constructions, abstract concepts, and humor. A study by Tager-Flushberg et al. (1990) recorded that the pragmatic abilities and deficits of people with DS, concluded that they exhibit pragmatic difficulties in initiating and maintaining the topic of conversation, turn-taking during communication, and proper use of non-verbal communication. In addition, the authors point out that people with DS have less developed narrative and conversational abilities and difficulties in understanding and producing more complex language constructions. In another study (Potier & Reeves, 2016), which studied the pragmatic abilities of children with DS, it was found that they show pronounced deficits in social interactions, such as initiating conversations, answering questions, and changing interlocutors, and then

show difficulties in understanding irony and sarcasm and interpreting non-verbal signals. Smith et al., (2017) stated the pragmatic deficits of children with DS concluded that these children exhibit significant pragmatic difficulties in maintaining the topic of conversation and changing interlocutors, understanding figurative language, and indirect speech.

1.1. Purpose of study

Pragmatic deficits in people with DS can be mitigated with adequate support and interventions that create situations in which pragmatic skills can be practiced in a natural environment (Paul, 2017; Pascual et al., 2008). Many studies highlight various deficits in the domain of pragmatics in children with DS, which is why we believe it is necessary to further research the literature on this topic. This paper aims to provide a review of research that shows the pragmatic abilities of people with DS

2. METHODS AND MATERIALS

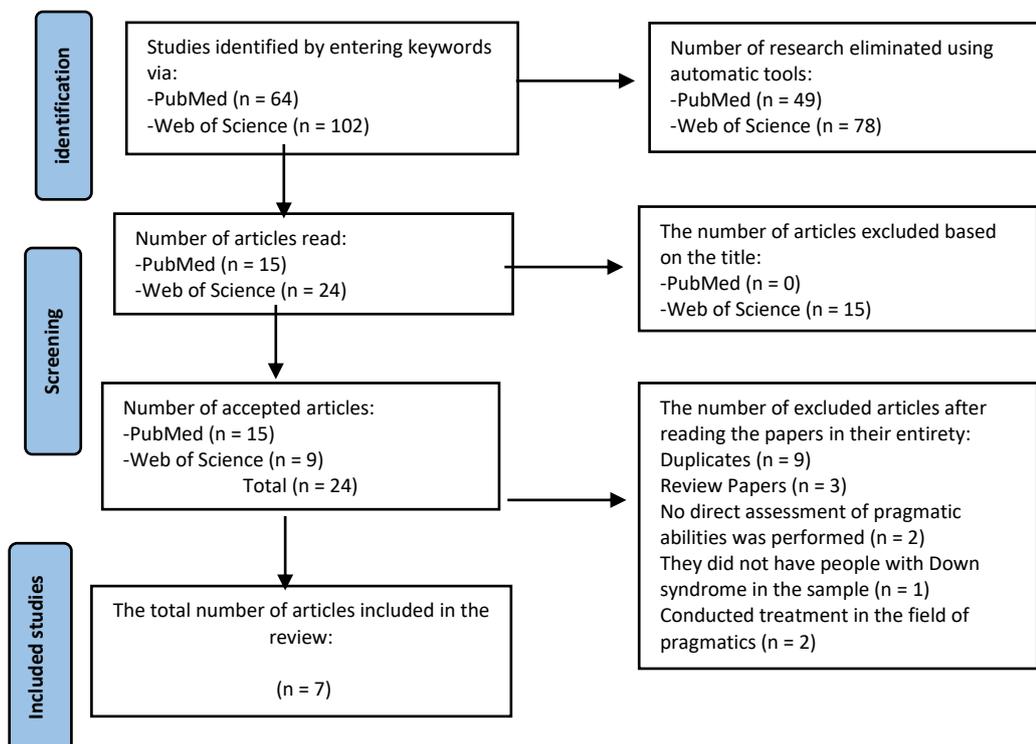
2.1. Data collection

Available literature was searched through the *PubMed* and *Web of Science* search engines. The literature was searched using the following keywords in the English language: Down syndrome and pragmatics. The search was intentionally limited to those two keywords in order to maintain a focused scope and ensure the retrieval of studies specifically addressing the intersection of these two topics, thereby enhancing the relevance and specificity of the findings.

Seven papers were included in the final selection, and the selection process is shown on the Prism diagram in Figure 1.

Figure 1

Prism diagram



After searching based on keywords, using automatic tools, those articles were selected that were published entirely in English, in the form of articles in journals, and in the last five years (2018–2023). The search was limited to articles published between 2018 and 2023 in order to capture the most recent research findings and current trends in the field, ensuring that the review reflects up-to-date theoretical perspectives, methodologies, and clinical implications. Furthermore, based on the abstract, it was determined whether the selected articles meet the criterion that implies that the research carried out a direct assessment of the pragmatic abilities of people with DS. On that occasion, articles that were of a review nature, duplicates, papers in which no direct assessment of pragmatic abilities was performed, articles that did not have a person with DS in the sample, as well as articles in which the treatment of pragmatic abilities was carried out, were excluded.

2.2. Data analysis

In the literature review, the methodological quality of all papers was assessed using the *Quality Assessment Tool for Quantitative Studies* (Thomas & Harden, 2008). This instrument consists of eight domains that include sample selection objectivity, methodological design, confounding factors, measurement objectivity, data collection methods, intervention integrity, and data analysis. Evaluators rated each of these domains using a scale of one to three, where a score of one indicates strong, a score of two moderate, and a score of three weak. Average scores for each domain were calculated, and based on this, the quality of the papers was rated as strong (1), moderate (2), or weak (3).

(2), or weak (3).

The author and an independent evaluator assessed the quality of the articles, and their ratings were compared to determine the agreement and the reasons for the inconsistency. If the scores were too different, a decision was made on how to resolve the differences. If the scores were similar, the final quality score was calculated. Further analysis of all articles that met the inclusion criteria was carried out concerning the respondents from the sample, the aim of the conducted research, the instruments used in the research, the results, and the quality assessment of the mentioned papers

3. RESULTS

Table 1 shows the articles included in the literature review, in alphabetical order, and concerning the research sample (control and experimental group), objectives, instruments used, research results, and research quality assessment.

Table 1
Literature review

Reference	Sample		Aim	Measures	Instruments	Result	Quality assessment
	DS	Control group					
Hoffmann et al., 2022	N = 34 M = 18, F = 14 AS = 14.1	FXS N = 29 M = 25, F = 4 AS = 13.2 ASD N = 30 M = 22, F	A comparison of pragmatic abilities in the domains of expressive and receptive language in DS, FXS, and ASD	Repetition of topics and phrases in free speech	ELS protocol SB5 ADOS-2 VABS-II ABC	FXS shows the repetition of themes and phrases to the greatest extent, followed by PSA, while DS to the least extent.	1.3

		= 8 AS = 12.9					IQ only in the group with ASD correlates with the repetition of phrases when speaking	
Martin et al., 2020	N = 42 M = 21, F = 21 AS = 10.05	FXS and ASD N = 60 M = 49, F = 11 AS = 9.7 ASD N = 38 M = 38, F = 0 AS = 9.2 FXS N = 38 M = 13, F = 25 AS = 9.5 TP N = 41 M = 21, F = 20 AS = 5.1	Comparison of communication abilities between DS, FX, ASD, PSA, FXS, and TP, and observation of changes with increasing chronological age (longitudinal study)	Using inappropriate responses during conversation	Leiter-R PPVT-III EVT	In all groups of respondents, with an increase in calendar age, that is, the passage of time, there is a spontaneous improvement in communication skills, especially in the domain of using inappropriate answers Only in the TP group, with the passage of time, there is an improvement in the domain of structural language abilities	1.5	
Martzoukou et al., 2020	N = 20 M = 9, F = 11 AS = 28.2	TP – non-verbal IQ N = 20 M = 9, F = 11 AS = 4.2 TP – verbal IQ N = 20 M = 9, F = 11 AS = 5.1	Comparison of the achievements of TP and adults with DS in the domain of microstructural and macrostructural pragmatic abilities	Comprehension of a story told in a different prosody	RCPM SRT FDR LITMUS-MAIN Tool	TP is better than DS in all assessment domains. DS perceives the inner state of a person to a lesser extent than both TP groups. All three groups understand the context better when the prosody is more lively than when it is flat. People with DS have poorly developed morphosyntactic abilities, making it impossible to give more detailed descriptions of the	1.5	

						story.	
Mashaqba et al., 2020	The youngest N = 20 M = 10, F = 10 AS = 9.7 Medium N = 20 M = 10, F = 10 AS = 15.2 The oldest N = 20 M = 10, F = 10 AS = 22.6	/	Determining the accuracy of grammatical inflections of children and adolescents with DS, and determining the correlation between age and correct grammar production	Grammatical accuracy	SB5 PNT	When describing objects seen in photographs, 83% of people with DS use the singular, while only 27% use the plural. With increasing chronological age comes spontaneous improvement in the domains of grammar.	1.5
Panzeri et al., 2020	N = 13 M = 6, F = 7 AS = 13.6	TP N = 13 M = 6, F = 7 AS = 4.1	Assessment of understanding of irony and comparison of DS and TP groups in the domain of irony understanding A comparison of irony comprehension with linguistic ability and theory of mind	Understanding irony	BVL 4-12 Contents False Belief Sally-Anne Task Birthday Puppy Task ICT	The DS and TP groups did not differ on the theory of mind and linguistic abilities. Both groups perform with approximately the same accuracy on irony comprehension tasks, but both groups have better comprehension of literal versus ironic comments	1.5
Stephan et al., 2021	N = 29 M = 12, F = 17 AS = 13.46	/	Comparison of pragmatic abilities with adaptive behavior and non-verbal IQ of children with DS	Structural pragmatic communication skills	CCC-2 ABAS-II DAS-2	Pragmatic abilities of children with DS correlate with adaptive abilities and non-verbal IQ. Gender, age, and non-verbal IQ are the biggest predictors of pragmatic abilities	1.5
Udhmani et	N = 41	ASD	The relationship	Structural	CCC-2	In children with	1.7

al., 2020	M = 16, F = 25 AS = 11.2	N = 91 M = 73, F = 18 AS = 7.7	between EF and language pragmatic abilities in children with DS and ASD	pragmatic communication skills	BRIEF KBIT-2 DAS-2 WASI-II VABS-II	DS EFs are a predictor pragmatic abilities, but no and structural aspects of language, while they are with children with ASD EF predictor i pragmatic and structural language abilities
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Note: M – male; F – female; AS – average age; DS – Down syndrome; FXS – Fragile x syndrome; ASD – Autism spectrum disorder; TP – typical population; IQ – intelligence quotient; EF – executive functions; ELS protocol – *Expressive Language Sample Protocol*; SB5 – *Stanford Binet-Fifth Edition*; ADOS-2 – *The Autism Diagnostic Observation Schedule-Second Edition*; VABS-II – *Vineland Adaptive Behavior Scales-Second Edition*; ABC – *Aberrant Behavior Checklist – Innapropriate speech*; Leiter-R – *Leiter International Performance Scale-Revised*; PPVT-III – *Peabody Picture Vocabulary Test-Third Edition*; EVT – *Expressive Vocabulary Test*; RCPM – *Raven’s Colored Progressive Matrices Test*; SRT – *Sentence Repetition Test for Preschool Children*; FDR – *Forward Digit Recall* subtest from the *Athena Test*; LITMUS-MAIN Tool – An instrument designed by the author of the research that refers to the retelling of a story spoken with different voice prosody; PNT – *Picture Naming Task*; BVL 4-12 – Language assessment battery for children aged four to 12 years (*Batteria per la Valutazione del Linguaggio in Bambini dai 4 ai 12 anni*); ICT – *Irony Comprehension Task*; CCC-2 – *Children’s Communication Checklist-Second Edition*; ABAS-II – *Adaptive Behavior Assessment Scale-Second Edition*; DAS-2 – *Differential Abilities Scale-Second Edition*; BRIEF – *Behavior Rating Inventory of Executive Function*; WASI-II – *Wechsler Abbreviated Scale of Intelligence-Second Edition*

3.1. Sample

In the sample in all studies from the literature review (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021; Udhmani et al., 2020) included a total of 239 people with DS, of whom 112 were male, and 127 were female. The average age of the respondents was in the range of 9.7–28.2 years.

In two studies from the literature review, the authors did not have a control group (Mashaqba et al., 2020; Stephan et al., 2021), while in other studies (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Panzeri et al., 2020; Udhmani et al., 2020) there were control groups (Panzeri et al., 2020; Udhmani et al., 2020) or several (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020). Looking only at studies from the literature review that had control groups, they most often included individuals from the typical population (TP) (Martin et al., 2020; Martzoukou et al., 2020; Panzeri et al., 2020), as well as individuals with autism spectrum disorders (ASD) (Hoffmann et al., 2022; Martin et al., 2020; Udhmani et al., 2020) and fragile X syndrome (FXS) (Hoffmann et al., 2022; Martin et al., 2020). We believe that the existence of control groups is an additional quality of these articles. In research that includes an experimental group of people with a certain syndromic neurodevelopmental disorder, it is recommended to include a control group to compare the results obtained or to see the average functioning of TP persons or persons with another syndromic neurodevelopmental disorder condition in the area being evaluated (Campbell & Stanley, 2015; Shadish, 2002). Also, it is necessary to carefully select the control group, that is,

choose whether it will consist of persons with another syndrome or persons of TP, which usually depends on the goals and hypotheses of the research, as well as the availability of the sample (Norscia et al., 2020).

Only two groups of authors from the review (Martzoukou et al., 2020; Panzeri et al., 2020) matched the control and experimental groups to the non-verbal intelligence quotient (IQ). The matching of the sample from the control and experimental groups in terms of factors such as age, gender, and IQ is important because it enables the comparison of groups, as well as the accuracy of the interpretation of the results and the recognition of real differences between groups (Stuart, 2010; Rosenbaum & Rubin, 1985).

In most studies from the literature review (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Stephan et al., 2021), groups of authors stated exclusion and inclusion criteria relating to sample selection. When it comes to exclusion criteria, they mostly relate to sensory deficits (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020), physical difficulties (Martzoukou et al., 2020), or associated medical and behavioral conditions (Mashaqba et al., 2020). When it comes to inclusion criteria, they most often included the previous application of genetic tests that confirmed the presence of DS (Hoffmann et al., 2022; Stephan et al., 2021), then the development of vocal communication of persons with DS (Hoffmann et al., 2022) and monolingualism (Mashaqba et al., 2020). Emphasizing inclusive and exclusive criteria related to the selection of the sample ensures that the sample of respondents in the research is representative and relevant to the set goal of the research, but also enables the replication of the research.

The age groups of subjects with DS in the studies included in the literature review were most often elementary school age (Martin et al., 2020; Mashaqba et al., 2020; Udhmani et al., 2020), then adolescent age (Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021), while the smallest number of authors included in the sample were people with DS who are of an older calendar age (Martzoukou et al., 2020; Mashaqba et al., 2020). We hypothesize that the presence of comorbid conditions in adults with DS, such as congenital heart malformations (Liu et al., 2015), hypothyroidism (Roizen & Patterson, 2003), respiratory problems (Pueschel, 1990), gastrointestinal problems, and dementia in old age (Musiek, 2017) one of the potential causes of the inclusion of a larger number of younger respondents in the sample. However, due to advances in medicine and the treatment of comorbid medical conditions, the life expectancy of people with DS has increased significantly in recent years, and some authors point out that it is now around 60 years (Sullivan et al., 2007; Toto et al., 2002). Following the above, we believe that it would be necessary to include older people with DS to a greater extent in subsequent research.

Slightly more than half of the studies in the review provided information about obtaining written consent from parents or guardians of persons with DS to participate in the study (Hoffmann et al., 2022; Martin et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020). Given that it is ethically and legally necessary to ensure that persons with any degree of ID give informed consent to participate in research, as this ensures respect for the autonomy of these persons (Sauna-aho et al., 2020; Heather, 2003), as well as making informed decisions regarding their participation in research (Tuffrey-Wijne et al., 2016), future research should take this aspect into account. However, in most research involving people with DS, informed consent to participate in research is sought from parents or guardians, not from the people with DS themselves (Buckley, 2000).

Only four groups of authors stated the method by which they obtained the sample (Martin et al., 2020; Martzoukou et al., 2020; Panzeri et al., 2020; Udhmani et al., 2020) which included contacting the association

of parents of persons with DS (Martzoukou et al., 2020; Panzeri et al., 2020), then using the university database of people with DS (Udhmani et al., 2020) or connecting with different schools for the education of people with developmental disabilities (Martin et al., 2020).

In a small number of studies included in this literature review (Hoffmann et al., 2022; Mashaqba et al., 2020; Stephan et al., 2021), the authors provided additional information about the respondents, and these most often related to the language spoken by the participants (Hoffmann et al., 2022; Mashaqba et al., 2020). Mashaqba et al. (2020) provided, in addition to language, information on the average number of words in sentences that respondents use in everyday speech, as well as the type of school they attend, while Stephan et al. (2021) were the only ones to state the ethnic distribution of the sample. Providing information about the language used by respondents is important in research conducted to assess pragmatic abilities, because research shows that there is a connection between verbal abilities and pragmatic abilities (Lockton et al., 2016; Matthews et al., 2018; Westra & Carruthers, 2017), and that there are differences in pragmatic abilities between monolingual and bilingual individuals (Antonioni et al., 2020; Backus & Yagmur, 2019; Dupuy et al., 2019; Groba et al., 2018).

3.2. Research objectives

The largest number of studies included in the literature review were conducted to compare the pragmatic characteristics of people with DS and other syndromes or developmental disorders (Hoffmann et al., 2022; Martin et al., 2020), as well as comparing achievements in different domains of pragmatics between people with DS and TP individuals (Martzoukou et al., 2020; Panzeri et al., 2020). Assessing the pragmatic abilities of people with different syndromes is important because it allows the identification of strengths and difficulties in different areas of pragmatics (Adams & Gaile, 2020) and thus the adaptation of interventions for the development of pragmatic abilities (Laws & Bishop, 2004).

Martin et al. (2020) also looked at gender differences in addition to examining pragmatic differences between different syndromes and neurodevelopmental disorders. Sometimes there are significant gender differences in people with one syndrome, for example, in people with FRX syndrome, men often have a more severe clinical profile than women with the same syndrome (Hagerman et al., 2017; Hufnagel et al., 2016). When it comes to people with DS, some authors find that men have a lower average IQ than women (Dykens & Kasari, 1997; Edgin et al., 2010). In addition, males with DS have more medical comorbidities than females (Toto et al., 2002). It is important to examine gender differences within a syndrome because they can affect the treatment and outcome of people with a certain syndrome, so interventions must be adjusted accordingly.

The same group of authors (Martin et al., 2020) also researched to observe differences in the domains of pragmatics in people with DS over time, while Mashqaba et al. (2020) researched to examine differences in pragmatic abilities of people with DS who are of different ages. Research shows that with increasing calendar age, spontaneous improvement can occur in individuals with DS in various domains, such as behavioral problems (Grieco et al., 2015), symptoms of inattention and hyperactivity (Kaditis et al., 2016), adaptive skills (Cvijetić, 2016), but there can also be a spontaneous improvement of certain accompanying medical conditions (Fort et al., 1984; Rosen, 2010).

In the research by Udhmani et al. (2020), the goal was to compare pragmatic abilities with other cognitive functions, that is, executive functions. A large number of studies indicate the influence of executive functions on pragmatic skills (Berenguer et al., 2018; Bosco et al., 2017; Gioia et al., 2000; Matthews et al.,

2018; Rowley et al., 2017) because executive functions provide the necessary cognitive basis for effective social communication. For example, working memory allows individuals to retain and manipulate information during a conversation, which enables adequate interlocutor switching and understanding of complex language forms (Lezak, 2004). Inhibitory control and cognitive flexibility contribute to social adaptability and the ability to adapt language to the conversational context (Greven et al., 2012). Planning skills help an individual to structure their thoughts and participate in cohesive and coherent conversations (Miyake et al., 2000; Roebbers et al., 2012).

Stephan et al. (2021) aimed to examine the characteristics of the pragmatic abilities of people with DS in different domains of pragmatics. Pragmatics includes various domains that are important for effective social communication, such as non-verbal communication (Paul, 2017), respect for conversational rules (Adams & Gaile, 2020), the ability to adapt the communication style to the context and the interlocutor (Bishop, 2014), as well as the ability to understand and use figurative speech (Lezak, 2004). Because pragmatic abilities include different domains, it is important to assess in which of the mentioned domains people with DS show the most prominent deficits, to plan treatment following the mentioned findings.

3.3. Instruments used

The largest number of studies from the literature review assessed pragmatic abilities through the analysis of narratives (Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020), where subjects recounted the pictures they observed (Martin et al., 2020; Mashaqba et al., 2020) or retold a story they heard before (Martzoukou et al., 2020).

Two groups of authors (Stephan et al., 2021; Udhmani et al., 2020) from the literature review used test batteries to assess the pragmatic abilities of the respondents from the sample, namely the CCC-2 test battery (Bishop, 2013).

Only one group of authors (Panzeri et al., 2020) from the literature review independently constructed an instrument for assessing the pragmatic abilities of the respondents from the sample. The instrument created by the authors was an assessment of the understanding of the story listened to, at the end of which they had to say whether the story was ironic or not, giving a dichotomous (yes/no) answer. Also, only one group of authors (Hoffmann et al., 2022) evaluated the pragmatic abilities of respondents by analyzing a conversation with respondents on a free topic, based on a recorded conversation sample.

analyzing a conversation with respondents on a free topic, based on a recorded conversation sample.

All authors measured the non-verbal IQ of the respondents from the sample (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Stephan et al., 2021; Udhmani et al., 2020). Nonverbal IQ is important for the development and expression of pragmatic abilities because it includes cognitive abilities that are independent of language, which are important for the acquisition of pragmatic skills (Lezak, 2004; Paul, 2017). People with a higher non-verbal IQ exhibit better pragmatic abilities (Adams & Gaile, 2020), and a positive correlation was also observed in previous research between the total IQ score and pragmatic abilities (Greven et al., 2012). Understanding the relationship between non-verbal IQ and pragmatic skills can provide guidelines for treatment, as it indicates the need to enhance and improve cognitive abilities, and thus pragmatic abilities in people with DS (Chapman & Hesketh, 2000; Hsu et al., 2013).

Most of the review authors assessed language abilities (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Panzeri et al., 2020) and most often morphosyntactic abilities (Martin et al., 2020; Martzoukou et al., 2020; Panzeri et al., 2020). Morphosyntactic abilities refer to linguistic skills that include morphological and syntactic aspects of language. Morphology refers to the rules in the internal structure of words, while syntax implies the rules of combining words into grammatically correct sentences (Bishop & Snowling, 2004; Leonard, 2017). Morphosyntactic abilities are the structural framework by which words convey the meaning and understanding of more complex grammatical sentences (Rice et al., 2009).

Some of the authors assessed receptive and expressive language abilities in the subjects (Martin et al., 2020), while others assessed exclusively expressive language abilities (Hoffmann et al., 2022). Receptive language abilities refer to the ability to understand written or spoken language and include the ability to process and interpret linguistic information, such as words, sentences and gestures, vocabulary, and grammar of others, while expressive language abilities imply the ability of an individual to produce the above to participate in purposeful communication (Adams & Gaile, 2020; Bishop, 2014; Paul, 2017). Hoffmann et al., (2022) are the only authors from the literature review who also focused on the assessment of language abilities, however, regarding the aberrant communication behavior exhibited by the respondents.

Three groups of authors evaluated adaptive abilities (Hoffmann et al., 2022; Stephan et al., 2021; Udhmani et al., 2020), which was also done by the authors of previous studies (Adams & Gaile, 2020), while only one group of authors evaluated the abilities of executive functions as a whole (Udnani et al., 2020). Martzokou et al. (2020) focused on the assessment of working memory as one of the aspects of executive functions. The only authors from the literature review who studied the theory of mind abilities in addition to pragmatic abilities were Panzeri et al. (2020).

3.4. Research results

In literature review studies in which the authors studied the pragmatic specificities of people with DS (Mashaqba et al., 2020; Stephan et al., 2021), it was found that people with DS do not have sufficiently developed grammatical abilities, which manifests itself in the form of using singular when describing items that are in the plural. Also, it was found that pragmatic abilities depend to the greatest extent on the degree of non-verbal IQ that was measured in persons with DS from the sample, as well as that with the increase in calendar age, there is a spontaneous improvement of pragmatic abilities in persons with DS. Previous research suggests the possibility of spontaneous improvement in various aspects of functioning with increasing calendar age in individuals with DS, such as sleep problems (Rosen, 2010; Bhaumik et al., 2025), medical problems such as hypothyroidism (Fort et al., 1984), language abilities (Chapman, 1996), motor problems (Lysenko et al., 2014), but also cognitive and behavioral problems that occur in this population (Grieco et al., 2015).

In the literature review, articles in which the authors compared the pragmatic abilities of people with DS and people with other syndromes or neurodevelopmental disorders (Hoffmann et al., 2022; Martin et al., 2020; Udhmani et al., 2020), it was found that executive function is the biggest predictor of the development of pragmatic abilities in people with DS. In addition, it has been observed that people with DS do not, to a large extent, exhibit repetition of phrases and topics during conversation, as do people with other syndromic conditions or neurodevelopmental disorders. However, repetition in speech is one of the characteristics of people with ASD (Brynskov et al., 2017; Eilers & Hayes, 2015; Lyakso et al., 2017) and people with FRX syndrome (Gross et al., 2015; Oakes et al., 2016). It is expected that, compared to them, people with DS will

achieve better results in this domain. Also, the authors, who had as a control group people with other syndromic conditions or neurodevelopmental disorders, found that with the increase in calendar age, as well as the passage of time, there is a spontaneous improvement in all aspects of pragmatic abilities.

In literature review studies comparing the pragmatic abilities of people with DS and people of TP (Martzoukou et al., 2020; Panzeri et al., 2020), it was found that people of TP are better in all aspects of pragmatics compared to people with DS, while they had similar results regarding the understanding of irony. People with DS have difficulty perceiving a person's internal state based on their voice prosody, but they have a better understanding of what the interlocutor is saying when the prosody is livelier, as opposed to flat. Research shows that the way words are pronounced, that is, the prosody of the voice, affects understanding in people of TP as well (Arnold & Watson, 2015; Rodero, 2015).

When it comes to language expression, due to a deficit of morphosyntactic abilities, people with DS show difficulties when describing a story or a photo. Research conducted to implement interventions to improve the morphosyntactic abilities of people with DS indicates the possibility of progress in this domain (Martin-Urda et al., 2020; Ortega et al., 2021), which can lead to the improvement of pragmatic abilities.

3.5. Quality assessment

The average quality rating of the research included in the literature review was 1.5, and the ratings ranged from 1.3 to 1.7. Most of the research from the literature review was of high quality, i.e., it received an average score of 1.5 (Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021). The research conducted by Hoffmann et al., (2022) that is, a rating of 1.3, received the best rating, while the research conducted by Udhmani et al., (2020) received the lowest rating, which was also the only research from the literature review that was evaluated as research of moderate quality, that is, with a grade of 1.7. Both evaluators gave the same answers to 100% of the questions.

No research from the literature review (Hoffmann et al., 2022; Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021; Udhmani et al., 2020) met the criterion of objectivity during the measurement, due to the lack of explanation to the respondents about the purpose of the research, as well as the lack of knowledge of the evaluator who evaluates the respondents about the aforementioned.

The only study from the literature review that reported sample shedding was the study by Hoffmann et al. (2022), which was assessed as the highest quality. The absence of data on sample shedding was one of the reasons for the lower rating of other studies from the review (Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021; Udhmani et al., 2020). Also, Hoffman et al., (2022) provided information on the process of randomizing subjects into groups, which resulted in a better score (score one) on the domain related to research design, compared to other studies included in the literature review (Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021; Udhmani et al., 2020) which, due to the lack of providing the mentioned data, achieved a grade of two.

In the domain of the study quality assessment instrument related to confounding factors, two studies (Hoffmann et al., 2022; Udhmani et al., 2020) achieved a lower score (score two) compared to other studies (Martin et al., 2020; Martzoukou et al., 2020; Mashaqba et al., 2020; Panzeri et al., 2020; Stephan et al., 2021) due to the existence of significant differences between subsamples.

4. CONCLUSION

The literature review revealed that people with DS exhibit grammatical and morphosyntactic language deficits and have difficulties in perceiving the internal state of a person based on their voice prosody, especially when the interlocutor uses flat prosody. The higher non-verbal IQ and more developed executive functions stand out as predictors of the development of pragmatic abilities. Therefore, as a recommendation, we point out the construction of a treatment for people with DS that would be aimed at developing language abilities, but also at other cognitive functions, which can consequently lead to the improvement of pragmatic abilities in this population.

The deficiency of the research included in the literature review observed in the assessment of the quality of the studies refers to the absence of homogeneity of the groups in terms of socio-demographic variables, then the presence of statistically significant differences between the subsamples, the absence of emphasizing the research objective to the respondents and the absence of giving information about the withdrawal of the respondents from the sample. All of the above stand out as recommendations for future researchers.

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