

Conference Proceedings of 10th International Conference: Research in Education and Rehabilitation Sciences : ERFCON 2023 : Vol. 2

Edited book / Urednička knjiga

Publication status / Verzija rada: **Published version / Objavljena verzija rada (izdavačev PDF)**

Publication year / Godina izdavanja: **2024**

Permanent link / Trajna poveznica: <https://urn.nsk.hr/urn:nbn:hr:158:219215>

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Download date / Datum preuzimanja: **2025-03-13**



Repository / Repozitorij:

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10th International Conference:
Research in Education
and Rehabilitation Sciences

ERFCON23

May 5-7, 2023
Zagreb, Croatia

CONFERENCE PROCEEDINGS

Vol. 2



10th International Conference:
Research in Education and Rehabilitation Sciences

ERFCON 2023

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Conference Proceedings

Vol. 2

Publishers

University of Zagreb Faculty of Education and Rehabilitation Sciences

Borongajska cesta 83f, 10000 Zagreb

www.erf.unizg.hr

Scientific Series, Book No. 31

For the Publisher

Prof. Lelia Kiš-Glavaš, Ph.D.Sc.

Croatian Academy of Sciences and Arts, Department of Medical Sciences

Trg Nikole Šubića Zrinskog 11, HR-10000 Zagreb

www.hazu.hr

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Peer Review

All papers were reviewed in peer review process.

Language Editor

Renato Samardžić, mag. philol. angl. et mag. philol. slav. merid.

Graphic Design

Axis-design d.o.o., Zagreb

University of Zagreb Faculty of Education and Rehabilitation Sciences

ISBN 978-953-8321-12-2 (set)

ISBN 978-953-8321-13-9 (Vol. 2)

Croatian Academy of Sciences and Arts, Department of Medical Sciences

ISBN 978-953-347-564-6 (set)

ISBN 978-953-347-606-3 (Vol. 2)

Zagreb, December 2024



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10th International Conference:
Research in Education and Rehabilitation Sciences

ERFCON 2023

May 5 -7, 2023
Zagreb, Croatia

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ERFCON 2023 was organized under the auspices of the President of the Republic of Croatia, Mr. Zoran Milanović

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Introduction

Welcome to the Conference Proceedings for the 10th International Conference: Research in Education and Rehabilitation Sciences - ERFCON2023, Volume 2. This milestone event brings together scholars, researchers, educators, and practitioners globally, facilitating profound discussions, the exchange of innovative ideas, and the presentation of groundbreaking research in the fields of education and rehabilitation sciences.

The themes of ERFCON2023 signify our dedication to exploring uncharted territories and pushing the boundaries of knowledge in special and inclusive education, rehabilitation, speech-language pathology, social pedagogy, and criminology. As we collectively explore new horizons, this conference provides a platform for intellectual exchange, fostering collaboration and inspiring transformative developments.

The Conference Proceedings underscore the importance of diverse perspectives and interdisciplinary collaboration in addressing the multifaceted challenges within education and rehabilitation sciences. By assembling experts with varying backgrounds, our aim is to weave a rich tapestry of insights contributing to the holistic advancement of these critical fields.

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Knowledge and stigma about children with diagnosis of autism spectrum disorder among preschool teachers

SUMMARY

Currently, children with autism spectrum disorder (ASD) are usually enrolled in mainstream kindergartens, so it is important to create optimal conditions for inclusive practice. Preschool teachers' attitudes and competence to support children with ASD are the most important factors for effective inclusion. When preschool teachers are competent and willing to support children with ASD in the group, these children can have their needs met, learn social and communication skills, and strengthen their sense of belonging to the preschool group.

The purpose of this study is to examine knowledge and stigma about ASD among preschool teachers and to determine how this relates to teachers' chronological age, direct work experience with children with autism spectrum disorder, and professional development. This study also examines how preschool teachers perceive their own abilities to work with children with autism spectrum disorder and how this relates to knowledge and stigma about the disorder. A total of 266 preschool teachers from various preschool institutions in the Republic of Croatia participated in the study. The Autism Stigma and Knowledge Questionnaire (ASK-Q) (Harrison et al., 2017) was translated and adapted into the Croatian language. Two additional questionnaires were created for the purpose of this study: the Sociodemographic Data Questionnaire and the Self-Perceived Competence in Supporting Children with ASD Questionnaire.

The results showed that all preschool teachers had good knowledge and did not stigmatize children with autism spectrum disorder. The difference between them was only in terms of chronological age, and differences in other factors were not confirmed. When evaluating their own competence to work with children with autism spectrum disorder, the preschool teachers gave neutral to slightly negative answers. A correlation between self-assessment and knowledge and stigma could not be confirmed. The results provide insight into the quality of implementation of inclusive practices in Croatia and indicate the need to provide additional support to preschool teachers.

8 **Keywords:** *children with autism spectrum disorder, inclusion, knowledge and stigma, preschool teacher*

Introduction

Research consistently confirms the increasing prevalence of autism spectrum disorder (ASD), which is currently 1 in 36 children in the population of 8-year-olds with higher rates of ASD among boys (4%) than girls (1%) (Maenner et al., 2023). This information is extremely important for societies to organize timely and optimal support for members of the community. In this sense, early childhood intervention is a valuable and critical component of support for children with autism spectrum disorder and their families. It involves the inclusion of children with autism spectrum disorder in mainstream or special education programmes depending on how much support the child needs. Enrolling children with autism spectrum disorder in the early education system (i.e., kindergarten) along with typically developing children increases the likelihood of optimizing the development of children with developmental disabilities and preventing secondary disabilities and educational neglect. For children with autism spectrum disorder to reach their potential within the educational system, the entire community must be transformed (Karamatić Brčić, 2011).

The inclusion of children with autism spectrum disorder in the mainstream setting does not ensure that individual needs are met unless there is a change in approaches according to each child's abilities. Inclusion requires the environment to be ready for these changes so that children with developmental disabilities feel like full and equal participants in the educational process just as children with typical development do. In this way, the sensitivity of the whole community is influenced. Members of the community become aware of the needs of others, learn to accept differences, and learn how to support these children appropriately.

Recognizing that children with autism spectrum disorder sometimes require significant adaptation of educational content to progress according to their abilities, preschool teachers must be adequately prepared and trained to work in an inclusive group. Preschool teachers can create an inclusive environment and adjust conditions to meet the individual needs of the child. Due to their unique position, they influence the child's progress and the development of his or her social and communication skills. However, preschool teachers' attitudes and their assessment of their own competence to work in an inclusive group are critical to the success of inclusion and connecting children with autism spectrum disorder with their typically developing peers.

A growing number of studies confirm that preschool teachers support the inclusion of children with autism spectrum disorder in regular education groups, but despite their positive attitudes, they rate their own competence to work in an inclusive group as neutral or negative (Barić, 2016; Engstrand and Roll-Pettersson, 2012; Loborec and Bouillet, 2012; Skočić Mihić, 2011; Sunko, 2010). However, studies provide mixed results in regard to teachers' knowledge of autism spectrum disorder. A larger number of studies indicate that preschool teachers have false

beliefs and lack basic knowledge (Liu et al., 2016; Taresh et al., 2020), while a smaller number indicate the opposite, i.e., that teachers have good knowledge about autism spectrum disorder and lack stigma towards this disorder (Handayani and Pramesti, 2018).

Teachers' sense of readiness and competence to work and support children with autism spectrum disorder increases with attendance at specialized training that increases the scope of knowledge about children's difficulties and improves the skills needed to work with them (Bouillet, 2011; Reber et al., 1995; Park et al., 2010; Stoiber et al., 1998). In addition, direct work experience with a child with autism spectrum disorder and younger chronological age of the preschool teacher have been shown to be important factors that influence the formation of positive attitudes (Gu, 2009, Skočić-Mihić, 2011; de Boer et al., 2010). Practical experience expands theoretical knowledge and thus affects self-confidence in one's own competencies and more positive attitudes, and younger preschool teachers are more willing to learn and more often use IT tools that facilitate access to necessary information.

Because preschool teachers are providers of educational services and active participants in the early intervention process, it is important to examine their readiness to work with children with autism spectrum disorder. Accordingly, the purpose of this paper is to examine their knowledge and the presence of stigma towards autism spectrum disorder as well as their sense of competence in working with children with autism spectrum disorder. By determining the knowledge and stigma of preschool teachers in preschool institutions in Croatia, a picture of the quality of inclusive acceptance of children with autism spectrum disorder can be obtained.

Purpose of the Research

The purpose of this study is to determine whether preschool teachers have stigma and knowledge about children with diagnosis of ASD and to examine how preschool teachers assess their own competence for working with children with ASD.

Research Problems and Hypotheses

1. To determine preschool teachers' level of knowledge and stigma about children with diagnosis of autism spectrum disorder.
2. To determine the relationship between certain sociodemographic characteristics and preschool teachers' knowledge and stigma about autism spectrum disorder.
3. To determine how preschool teachers rate their own competence in working with children with diagnosis of autism spectrum disorder.
4. To determine whether there is a relationship between self-assessed competence, knowledge, and stigma about children with diagnosis of autism spectrum disorder.

Hypothesis

H1: The majority of preschool teachers have adequate knowledge of autism spectrum disorder and have no stigma towards the disorder.

H2: There are differences in preschool teachers' knowledge and stigma towards children with diagnosis of autism spectrum disorder given some of their characteristics:

H2a: Younger preschool teachers have more knowledge and less stigma.

H2b: Preschool teachers with previous work experience with children with autism spectrum disorder have more knowledge and less stigma.

H2c: Preschool teachers who have had additional professional training have more knowledge and less stigma.

H3: Preschool teachers, on average, have a negative self-assessment of their competencies for working with children with diagnosis of autism spectrum disorder.

H4: There is a statistically significant relationship between self-assessed competence for working with children with autism spectrum disorder and knowledge and stigma about autism spectrum disorder.

H4a: Self-assessed competence and knowledge of autism spectrum disorder are positively related.

H4b: Self-assessed competence and stigma about children with diagnosis of autism spectrum disorder are negatively related.

Methods

Sample

The research was conducted on a convenience sample of preschool teachers. A total of 266 teachers from various preschool institutions throughout the Republic of Croatia participated in the study. Most of them were female (99.2%). The age range was from 21 to 64 years ($M=43.05$; $SD=12.41$).

Measuring instruments

The characteristics of the sample were examined with a sociodemographic data questionnaire that included variables such as age, previous experience working with children with diagnosis of autism spectrum disorder, experience with close people with autism spectrum disorder, prior knowledge acquired at university, and prior knowledge acquired during professional training.

To assess competence for working with children with autism spectrum disorder, the Self-Assessed Competence for Working with Children with Autism Spectrum Disorder Questionnaire was used, which was developed for the purposes of this study. The questionnaire consisted of 7

items. Some examples of items on this scale are: "I need help working with a child with an autism spectrum disorder", "I have enough knowledge to work properly and include a child with an autism spectrum disorder in my group" and "I believe that I can contribute a lot to the development of certain skills in a child with an autism spectrum disorder." The participants' task was to rate their own competence in working with children with autism spectrum disorder on a Likert scale from 1 ("does not apply to me at all") to 5 ("applies to me completely").

The Autism Stigma and Knowledge Questionnaire (ASK-Q) was used to assess stigma and knowledge about autism (Harrison et al., 2017). The ASK-Q consists of 49 items divided into four subscales: Diagnosis/Symptoms (18), Etiology (16), Treatment (14), and Stigma (7). The participants' task was to choose the offered response for each of the items, "I agree" or "I disagree." The results were formed by subscale as a linear combination of estimates of the items that constitute a given subscale. In addition to the confirmed four-factor structure of the questionnaire, the high reliability of the entire questionnaire was confirmed, i.e., Cronbach's alpha was 0.88, while the values for the individual subscales ranged from 0.93 to 0.98 (Harrison et al., 2019). For the purposes of this paper, the ASK-Q was translated into Croatian such that the items were first translated from English into Croatian and then from Croatian into English to check the quality of the first translation.

Data collection

The survey was conducted among preschool teachers in Osijek using the paper/pencil method and in other parts of Croatia online to facilitate the collection of results. The introductory part of the questionnaire contained a brief instruction to explain the purpose and aim of the survey to the participants and to ask for the voluntary participation of the preschool teachers in the survey. In addition, the instructions emphasized that the completion of the questionnaire was completely anonymous and that the research results would be processed and used for research purposes only at the group level. After the measurements, the collected data were entered into a common database and processed using the SPSS statistical data processing software package.

Results and Discussion

Prior to the selection of statistical methods for data analysis, it was determined that all requirements for the application of parametric tests were met. In further analysis of the results, the t test for large independent samples and Pearson's correlation coefficient were used.

All participants confirmed that they had heard of autism spectrum disorder (N=266, 100%). Regarding direct experience working with a child with an autism spectrum disorder, it was found that 65% of preschool teachers (N=174) had such work experience and 35% did not (N=94). Regarding experience with autism spectrum disorder in the family, 11.7% of preschool teachers

(N=31) had a person with diagnosis of autism spectrum disorder in their family, while 88.3% (N=235) did not. In addition, slightly more than half of the participants, 59.4% (N=158), indicated that they had attended lectures and courses at university that discussed autism spectrum disorder, while 40.6% (N=108) indicated that they did not have such content in their formal education. In addition, we wanted to explore how important preschool teachers felt it was to expand content on autism spectrum disorder in their formal education. The results showed that almost all participants agreed that there is a need for more courses at university that address this disorder (N=251; 94.4%). Although approximately half of the participants reported attending additional seminars and trainings on autism spectrum disorder (N=147; 55.3%), almost all of them agreed that it is necessary to organize additional trainings outside formal education (N=257; 96.6%).

The main objective of this study was to investigate the knowledge and stigma of preschool teachers towards autism spectrum disorder. According to the hypotheses established, it was expected that the majority of preschool teachers would have adequate knowledge about autism spectrum disorder and, accordingly, that they would not have stigma towards this disorder. The results of the study confirmed the stated hypotheses and revealed that all preschool teachers had adequate knowledge and not a single preschool teacher had stigma towards the disorder. Almost all participants achieved extremely high scores in all knowledge dimensions (Diagnosis/Symptoms, Etiology, Treatment).

Although there are a small number of studies on this topic, the results of these studies mostly indicate a lack of basic knowledge about autism spectrum disorder among preschool teachers (Barned et al., 2011; Liu et al. 2020; Taresh et al., 2020). However, the hypotheses in this study were established following a study that used the same questionnaire (ASK-Q), which confirmed the presence of sufficient knowledge about autism spectrum disorder among professionals (Handayani and Pramesti, 2018).

Moreover, previous research speaks to the relationship between knowledge and stigma towards autism spectrum disorder such that the greater the knowledge, the lower the level of stigma towards the disorder (Handayani and Pramesti, 2018; Harrison, 2019; Gillespie-Lynch et al., 2015; Obeid and al., 2015; Someki et al., 2018; Yu et al., 2020). Accordingly, the results showed a statistically significant but slightly negative correlation between knowledge and stigma towards autism spectrum disorder ($r=-0.29$, $p < 0.05$). The low correlation can be explained by the very high scores on the dimension of stigma, as none of the participants showed stigma and the dispersion of the results was minimal. According to numerous studies, an increase in specific knowledge about inclusion or difficulties leads to positive attitudes towards them (Bouillet, 2011; Park et al., 2010; Reber et al., 1995; Stoiber et al., 1998).

The second hypothesis of this research examined whether there is a statistically significant difference between preschool teachers' knowledge and stigma towards autism spectrum dis-

order in terms of age, direct experience working with a child with autism spectrum disorder, and participation in additional trainings.

Age. To investigate whether there was a difference between preschool teachers in terms of age, the participants were divided into younger and older preschool teachers. Younger teachers were those whose chronological age was less than 39 years, and older preschool teachers were those aged 40 years and older. The results showed that there was a statistically significant difference between younger and older preschool teachers in that younger preschool teachers had greater knowledge and lower stigma towards ASD than older preschool teachers did (see Table 1). The above findings are consistent with the hypothesis and with many studies (de Boer et al., 2010; Gu, 2009; Skočić Mihić, 2011).

It is assumed that younger preschool teachers have a higher level of IT competence and use the internet more often, which facilitates the availability of necessary information. In addition, younger preschool teachers in this study were more likely to report that they had taken courses on autism spectrum disorder in formal education, which contributes to greater knowledge and understanding of the disorder itself and thus to higher questionnaire scores. The greater the understanding of the disorder, the lower the stigma associated with the disorder.

Table 1. *Knowledge and stigma differences between preschool teachers in relation to their chronological age (N=266)*

	Age	M	SD	t
Knowledge	Younger	41.36	2.908	3.538**
	Older	40.11	2.779	
Stigma	Younger	6.32	0.830	2.278*
	Older	6.10	0.744	

Legends: M – Mean, SD – standard deviation, t – t test, **p<0.01, *p<0.05

Direct work experience. Comparison of the results between the preschool teachers who had direct experience working with a child with autism spectrum disorder and those who did not showed that they did not differ from each other in the overall results on either the knowledge or the stigma dimension (see Table 2). Therefore, the hypothesis is rejected.

Previous research suggests a significant influence of direct experience working with a child on the expression of attitudes towards children with developmental disabilities (Horrocks et al., 2008; Puž, 2016; Stoiber et al., 1998). Preschool teachers and teachers who had experience working with children with autism spectrum disorder showed greater knowledge and more positive attitudes towards inclusion than those who had not encountered this in their work.

Considering that the majority of the preschool teachers had such experiences during their professional experience, it is possible that a difference was not found because the groups were not comparable. In addition, an increasing number of children with autism spectrum disorder are being included in mainstream school groups, which means that preschool teachers who did not have a child with autism spectrum disorder in their group most likely encountered them in kindergartens and interacted with them in some way. Therefore, it is possible that there are no differences between these groups of preschool teachers on the dimension of knowledge and stigma because there are also no differences in experience.

Table 2. Differences in teachers' knowledge and stigma related to direct work experience with a child with autism spectrum disorder (N=266)

	Working experience	M	SD	t
Knowledge	Yes	40.71	2.909	0.848
	No	40.39	2.934	
Stigma	Yes	6.18	0.737	-0.344
	No	6.22	0.870	

Legends: M – Mean, SD – standard deviation, t – t test, **p<0.01, *p<0.05

Education. The responses of preschool teachers working in inclusive groups were compared in terms of participation in professional development training for working with children with autism spectrum disorder. Preschool teachers did not differ significantly in either knowledge or stigma (see Table 3). These results are not consistent with the hypothesis; therefore, the hypothesis is rejected.

Although some studies have not found differences in attitudes related to educational institutions attended, most studies report a significant influence of educational institutions on the formation of attitudes towards inclusion (Engstrand and Roll-Pettersson, 2012; Gillespie-Lynch et al., 2015; Ling et al., 2010). The results of this study can be explained by the methodological limitations of this study. Specifically, half of the participants completed the questionnaire online, which enabled them to search for the correct answers on the internet. In addition, the questionnaire contained questions about autism spectrum disorder that may have been too simple for this group of participants. The questionnaire examined general knowledge and familiarity with the disorder, as it was designed to be valid across cultures. The results indicate that preschool teachers are well acquainted with general information about autism spectrum disorder regardless of the training attended. In addition, an increasing number of preschool teachers indicated that they had attended courses on autism spectrum disorder, which cer-

tainly has an impact on increasing knowledge about these disorders. In addition, there is a growing influence of the media and experts who are increasingly addressing this topic, raising public awareness about autism spectrum disorder. Therefore, regardless of the training attended, preschool teachers in Croatia showed adequate knowledge about autism spectrum disorder and had no stigma towards this disorder.

Table 3. Differences between preschool teachers in terms of knowledge and stigma in terms of class participation (N=266)

	Education	M	SD	t
Knowledge	Yes	40.82	2.798	1.427
	No	40.31	3.044	
Stigma	Yes	6.14	0.773	-1.288
	No	6.26	0.797	

Legends: M – Mean, SD – standard deviation, t – t test, **p<0.01, *p<0.05

In addition to knowledge and stigma, it was important for this study to examine preschool teachers' subjective assessments of their readiness to work with children with autism spectrum disorder. The results indicate that preschool teachers' assessments of their own competence were predominantly neutral, with a slight tendency towards negative responses.

Previous research indicates that despite positive attitudes towards inclusion and children with disabilities, preschool teachers were generally rated as inadequately prepared and incompetent (Barić, 2016; Loborec and Bouillet, 2012; Skočić Mihić, 2011; Sunko, 2010; Sunko et al., 2019). It can be concluded that the results are partially consistent with the results of previous studies; thus, the hypothesis is partially accepted. This result may indicate hidden negative attitudes towards the inclusion of children with autism spectrum disorder and socially desirable reactions. Some authors emphasize the complexity of this problem by referring to the impact of aggravating working conditions (number of children in the group, spatial and material inadequacies, etc.) (Leutar and Štambuk, 2006; Loborec and Bouillet, 2012).

The purpose of this study was also to investigate whether and to what extent there is a relationship between self-assessed competence for working with children with autism spectrum disorder and knowledge and stigma about this disorder. The results confirm that there is no statistically significant relationship between the above factors ($r_{(knowledge)}=0.094$, $p > 0.05$; $r_{(stigma)}=-0.06$, $p > 0.05$). Therefore, the hypothesis is rejected.

16 Although previous research did not examine this type of relationship, these results can be compared to studies that showed that preschool teachers had positive attitudes towards chil-

dren with disabilities despite insufficient knowledge about the disorder, and when positive attitudes towards inclusion existed, they still felt insufficiently competent (Barned et al., 2011; Liu et al., 2016).

In addition to increasing media awareness of autism spectrum disorder, which likely contributed to preschool teachers' high ratings on the knowledge questionnaire, preschool teachers encountered this disorder in their formal education. More than half of the participants responded that they had attended lectures on autism spectrum disorder in school. However, although they were familiar with the theory, they lacked techniques and methods for working with these children that would increase their sense of competence. If preschool teachers are not offered a sufficient number of experiential workshops in training, they may lack the skills to work in inclusive groups, which affects their readiness (Sukbunpant et al., 2013). Other research confirms that preschool teachers are not satisfied with the skills they acquire during their studies to work with children with disabilities, which negatively affects their self-confidence. They emphasize dissatisfaction with the number of teaching hours in the field of working with children with disabilities (Lončarić, 2016). A similar result was obtained in this research, where preschool teachers emphasized the need for additional training. This finding speaks to the need to change the approach to formal education. It is important to consider these findings and adjust the needs of preschool teachers in initial training and subsequent professional development accordingly to influence the quality of inclusive practice. The educator is a key person in creating an inclusive environment in an educational institution. Therefore, it is important to train educators to work in different conditions so that they can give their best efforts when working with children with ASD.

Contributions, Limitations and Recommendations for Future Research

The aim of this study was to investigate the knowledge and stigma about children with diagnosis of autism spectrum disorder among Croatian preschool teachers. Stigma in this study is defined as false beliefs about autistic children that can lead to the social exclusion of these individuals. In a broader classification, stigma would imply the presence of a negative attitude, and as such it is explained in this study based on the results obtained. However, it should be noted that the questionnaire used did not include subjective feelings about the autism spectrum disorder, i.e. it did not include the emotional component used in the study of attitudes, but examined knowledge of facts related to a particular disorder. This study differs from the others in that it takes into account how familiar the preschool teachers are with the diagnosis of an autism spectrum disorder and whether they feel any stigma towards it given the knowledge they have.

Before interpreting the results of this study, several limitations should be considered. First, the data were collected on a convenient sample, which depends on the motivation of the pre-

school teachers, meaning that the generalization of the results is questionable. Second, some of the participants completed the questionnaire using the paper-pencil method, while others completed it online. The participants who completed the questionnaire online had the opportunity to check their answers online.

The ASK-Q questionnaire was used for the first time among preschool teachers in Croatia. To study knowledge and stigma worldwide in different cultures, it is necessary to understand how it is constructed. The reliability of the questionnaire remained high regardless of the population in which it was used. However, because the questionnaire was designed for a larger population, it did not include items that are necessary for preschool teachers working with children with autism spectrum disorder. This specific knowledge and skills are critical to strengthening teachers' readiness to work. Despite the very good results, the preschool teachers indicated that they felt they needed more subjects and more professional development in college. Therefore, a recommendation for future research is to include specific knowledge and methods of working with children with autism spectrum disorder to obtain an even more detailed picture of teachers' readiness and areas of self-work. This research also agrees with many who recommend changes in the initial training of preschool teachers. There is a need to expand topics related to children with autism spectrum disorder in all pedagogical and methodological courses to include sufficient theoretical and practical assignments to increase preschool teachers' readiness to work with these children. Experiential workshops and methods and techniques for working inclusively are key to training preschool teachers to work with children with autism spectrum disorder. To verify the impact of the training, a cycle of professional lectures and exercises can be organized and attitudes and self-assessed readiness to work before and after the trainings are held can be verified. For future research, it is suggested to investigate the self-assessment of preschool teachers' competence in working with children with diagnosis of autism spectrum disorder and the possibility of implementing the knowledge acquired during school years. It is necessary to prepare preschool teachers to work with children with autism spectrum disorder while they are still at faculty but it is also important to support them when they enter the world of work. Lifelong learning helps to improve the quality of everyone's work, and in this context the quality of inclusive practice increases, which is important both for children with autism spectrum disorder and for the whole community. Educational institutions are obliged to encourage teachers to do the same and empower them by organizing various workshops for working with children with autism spectrum disorder and support groups that help them cope with stressful situations more easily.

Conclusion

The results of this study show that preschool teachers are well aware of ASD and that there is no stigma. In addition, it was confirmed that younger preschool teachers have greater knowledge and less stigma about autism spectrum disorder compared to older preschool teachers, although this difference was not found in terms of education attended and direct work experience. In addition, the majority of preschool teachers rated their own competence in working with children with autism spectrum disorder as neutral to slightly negative, but no relationship was found between self-rated competence and knowledge and stigma of autism spectrum disorder.

It is recommended that future research examining specific knowledge of autism spectrum disorder, including methods and techniques of working with these children, and in-service training on the subject be conducted to examine the impact of in-service training on knowledge and the impact of knowledge on feelings of readiness to work with children with autism spectrum disorder. In addition, the self-assessment of preschool teachers' competence in working with children with autism spectrum disorder and the possibility of implementing the knowledge acquired at school should be examined.

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Some insights into the development of morphological awareness: Examples of derivational morphology in Croatian

SUMMARY

Morphological awareness refers to children's ability to reflect on and manipulate morphemes and word formation rules (Carlisle, 1995). This linguistic awareness skill is important because it contributes to reading comprehension and vocabulary growth (Carlisle, 2007). Knowledge about derived word forms starts to develop in preschool and continues throughout the school years and beyond (Apel, 2014). A growing body of cross-linguistic research suggests that this development varies among speakers of different languages (e.g., Duncan et al., 2009; Kuo & Anderson, 2006). Therefore, this research aims to assess some aspects of development of morphological awareness in Croatian children and examine the relationship between morphological awareness and vocabulary. First and fourth graders from one elementary school in Zagreb were tested on a morphological awareness task and the Peabody Picture Vocabulary Test (Dunn et al., 2010). In the morphological awareness task, participants decided whether 20-word pairs were semantically connected. Half of the pairs were derivationally related words (e.g., zub – zubar), and the other half were foil pairs (words phonologically similar but not semantically related, e.g., šal – šalica). Results showed that age groups differed significantly in judging semantic relatedness of word pairs (Kolmogorov-Smirnov test, $Z = 1.68$, $p < 0.01$). While the first graders made some incorrect judgments ($C = 17.5$, $Q = 3$), the fourth graders "reached the ceiling" and correctly judged all the pairs ($C = 20$, $Q = 1.25$). Vocabulary size did not significantly correlate with results on morphological awareness tasks in either grade group (Spearman correlation = 0.22, $p > 0.05$). These results provide the first empirical evidence of age differences in understanding derived forms in Croatia. Additionally, they serve as a preliminary step for future research of various aspects of morphological awareness, the relationship between morphological awareness and vocabulary, and the impact of morphological skills on reading ability.

Keywords: *morphological awareness, derivational morphology, relational knowledge*

Introduction

Morphology defines how morphemes combine to form verified words in a particular language (Babić, 2002). Morphemes, which include roots and affixes, are the smallest units of language that have both form and meaning (Marković, 2013, p. 36). The root carries the core meaning of the word, while affixes either modify grammatical features of words (inflectional affixes, e.g., *glava – glave / sister – sisters*) or form new words (derivational affixes, e.g., *letjeti – preletjeti / lead – mislead*) (Barić et al., 2005; Marković, 2013; Yule, 2010). Thus, inflectional morphology examines how affixes modify grammatical features of words, while derivational morphology explores how new words are formed by adding affixes (Barić et al., 2005).

In Croatian psycholinguistic literature, much more is known about the acquisition of morphology than about morphological awareness. Morphological acquisition refers to unconscious morphological processing and the acquisition of morphological rules. This phenomenon is predominantly explained in the framework of the natural morphology theory in the Croatian language (Dressler, 2001; Dressler et al., 1996). According to this functionalist approach, morphological development occurs in phases and relates to the morphological structure of the language. Therefore, in speakers of morphologically richer languages, such as Croatian, the use of the first morphological markers (i.e., inflectional affixes) occurs very early (Hržica et al., 2015; Gülzow, 2003; Ketrez & Aksu-Koç, 2009; Kovačević et al., 2009) and continues throughout language development, which lasts a lifetime (Kuvač & Cvikić, 2003, 2005; Bošnjak Botica, 2016).

Morphological awareness is a metalinguistic ability that includes the ability to recognize, manipulate, and reflect on morphemes (Carlisle, 1995). This transition from unconscious processing and implicit knowledge of morphology to conscious reflection and explicit morphological knowledge occurs gradually (Karmiloff-Smith, 1986) and it is motivated by environmental demands for conscious reflection on language (Gombert, 1992). Although cross-linguistic data on the development of this ability are limited, recent research suggests that speakers of morphologically richer languages exhibit higher levels of morphological awareness at school age (Casalis & Louis-Alexandre, 2000; Duncan et al., 2009; Ku & Anderson, 2003). Children typically have a high level of awareness of inflectional morphology at the beginning of their school years (Berko, 1958; Carlisle & Nomanbhoy, 1993; Rubin, 1988; Smith-Lock, 1995). However, awareness of derivational morphology develops intensively during school age and continues into adolescence and adulthood (Anglin, 1993; Berninger et al., 2010; Carlisle & Nomanbhoy, 1993; Casalis & Louis-Alexandre, 2000; Nagy et al., 1993). Since awareness of derivational morphology is a predictor of language competencies, such as reading skill and vocabulary, studies on morphological awareness predominantly focus on this type of morphology.

24 Researchers have investigated the impact of derivational morphology awareness on language competencies using various tasks, resulting in methodological heterogeneity that complicates

the comparison of research results. In addition, using a limited number and type of morphological awareness tasks makes the assessment incomplete (Apel, 2014). According to Apel (2014), morphological awareness is a complex construct encompassing several aspects. Therefore, if research uses only one or a few tasks to assess morphological awareness, it is crucial to emphasize which aspect is being investigated.

Various authors classify aspects of morphological awareness differently. Among the prominent classifications is one proposed by Wang et al. (2006). According to these authors, morphological awareness includes four aspects: identification (the ability to identify morphemes within complex words), discrimination (the ability to distinguish morphemes from semantically or phonologically similar words), interpretation (the application of morphological knowledge to correctly interpret complex words), and manipulation (the application of morphological knowledge to produce appropriate word forms in certain contexts).

Among the aspects of morphological awareness mentioned above, the discrimination ability develops first (Tyler & Nagy, 1989). Since there is no research on the development of morphological awareness in speakers of Croatian, this study aims to investigate the level of discrimination ability in children at different school ages. By examining the first aspect expected to be acquired, we begin studies of morphological awareness in speakers of Croatian. Furthermore, exploring only one aspect of morphological awareness acknowledges the complexity of this skill and the need to examine each aspect separately before synthesizing knowledge into a complete picture of morphological awareness development.

The discrimination aspect of morphological awareness is often referred to as *relational knowledge* in literature. Tyler & Nagy (1989) proposed this term, defining it as the *ability to see the morphological relations between two words that share a common base morpheme* (p. 649). Since this knowledge is the first aspect of metamorphological knowledge to be acquired, it serves as the foundation for further development of morphological awareness. Moreover, it is one of the most important aspects contributing to vocabulary development in school-age children (Anglin, 1993; Duncan et al., 2009).

This aspect of morphological awareness is often assessed through a judgment task, where participants determine whether pairs of phonologically similar words are semantically related (e.g., *wash-washer, moth-mother*). In the related condition, the words are both morphologically and semantically related, while in foil pairs, there are no morphological or semantic relationships between the words. Several studies on relational knowledge in English have demonstrated that this aspect of morphological awareness develops from the first grade of elementary school through high school (Berninger et al., 2010; Carlisle, 1995; Carlisle & Nomanbhoy, 1993; Mahony et al., 2000; Nagy et al., 2006; Tyler & Nagy, 1989) and is a strong predictor of reading comprehension (Carlisle 1995, Kirby et al., 2012). The conducted studies indicate a general

relationship between vocabulary size and morphological awareness. However, Berninger et al. (2010) found vocabulary correlation in only two of four investigated types of morphological awareness. The development of relational knowledge during elementary school and its relationship with vocabulary size has also been observed in French (Casalis & Louis-Alexandre, 2000; Duncan et al., 2009) and Chinese (Ku & Anderson, 2003).

Furthermore, cross-linguistic research has revealed that the morphological structure of a language influences the level of relational knowledge among its speakers. For example, at an early school age, French speakers outperformed English speakers on the judgment task (Duncan et al., 2009). Conversely, English speakers in second, fourth, and sixth grades were more successful in judgment tasks than Chinese speakers of the same grades (Ku & Anderson, 2003). This cross-linguistic evidence suggests that the morphological structure of a language contributes to the development of relational knowledge. Consequently, this raises questions about how such knowledge develops in morphologically rich languages like Croatian and its relationship to vocabulary size.

Croatian is an inflectional language with a rich morphological structure (Marković, 2013; Babić, 2002). Derived words can be formed by adding prefixes and suffixes (Barić et al., 2005; Marković, 2013). Furthermore, derived words can be analyzed both morphologically and according to the type of word formation. In the analysis based on the word formation process, the base word and affixes are isolated. For example, the word *čistačica* (Eng. cleaner) is analyzed as *čistač-*, *-ica* (Barić et al., 2005). Non-derived words are those not connected to any other word through the word formation process, such as *kadulja* (Eng. sage) (Barić et al., 2005). When a derived word is analyzed morphologically, the root, derivational affixes, and inflectional affixes can be distinguished. For example, the word *čistačica* (Eng. cleaner) has four morphemes: *čist-*, *-ač-*, *-ic-*, *-a*. The first is a root, *-ač-* and *-ic-* are derivational suffixes, and *-a* is an inflectional suffix. All words that share the same root belong to the same family of words related by a word formation process (Barić et al., 2005). For example, the root *bol* (Eng. pain) can be found in numerous related words such as *bolnica* (Eng. hospital), *boljeti* (Eng. hurt), *bolest* (Eng. illness), *bolesnik* (Eng. patient), etc. (Kovačević et al., 2009). According to Kovačević et al. (2009), this productivity of derivational morphology likely influences the acquisition of vocabulary and morphology in speakers of Croatian.

Moreover, research on the mastery of vocabulary and morphology among speakers of Croatian as a foreign language has confirmed that these speakers rely on the morphological structure of words to derive the meaning of unknown words (Cvikić, 2007). Also, these speakers develop sensitivity to morphological relationships between derived word forms (Cergol Kovačević & Cvikić, 2012). Cvikić (2010) reported that affix features, such as frequency, meaning, and transparency, influence the lexical retrieval of derived words in non-native speakers. Since these

findings were obtained from speakers who consciously learn Croatian morphology, they also reflect the development of morphological awareness in this population. Nevertheless, there is a lack of research data on the development of morphological awareness in native speakers of Croatian. To date, most research on the metalinguistic abilities of these speakers has focused on another metalinguistic ability—phonological awareness. This ability has been found to affect reading fluency (e.g., Kolić Vehovec, 2003), accuracy (e.g., Blaži et al., 2011), and speed (Kelić et al., 2021). Consequently, it has been studied in children of different ages (e.g., Kolundžić & Drkulec, 2007; Šimek, 2016) and in various clinical populations (Blaži et al., 2011; Ivšac Pavliša & Lenček, 2011; Kelić, 2019; Planić, 2022; Sardelić et al., 2007; Ščapec & Kuvač Kraljević, 2013).

Therefore, initiating studies on morphological awareness in native speakers of Croatian is crucial. Since relational knowledge is one of the first aspects of this complex ability to develop, this study aims to gain insight into its development and its relationship to vocabulary size in native Croatian speakers.

Objective

The objective of this study is to investigate the relational knowledge of native Croatian speakers in different grades of primary school and to determine its relationship with the size of children's vocabulary.

Research Problems and Hypothesis

The first research question is whether children in fourth grade achieve the ceiling effect on the measure of relational knowledge and whether there are qualitative differences in relational knowledge of children in first and fourth grade. The second research question is whether relational knowledge is related to vocabulary size in first and fourth grade.

Hypotheses

Children in fourth grade achieve the ceiling effect on the measure of relational knowledge, and there are qualitative differences in relational knowledge of children in first and fourth grade.

Relational knowledge is related to vocabulary size in both grade groups of participants.

Methods

Participants

The participants were children attending first and fourth grades of elementary school in Zagreb. Each grade level included 30 participants, all of whom were typically developing. Language abilities were assessed using the Test for Reception of Grammar – 2nd Edition (TROG-2:HR, Bishop, Kuvač Kraljević et al., 2014) and the Peabody Picture Vocabulary Test

(PPVT-III-HR; Dunn, Dunn, Kovačević et al., 2010). Non-verbal abilities were assessed using Raven's Colored Progressive Matrices (Raven et al., 1999) and Standard Progressive Matrices (Raven et al., 1999). All participants scored average on all language and cognitive measures.

Materials and Procedures

Relational knowledge was assessed using a judgment task specifically developed for this study. The task included 20 items, i.e., 20-word pairs (see Appendix 1). To ensure that all participants were familiar with the words included in the task, medium to high-frequency words from first grade vocabulary were selected according to the school written language corpus (*Školski korpus pisanog jezika* – RyDDis, Kuvač Kraljević & Lenček, 2020).

Half of the pairs (N = 10) consisted of morphologically and semantically related words. In nine pairs, the first word was the base of the derived second word. In one pair, the second word was not derived from the first, but the first word was its root (*dah* – *uzdahnuti* / *breath* – *to breathe in*). This pair was included due to the limited number of frequently derived words in the first-grade corpus (*Školski korpus pisanog jezika* – RyDDis, Kuvač Kraljević & Lenček, 2020). Therefore, it was not possible to find enough derived forms with a frequent base word containing only one morpheme. The derived forms in the related condition included nouns (N = 5) and verbs (N = 5).

In the foil pairs (N = 10), the first word was a string of phonemes from the second word. More precisely, the first word was not a morphological building block of the second, complex word (*šal* – *šalica* / *scarf* – *cup*), meaning that these words were not semantically related. The second words in the foil pairs also included nouns (N = 4) and verbs (N = 6).

The related and foil pairs were randomly presented to the participants. The instruction (*You will hear two words in a pair. Tell me if you think these two words have a similar meaning.*) was presented orally to the participants. In addition, word pairs were presented orally, and the participants provided oral yes/no responses. The task was administered individually to each participant without a time limit for answering. Before administering the task, all participants practiced with the task administrator.

Vocabulary size was assessed using the Peabody Picture Vocabulary Test. This test measures receptive vocabulary, requiring the participant to select one of four presented pictures that represents the target word. The target words were presented orally by the test administrator.

Results and discussion

The research results were analyzed quantitatively using IBM SPSS Statistics 26. The normality of distribution was tested with the Kolmogorov-Smirnov test. The test revealed that the distribution of the relational knowledge variable deviated from normal distribution ($p < 0.05$),

while the vocabulary size variable followed a normal distribution ($p > 0.05$). Given that one variable deviated from the normal distribution and the sample size was small, nonparametric tests were conducted.

Descriptive statistics for the judgment task results are shown in Table 1. Minimum (min), maximum (max), median (C), and interquartile range (Q) were calculated for both grade groups.

Table 1. Descriptive statistics for the relational knowledge variable.

	Min	Max	C	Q
1 st grade	10	20	17.5	3
4 th grade	16	20	20	1.25

As shown in Table 1, all participants achieved high accuracy rates on the judgment task. The median score for first grade children was 17.5, while fourth grade children reached the ceiling, correctly judging all the pairs. Although the group difference is small, the Kruskal-Wallis test indicated that it is statistically significant ($z = 1.68$; $p < 0.01$). Further analysis revealed that first grade children primarily made errors in judging the semantic relatedness of foil pairs (e.g., *šal – šalica / scarf – cup*; *grm – zagrmjeti / bush – to thunder*). Similar errors in younger children were also reported by Carlisle & Nomanbhoy (1993), who suggested that younger children might be inclined to give positive responses. In addition, these errors may reflect a lower level of general metalinguistic abilities in younger children (Fowler et al., 2003).

These findings suggest that while relational knowledge is high among first grade children, it is still developing. By fourth grade, this knowledge appears to continue developing, likely due to schooling and mastery of written language skills. These results partially corroborate findings from studies on relational knowledge in speakers of other languages at the fourth-grade level. For instance, Berninger et al. (2010), Ku & Anderson (2003), and Nagy et al. (2006) found that fourth grade speakers of English and Chinese also achieved high accuracy rates on judgment tasks, with over 80% correct answers. However, none of these studies reported a ceiling effect, even in higher grades, such as sixth or eighth grade (Nagy et al., 2006). This suggests that the rich morphological structure of Croatian might contribute to the earlier development of relational knowledge. However, to fully understand relational knowledge in Croatian-speaking fourth graders, further comprehensive investigation is needed on this aspect of morphological awareness.

Moreover, comparisons of research findings should be approached with caution due to substantial methodological differences between studies. For example, Ku & Anderson (2003) and Mahony et al. (2000) used 20 items in their judgment tasks, whereas Berninger et al. (2010) and Nagy et al. (2006) used 80 items. Additionally, the studies differed in the phonological trans-

parency of derived forms in the word pairs. In phonologically transparent derived words, the addition of an affix does not alter the phonological form (e.g., *kuća* - *kućica* / *teach* - *teacher*), while semi-transparent forms involve phonological changes (e.g., *majka* - *majčica* / *close* - *closure*) (Marković, 2013; Apel et al., 2013). The studies by Ku & Anderson (2003) and Nagy et al. (2006) included only phonologically transparent derivatives, whereas Mahony et al. (2000) included mostly semi-transparent derivatives. Since the phonological transparency of derived forms affects accuracy rates on the judgment task, it is uncertain whether Croatian speakers would perform similarly if semi-transparent words were included.

In light of these considerations, the first hypothesis is supported, as fourth grade children reached the ceiling effect and there are qualitative differences in relational knowledge between first and fourth grade children.

The second aim of this research was to determine whether vocabulary size correlates with relational knowledge among Croatian speakers. Spearman's rank correlation coefficient was calculated, and no significant correlation was found between these two variables in any of the grade groups ($r = 0.22$, $p = 0.24$ for both grade groups). Therefore, the second hypothesis was rejected. This lack of correlation was surprising and contrary to most studies that have examined this phenomenon (Berninger et al., 2010; Ku & Anderson, 2003; Mahony et al., 2000; Nagy et al., 2006).

However, differences in the vocabulary measures used in these studies may account for this discrepancy. For example, Berninger et al. (2010), Ku & Anderson (2003), and Mahony et al. (2000) examined expressive vocabulary and word knowledge, while Duncan et al. (2009) focused on receptive vocabulary, and Nagy et al. (2006) investigated reading vocabulary. Future studies should specify the type of vocabulary knowledge assessed. Additionally, it is crucial to identify the specific aspect of morphological awareness that correlates with vocabulary.

The results of this study suggest that receptive vocabulary is not related to relational knowledge in Croatian. It is possible that the correlation between receptive vocabulary and relational knowledge is underestimated in this study due to the smaller sample size and characteristics of the relational knowledge task (e.g., fewer task items and phonological transparency of derived forms). Furthermore, Nagy et al. (2006) argue that the proportion of morphologically complex words increases as word frequency decreases, suggesting that as children progress through grade, they encounter more morphologically complex words. This feature may be language-specific; therefore, a more detailed investigation of the Croatian lexicon is necessary to better understand the relationship between vocabulary and morphological awareness in Croatian. It is possible that, in Croatian, relational knowledge correlates more with measures of vocabulary depth (e.g., knowledge of multiple meanings of a word, ability to use a word in various contexts) rather than vocabulary breadth, i.e., vocabulary size.

This study has three limitations. The first is the small size of participants. The second limitation is the focus on only one type of vocabulary skill—receptive vocabulary. Future studies should include additional lexical measures, such as active vocabulary size or other aspects of lexical knowledge. The third limitation is the number of items used to assess relational knowledge; expanding the scope of this task would be beneficial. To fully understand the development of this aspect of morphological awareness and its relationship to vocabulary among Croatian speakers, future research should incorporate a broader range of measures. Furthermore, it is important to investigate how relational knowledge, along with other aspects of morphological awareness, impacts other language abilities in native speakers of Croatian.

Conclusions

This study provides the first insight into the development of an aspect of morphological awareness in native Croatian speakers. Relational knowledge, the initial aspect of morphological awareness, forms the foundation for the further development of this important metalinguistic skill. The findings indicate that Croatian speakers exhibit a high level of relational knowledge early in their schooling. This knowledge continues to develop through fourth grade, likely as a result of formal education and the acquisition of reading and writing skills. Also, the study found no significant correlation between relational knowledge and the size of receptive vocabulary in Croatian. This suggests that the ability to recognize morphological relations between words may be associated with other vocabulary skills, such as the depth of vocabulary.

Acknowledgments

We would like to thank all the respondents and their parents for their participation in this study.

Appendix 1. *Word pairs from the judgment task.*

Related pairs	Foil pairs
ZUB – ZUBAR (tooth – dentist)	MAČ – MAČAK (sword – cat)
SLIKA – SLIKANJE (picture – painting)	ŠAL – ŠALICA (scarf – cup)
LOV – LOVAC (hunting – hunter)	KAP – KAPICA (drop – little cap)
IGRA – IGRICA (game – little game)	RAD – RADOST (work – joy)
ŠTAP – ŠTAPIĆ (stick – little stick)	BRAT – UBRATI (brother – to collect)
LET – DOLETJETI (flight – to fly to)	BOR – ZABORAVITI (pine – to forget)
BROJ – NABROJATI (number – to list)	GRM – ZAGRMJETI (bush – to thunder)
GOVOR – PROGOVORITI (speech – to start speaking)	PAS – OPASNOST (dog – danger)
DAH – UZDAHNUTI (breath – to breathe in)	NOS – DONOSITI (nose – to bring)
RED – POREDATI (row – to order)	GRAD – NAGRADITI (city – to award)

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Potential for implementation of new technologies in aphasia assessment and treatment - a speech-language pathologists' perspective

SUMMARY

In today's world, the usage of information and communication technologies is inevitable. Therefore, it is crucial to implement new technologies in everyday speech-language pathology practice. However, little is known about speech-language pathologists' views on the subject. This research aims to gain insight into the everyday practice of Croatian speech-language pathologists employed in the public healthcare system, with expertise in working with people with aphasia. The goal is to explore the potential for the implementation of new technologies in the assessment and therapy of acquired communication, speech and language difficulties following a cerebrovascular incident. The emphasis is set on using high-tech means of augmentative and alternative communication. This study investigates how Croatian speech-language pathologists conduct aphasia assessment and treatment, what experiences Croatian speech-language pathologists have regarding the use of new technologies with people with aphasia, and what features and functions of high-tech means of augmentative and alternative communication Croatian speech-language pathologists find useful. To answer research questions, in-depth interviews were conducted. After completing the recruitment questionnaire, six Croatian speech-language pathologists employed in public hospitals and rehabilitation centres were selected. The interview consisted of twenty open-ended questions that encouraged respondents to share their knowledge and talk about their professional experiences, problems in everyday practice, opinions and ideas. Interviews were transcribed and analysed according to qualitative research methodology. Participants pointed out segments of their workflow that new technologies could optimize. They also stated necessary specifications which can be used for the development and design of devices and applications for people with aphasia.

Keywords: *augmentative and alternative communication, aphasia, speech-language pathologists, in-depth interviews, qualitative research*

Introduction

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Cerebrovascular incident is one of the leading causes of death and acquired disability in

the Republic of Croatia (Hrvatski zavod za javno zdravstvo, eng. Croatian Institute of Public Health, 2022) and the world (Feign et al., 2022). According to statistics, every fourth person in the population will experience a stroke, and every third stroke survivor will be diagnosed with aphasia (Grönberg et al., 2022). Aphasia is an acquired language disorder, usually secondary to a stroke in the left hemisphere perisylvian region (Greenwald & McCarney, 2017), characterized by impaired language comprehension and production and reading and writing difficulties, which can significantly disrupt functional communication. In addition to the usual therapeutic approaches and procedures, technological advances have enabled the development of new solutions for people with aphasia (PWA). Augmentative and alternative communication (AAC) strategies aim at replacing, supporting or supplementing preserved language and speech abilities (Greenwald & McCarney, 2017). Bibliometric analysis done by Asghar et al. (2021) gave insight into various digital solutions for PWA, from communication aids to online platforms for speech and language therapy and even augmented and virtual reality. Russo et al. (2017) reviewed high-technology means of AAC for adults with post-stroke aphasia. They concluded that AAC systems may be an effective tool for improving communication and social participation of adults with post-stroke aphasia, but "the practical application of AAC interventions as a compensatory tool remains still in the developmental stage" (pg. 366). Dietz et al. (2020), as they stated, proposed "a thought-provoking viewpoint on the role of AAC in post-stroke aphasia rehabilitation" (pg. 1). They emphasized that AAC can be used to empower PWA and help them to participate in everyday activities with more independence. When it comes to the implementation of new technologies in aphasia assessment and treatment, many questions about its features arise. One of the most important is availability and practicality, and research done with speech-language pathologists (SLPs), occupational therapists and communicative disorder assistants showed that "smart mobile devices are garnering acceptance as a promising platform for high-tech AAC" (Moffatt et al., 2017; pg. 115). Nichol et al. (2023) conducted a qualitative study using semi-structured interviews to look into SLPs' viewpoints on the potential use of technology to support aphasia self-management. They identified that the implementation of new technologies could expand service delivery options, resulting in increased frequency and intensity of speech and language therapy, along with facilitating functional communication of PWA.

Research problem, objective and research questions

The literature search did not reveal any work describing and interpreting the experiences and daily challenges of SLPs who work with PWA within the public healthcare system in the Republic of Croatia. We recognized the need for research on this neglected aspect of speech-language pathology (SLP) practice.

The aim of the research is twofold: (1) to gain insight into the everyday practice of Croatian

SLPs employed in the public healthcare system who work with PWA, with an emphasis on the use of high-tech means of AAC, and (2) to explore the potential for implementation of new technologies in the assessment and therapy of acquired communication, speech and language difficulties following a cerebrovascular incident.

Accordingly, the following research questions were defined: (1) How do Croatian SLPs conduct aphasia assessment and treatment? (2) What experiences do Croatian SLPs have regarding the use of new technologies with PWA? (3) What features and functions of high-tech means of AAC Croatian SLPs find useful?

Methods

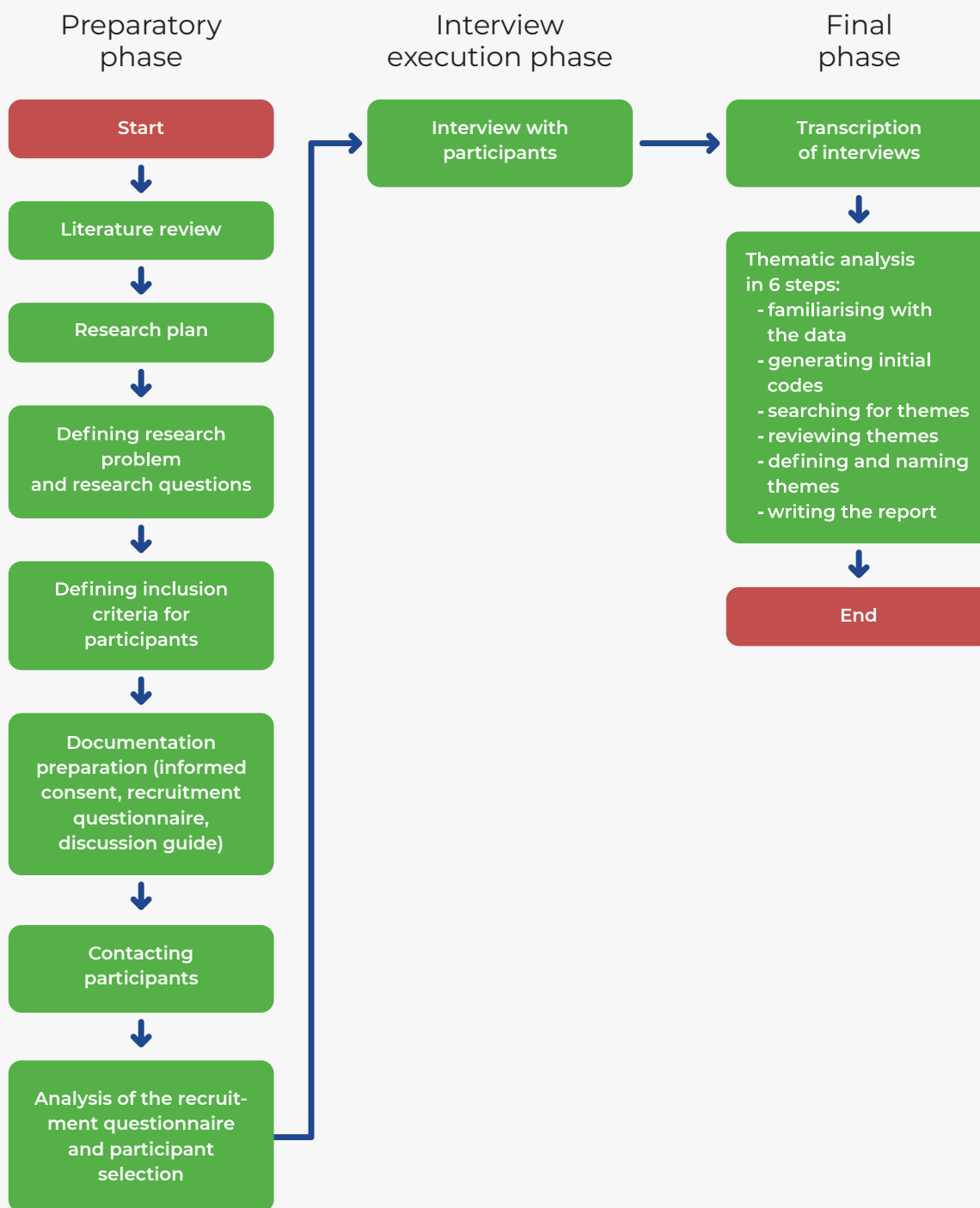
Since the research aims to describe, interpret and understand the subjective experience of SLPs who work with PWA, a qualitative research design was developed (Milas, 2009), and the method of problem-oriented, i.e. in-depth interview was chosen for data collection (Halmi, 2005). In addition to providing the researchers with an opportunity for initial familiarization with the problem (Milas, 2009), we chose this method because it allows research participants to spontaneously express their own opinions, attitudes and feelings and to explain their own behaviour in relation to the defined research problem (Halmi, 2005). Qualitative methodology applies in both market research and user experience research (UX research). Both mentioned research types aim to identify, investigate and describe the interests and needs of users (Rosala, 2022).

As can be seen in Figure 1, the research was carried out in three phases. In the preparatory phase (Halmi, 2005), we reviewed the literature related to the research problem. Secondly, we developed a detailed research plan. The research problem and research questions were defined, as well as inclusion criteria for participants. We prepared research documentation, including informed consent, a recruitment questionnaire and a discussion guide. The recruitment questionnaire contained demographic questions and questions about daily SLP practice to check whether the participants met the inclusion criteria for the research. The script consisted of 20 open-ended questions divided into three thematic units (Appendix 1). The problem-oriented interview had the form of a funnel, which means it consisted of general probing questions that gradually entered the conversation and thematic questions directed towards the core of the research problem (Halmi, 2005). The questions were formulated to encourage the participants to talk about specific experiences from working with PWA, define the problems they think need to be solved, and share their insights and ideas on improving daily practice. A recruitment questionnaire made in Google Forms was e-mailed to SLPs employed in the public healthcare system, whom the authors knew worked with PWA, together with an informed consent document. After analysis of the recruitment questionnaires, research participants were selected, and interview dates were scheduled, after which the in-

interview phase began (Halmi, 2005). The interviews were conducted in February 2022 via the Zoom virtual platform due to the current epidemiological situation caused by the COVID-19 pandemic and the geographical distance between researchers and participants. The interviews were conducted until theoretical saturation (Strauss & Corbin, 1990, as cited in Milas, 2009), i.e. until the same patterns began to repeat in the participants' answers. All interviews were recorded for subsequent transcription and analysis. The interviews were conducted by the second author, a user experience researcher, who did not previously know the participants, while the first author, an SLP, took notes during the interviews. Interviews lasting up to 60 minutes were subsequently transcribed in the final phase of interview execution (Halmi, 2005). Transcription was carried out by both authors and the process lasted approximately 24 hours (4 hours of transcription for 1 hour of audio). Quality of the audio recordings was optimal, so there were no difficulties during the process. The authors reviewed the transcripts before analysis. A thematic analysis of the collected data was carried out in 6 steps, which include: (1) familiarising with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) writing the report (Braun & Clarke, 2006). The data were analysed manually using the computer program Microsoft Word and the online collaboration platform Miro for content and data visualisation.

The research was conducted in accordance with the rules of the ethical code of the University of Zagreb. Before the research started, the procedure was described in detail to the participants, and they signed the Informed Consent to participate. Participation in the research was voluntary. Data confidentiality was respected throughout the entire research process and in the presentation of the collected data.

Figure 1. Phases of conducting the research



Participants

Purposive or judgment sampling (Petz et al., 2012; Milas, 2009) was used to choose research participants. The sample consisted of six SLPs employed in the public healthcare system in Croatia. Research participants were selected based on the answers from the recruitment

questionnaire. The participants met the following inclusion criteria: (1) completed study of speech-language pathology, (2) working in a public healthcare institution (clinic, polyclinic, rehabilitation institution, health centre), (3) a minimum of three years of working experience with people with acquired communication, language and speech difficulties after a stroke, (4) a minimum of 51% of working time in direct work with patients, (5) a minimum of ten patients with aphasia currently involved in SLP therapy, and (6) conducting SLP assessment and treatment in a daily practice. Of the six participants, four completed graduate studies in SLP (MSLP), one earned the title of Master of Science (MSc), and one got the doctoral degree (PhD). In Croatia, a small number of SLPs work with PWA, and are well known in the SLP community. In order to protect the identity of the participants, further information (e.g. age, years of working experience, place of work, name of the institution), although known to the authors, is deliberately not presented in this paper.

Results and Discussion

The thematic analysis of the data collected through the interviews defined three main themes and nine sub-themes, as shown in Table 1. The first theme covers the daily experiences of SLPs who carry out SLP assessment and treatment of PWA. The second theme refers to the experiences of SLPs with the use of high-tech means of AAC in working with PWA. The third theme summarizes the (un)desirable features and functions of high-tech means of AAC and offers guidelines for developing new technological solutions for SLPs and PWA.

Table 1. *Main themes and sub-themes of research*

	Main themes	Sub-themes
Theme 1	Everyday work of SLPs with PWA in the public healthcare system	Conducting SLP assessment
		Conducting SLP treatment
		SLPs' perception of PWA
Theme 2	Experiences of SLPs with the use of high-tech means of AAC in working with PWA	Acceptance of high-tech means of AAC by PWA
		Independence of PWA when using high-tech means of AAC
		Experience with already existing solutions
Theme 3	Potential for implementation of new technologies in aphasia assessment and treatment	Features and functions of devices or applications that facilitate the work of SLPs
		Features and functions of devices or applications that make the work of SLPs difficult
		The role of communication partners

Theme 1: Everyday work of SLPs with PWA in the public healthcare system

One of the goals of conducting user interviews is to define a problem for which a solution needs to be designed. With this goal in mind, the researchers get to know the research participants, i.e. potential users, and learn about their experiences, needs and motivation through an in-depth interview. The first theme covers the everyday struggles of SLPs working with PWA in the public healthcare system. In their answers, the SLPs described their work routine, which consists of planning work duties, conducting SLP assessment and treatment, communicating with the multidisciplinary team of experts participating in the rehabilitation process, and performing administrative tasks that include writing reports and entering data into the hospital information system (cro. Bolnički informatički sustav - BIS).

Depending on the type of healthcare institution where the participants are employed, they encounter patients in different stages of illness, i.e. recovery. Therefore, they reported different ways of conducting SLP assessment and diagnostics, which is the first step in rehabilitation. Common to all answers is that all SLPs evaluate the characteristics of communication, language comprehension and production, voice, speech, swallowing, reading and writing in patients suspected of having aphasia after a stroke. A participant employed at the neurology clinic, more precisely in the intensive care unit, emphasized the importance of triage: *"...already at the staff meeting I find out which new patients are admitted, and by inspection of the hospital's information system and going personally to each of the departments, I check which of the patients would be suitable for initial contact, according to triage criteria."* (S1). She also described how she conducts the initial SLP assessment at the patient's bedside: *"First, state of consciousness, orientation, personal data, naming, execution of simple functions, automatisms. There are no standardized tests regarding this in the Republic of Croatia. They do not exist."* (S1). The problem of the lack of a standardized test or protocol for assessing communication, language and speech abilities in the acute phase after a stroke was also discussed by the participants employed in a rehabilitation facility: *"These first meetings with patients, since we are dealing with such difficult patients, are in the patients' rooms... where these first assessments are done, the so-called bedside assessments. Since we don't have standardized tests in Croatia to assess and diagnose aphasia in this acute phase, we use what we and our patients find the most convenient to work with. We translated some bedside tests that refer to what is important to us when first meeting."* (S2). All the participants stated that in the diagnostics procedure, in addition to their own clinical judgment, they rely on the results of standardized language tests - the Peabody Picture Vocabulary Test (PPVT-III-HR; Dunn et al., 2010) for evaluating receptive vocabulary, and the Test for Reception of Grammar (TROG-2:HR; Bishop et al., 2014), which examines the understanding of different syntactic structures. They singled out the Comprehensive Aphasia Test (CAT-HR; Swinburn et al., 2020), which assesses all four language domains (comprehension, production, reading and writing)

in people who have experienced a stroke: *"It is one test that is quite comprehensive and long, but it's great for us. It doesn't give us aphasia type, but actually gives us an insight into the state of language..."* (S2). In addition to standardized tests, non-standardized tests are also in daily use: *"And we also use non-standardized materials, which we actually somehow created over time for patients with aphasia. There is a Token test, translated into Croatian, but not standardized. As well as the Palpa test, which we use in our daily assessments."* (S4).

SLPs base their treatment on the results of an SLP assessment: *"When it comes to therapy, later therapy is created according to the results of all those tests and is actually adapted to each patient in a certain situation."* (S4). It means that SLPs define the rehabilitation goals according to the impaired functions. They select and create therapeutic procedures while taking into account the strengths of each patient: *"I personally use a total approach in therapy. Therefore, I use all possible means and methods in rehabilitation that show results in the recovery of a given patient. So, we use a lot of non-verbal communication, assisted communication, and all possible compensatory means in order to achieve successful communication, total communication, transfer of information and mutual understanding... all possible techniques that facilitate the recovery of lost functions. So, we do some kind of, I would say, psycholinguistic approach in rehabilitation where we recover certain lost functions, but also a compensatory approach where we use different preserved abilities to compensate for the lack and succeed in bringing functional communication to a satisfactory level... both from my side and from the patient and his family."* (S5). It is important to emphasize that in their treatment SLPs, in addition to acquired language difficulties, also focus on motor speech disorders and swallowing difficulties, which often occur as comorbidities.

The interviewed SLPs described the group of PWA as highly heterogeneous. They singled out that one of the main features that SLPs must adapt to is the variability of the clinical picture: *"This kind of adaptation is something that is extremely important to us, and I think that every SLP who works with PWA needs to be very adaptable to those changes. Because change is something that is actually constant in our work."* (S4).

The participants unanimously agreed that the main problem they face in their daily practice is too many patients and too little time. In addition to the above, they complained about a lack of materials adapted to adults: *"By the way, in Croatia, very few SLPs deal with the rehabilitation of adults, and we have very few materials to work with, unlike children where there are numerous exercise books, various things adapted to working with children."* (S2). They also lamented on the lack of solutions adapted to the individual needs of patients and the modern way of life: *"Because everything is moving forward. And people are looking for something else, aren't they? Not everybody is satisfied by a pen, paper, or picture in front of him."* (S2).

In brief, the participants mutually agreed that in everyday practice they have too many pa-

tients and very little time, so they have to be very fast and well-organized. In assessment and treatment, they use standardized, non-standardized and sometimes even improvised methods. Due to the heterogeneity of the group of PWA, SLPs have to be flexible and adaptable, as well as methods and materials used. SLPs pointed out that they miss a standardized protocol for bedside assessment and more materials adapted for adults.

Theme 2: Experiences of SLPs with the use of high-tech means of AAC in working with PWA

All participants shared their experiences with using high-tech means of AAC in working with PWA. The SLPs concluded that accepting high-tech means of AAC depends on several factors such as age, severity of impairment, level of education, profession, previous experience with the use of technology, personal interests and worldview. One participant summed up her experience with using new technologies in working with PWA: *"So, we use those exercises on a tablet, which are very, very convenient for us, but I must emphasize that the older population is reluctant to accept a tablet or a computer. So, they still prefer paper and pen, a picture on paper, etc."* (S2). On the other hand, another participant observed that the openness towards the use of new technologies is greater today than ever before, which she connected to the decreasing chronological age of patients recovering from a stroke, but also to the pandemic of the disease COVID-19, due to which many activities of daily life relocated into a virtual environment: *"Well, everything is better, unlike five or ten years ago. Now they are much more open, and even those who do not have a computer or had no experience with it during their working life, open up a lot to it. I think this pandemic has actually made it possible to take a big step in that direction. I also have to mention that I have noticed that in the last two years of the pandemic, younger people come to us for therapy more often. Also, the patients' age has been lowered. Now we have patients who are twenty years old, or younger, whereas in the past, the patients were usually older than sixty-five."* (S5).

Regarding the independence of PWA when using high-tech means of AAC, SLPs agree that, in addition to the previously mentioned factors that influence their acceptance, it also depends on the severity of the impairment, language comprehension, phase of recovery and comorbidities such as hemiparesis and visual neglect. They state that PWA definitely need help with programs and applications installation and adaptation, and they necessarily need training in using them. This is in line with the universal attitude that digital solutions for speech therapy are best used under the surveillance of SLPs who can adjust them to suit the specific needs of PWA (Asghar et al., 2021).

The participants shared their own experiences with using applications created within the framework of the ICT-AAC project (for more information, visit www.ict-aac.hr). Most of them are satisfied with the "Language-Speech Exercise" application (cro. "Jezično-govorna vježbal-

ica"), intended for PWA, as well as the "Vocals" application (cro. "Glaskalica"), which was developed for children, but according to the examined SLPs proved to be suitable in working with PWA, too. The examined SLPs do not use the "Communication Keys" application (cro. "Komunikacijski ključevi"), because both they and PWA perceive it as unpractical and confusing. Opinions about the "Communicator+" application are divided. The participants agree that most PWA find the application confusing and hard to navigate and that PWA do not like pictograms, but prefer photographs: *"As for those communicators, they are not the best solution in my opinion for PWA because it's a lot of pictures, tiny pictures, and it's too much for them."* (S2). Applications in foreign languages are used exceptionally, usually when working with multilingual speakers. However, they mentioned some positive features of the "Lefor" application developed in the Bosnian language. Hierarchical organization of tasks according to language domains, task types and task difficulty, and the pairing of images and sounds are singled out as good functionalities, while too small drawings are perceived as something that should be changed in the application.

In short, all of the participants use high-tech means of AAC with PWA, and some provide teletherapy. They have opposite experiences. On one hand, they noticed that the older population is reluctant to accept new technology, but on the other hand, younger patients show interest in using somehow advanced and more modern solutions. SLPs agree that it is necessary to utilize technological achievements and develop modern solutions for PWA.

Theme 3: Potential for implementation of new technologies in aphasia assessment and treatment

The interviewed SLPs expressed interest in new high-tech solutions that could facilitate daily work with PWA and presented their own ideas. Primarily, SLPs are interested in an application that would make it easier for them to carry out assessment and diagnostics, especially in the patient's room: *"It is necessary to create some good application where, first of all, I will be offered specific diagnostic tasks. Let's say that the tablet can have a diagnostic form for assessment for PWA. So, when I go to the patient's room, I can go with the tablet and simply do the assessment."* (S3). Also, they believe that new technologies could serve to automate the previous methods of SLP assessment, which would make the whole process faster, simpler and more objective: *"So, it could be audio-recorded and they could monitor their progress... they could have audio-records of their speech, and in some way, the computer could keep track of their success... the program could present results objectively... calculate itself... and give some objective measures of progress."* (S5). One of the ideas concerns the storage and sharing of data between the SLP and the PWA using, for example, cloud storage: *"Maybe it would be convenient, for example, to have a virtual place where the SLP and the patient could be together, enter their content, which at that moment they are dealing with in ther-*

apy. And to have a place where progress information could be entered. Now, whether that information would be numerical or descriptive is something that needs to be determined." (S4). Respondents believe that the option of a social network that connects PWA, SLPs and communication partners could improve the user experience but also positively influence the motivation of PWA: *"It's okay for them to communicate with the therapist and maybe with each other, to connect with people who have experienced the same things as them, to know that they are not the only ones, to know that there are people who have succeeded in rehabilitation, who have achieved good results and so on because that motivates them to continue."* (S2).

Participants listed numerous features and functions of devices and applications that make it difficult for both SLPs and PWA to use them, such as poor ergonomics of the device, technical difficulties, complexity of the application, poorly designed graphic interface with too much content, small images and little letter font. In addition, they mentioned that they are not interested in time-consuming and expensive products.

The SLPs agree on the importance of communication partners' role, especially family members, in using high-tech means of AAC with PWA: *"Well, I think that a family member should be an equal partner in therapy, just as we are equal partners in classic speech therapy; should be in constant communication with the therapist and through an agreement with the therapist and the patient, content could be created and used as well as the offered technological possibilities."* (S4).

In summary, SLPs state that an application for PWA must have the following features: a simple and intuitive graphic interface, the functionality of personalization and fast data entry, the possibility of conducting standardized speech and language tests using the application, progress tracking paired with a comprehensive overview of quantitative and qualitative patient data, and option of connecting PWA with SLPs. SLPs seek features that could motivate PWA for speech-language therapy, and see mobile gadgets as good tools for providing assessment and treatment, especially for doing it in a patient's room or at home. In addition, as in the research by Nichol et al. (2023), Croatian SLPs recognized personal, professional and organizational obstacles that need to be addressed while developing aphasia-friendly technological solutions.

Limitations and recommendations for further studies

This study focuses specifically on SLPs working with PWA within the public healthcare system in Croatia. While these participants provide valuable insights, the findings may not be generalizable to SLPs in other countries or those working in private practice settings with different resources and priorities. The data collected through in-depth interviews rely on self-reported experiences and perceptions of the participants. There is a possibility of response bias, where participants may provide socially desirable responses or overstate their usage of technology.

Future research could benefit from a larger and more diverse sample of SLPs, including those from different countries, healthcare sectors (public and private), and levels of experience. This would provide a more comprehensive understanding of attitudes and practices regarding technology use with PWA. Furthermore, combining qualitative insights with quantitative data could offer a more comprehensive understanding of the factors influencing the adoption and effectiveness of technology in SLP. Surveys, observational studies, and usability testing could complement the qualitative findings from interviews.

Conclusion

This paper is the first to describe the experiences and daily challenges of SLPs working with PWA in the public healthcare system in Croatia. Until recently, this aspect of SLP practice was insufficiently represented and studied. With the increased occurrence of cerebrovascular incidents in the general population, the lowering of the age limit, the recognition of the consequences of stroke and the development of treatment and rehabilitation methods, the role of SLPs in neurological rehabilitation is gaining more and more importance. Communication is a basic human need and a fundamental human right. Therefore, SLPs, as experts in communication, language and speech, help PWA to achieve functional communication. In the spirit of the century of technology in which we live, the emphasis of this research is placed precisely on the implementation of new technologies in SLP assessment and treatment aimed at PWA. Croatian SLPs recognize the potential of introducing new technologies into daily work with PWA and are open to new solutions. In conclusion, the following statement summarizes SLPs' desire and need for new solutions on the market: *"I believe that, if such a thing existed, the SLPs would rush to use it."* (S1).

Acknowledgments

The research was conducted during the development of the student startup project "TONGUEO". We want to thank Matija Srbić, head of "SPOCK" - the startup incubator of the Faculty of Electrical Engineering and Computing at the University of Zagreb, for his unconditional support throughout the entire research and development process of the "TONGUEO" project. We thank Filip Sviben for mentoring the market research task and helping with the research plan. We are thankful to project team members Veronika Žunar and Luka Matijević for their constructive comments on the research results. We are most grateful to the research participants whose shared experiences and thoughts enabled us to understand the topic and direct our further work.

The work was presented in May 2023 at the 10th International Conference: Research in Educational and Rehabilitation Sciences ERFCON 2023, which took place in Zagreb, Croatia.

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Misconceptions in speech-language pathology

SUMMARY

Misconceptions, defined as beliefs that contradict accepted scientific facts (Dellantonio & Pastore, 2020; Taylor & Kowalski, 2004), are prevalent in various scientific fields, including speech-language pathology (SLP). In SLP, misconceptions are statements about developmen-

tal and acquired speech, language, and communication disorders that conflict with theoretically sound concepts and established scientific research. This study aims to identify the most common misconceptions among Croatian SLPs and to assess whether years of work experience and work system influence the development of item- and domain-level misconceptions. Two hundred and five SLPs reported their level of agreement or disagreement with 36 statements regarding seven domains in SLP. The results indicate that SLPs hold misconceptions in the areas of swallowing and feeding disorders, voice disorders, language disorders, and communication and augmentative and alternative communication. No misconceptions were identified within the domains of speech and sound disorders, hearing disorders, or SLP in general. A one-way ANOVA revealed that years of work experience significantly impact the acceptance of misconceptions, with SLPs who have ten or more years of experience more likely to hold misconceptions than those with ten or fewer years of experience. However, no significant difference was found regarding the work system. This study confirms the presence of misconceptions among Croatian SLPs and underscores the need to bridge the research-practice gap.

Keywords: *misconceptions, speech-language pathology, speech-language pathologists*

Introduction

Misconceptions, defined as beliefs that contradict accepted scientific facts (diSessa, 2006; Taylor & Kowalski, 2004a), are common across various scientific fields. These misconceptions conflict with established scientific knowledge and are prevalent not only in the general population but also among students and experts within specific disciplines (Furnham & Hughes, 2014; Gardner & Brown, 2013, Hughes et al., 2015). Although extensively researched in psychology (Bensley & Lilienfeld, 2015, 2017), it is believed that there are no significant differences in their nature and occurrence across scientific fields. However, misconceptions can be classified by their severity: some are more benign because they are easier to recognize and/or reject, while others have greater consequences for society, influencing both everyday and professional behavior (Dellantonio & Pastore, 2020).

Defining misconceptions involves conceptualizing their lack of empirical support (Bensley & Lilienfeld, 2017). A distinction exists between misconceptions that (1) arise from simple errors due to misunderstanding and (2) those that influence belief systems by emerging from (pseudo)explanations lacking a basis in scientific theories (Dellantonio & Pastore, 2020; Hughes et al., 2013b). The latter perspective associates misconceptions with naïve science, suggesting that individuals with limited scientific knowledge replace scientific explanations with belief-based, theory-like explanations (Bensley & Lilienfeld, 2015; Taylor & Kowalski, 2004a). Scientific explanations, which require rigorous testing and empirical evidence, stand in contrast to non-scientific or pseudoscientific explanations that rely more on common sense or faith. These com-

mon-sense explanations often depend on minimal information, limited empirical support, personal experience, or other less reliable sources, leading to intuitive inferences (Bordens & Abbott, 2014; Hughes et al., 2013b).

Misconceptions can be simple errors that are easily discarded or theory-like beliefs that are harder to change because they are embedded in flawed belief systems (Dellantonio & Pastore, 2020). The ease with which erroneous beliefs can be discarded depends on their observability and the consistency of their explanations with scientific reasoning. Understanding these types of misconceptions can aid in developing strategies for identifying and correcting them, such as using refutation approaches or promoting critical thinking (Kowalski & Taylor, 2009; Taylor & Kowalski, 2004b).

Another way to define misconceptions is by operationalizing them as claims that contradict research and are supported by at least 50% of respondents (Brown, 1983; Furnham & Hughes, 2014). However, even misconceptions endorsed by fewer people can have significant negative effects with social consequences. False beliefs about scientifically proven phenomena are also considered misconceptions, regardless of their prevalence (Bensley & Lilienfeld, 2015). On the other hand, the identification of misconceptions often relies on questionnaires that are methodologically and psychometrically flawed, particularly those with dichotomous true/false answers and ambiguously worded statements. These flaws can interfere with accurately understanding the extent and strength of these beliefs (Bensley & Lilienfeld, 2015, 2017; Hughes et al., 2013a).

Professionals tend to hold less naïve, faith-based misconceptions than the general population. Their misconceptions often stem from inaccurate knowledge obtained from informal or unreliable sources, leading to common-sense concepts or simple errors (Bensley & Lilienfeld, 2015; Lilienfeld, 2010; Hughes et al., 2013b). These misconceptions may reflect what diSessa (2006, p. 269) describes as “knowledge in pieces,” meaning information that is not well integrated into a coherent knowledge system and that contradicts established facts, rather than indicating a bias toward naïve theories.

Another important factor is the dynamic nature of misconceptions. Understanding of the world and its concepts is constantly evolving, driven by ongoing scientific research. Consequently, beliefs once considered true may later be recognized as misconceptions (Bensley & Lilienfeld, 2015; Taylor & Kowalski, 2014). Taylor and Kowalski (2014, p. 259) define the concept of misconception as “incorrect prior knowledge,” which aligns with the ever-changing nature of scientific research. This suggests that current knowledge can become a misconception as research advances and new findings challenge previous understandings.

Therefore, the impact of work experience on misconceptions among professionals can be understood through this lens of evolving knowledge. Professionals with extensive experience

may have acquired their knowledge and skills at a time when certain beliefs or practices were considered standard or even state-of-the-art (Southwood et al., 2015). However, as scientific research progresses and new evidence emerges, some of these previously accepted beliefs may be questioned or refuted.

Misconceptions in speech-language pathology (SLP) are claims about developmental and acquired speech, language, and communication disorders that contradict theoretically sound concepts and established scientific research. These misconceptions arise from various causes, including misinformation, oversimplification of complex concepts, or personal biases (Bensley & Lilienfeld, 2015; Hughes et al., 2013b; McDaniel et al., 2023). Among professionals, misconceptions can have significant consequences, both professionally and academically (Hughes et al., 2013b, McDaniel et al., 2023).

In the context of SLP, speech-language pathologists (SLPs) who hold misconceptions about the characteristics of certain speech, language, and communication disorders may fail to accurately diagnose and understand the needs of their clients. This can lead to inappropriate interventions, prolonging the duration of therapy and affecting both time and financial resources. Additionally, SLPs with misconceptions about certain disorders may miss opportunities for further education and the adoption of new research, findings, and practices in the field. This includes the importance of ongoing education, professional development, and critical thinking and reflection on one's beliefs (Bensley & Lilienfeld, 2017; Hughes et al., 2013b). Finally, the failure to systematically address and correct misconceptions can also impact funding for scientific research on specific disorders, thereby hindering the generation of new knowledge in the field.

Research papers frequently review the existing literature on misconceptions in SLP. For example, Ronski and Sevcik (2005) and Smith et al. (2016) examined myths and misconceptions regarding the use of augmentative and alternative communication (AAC). Guiberson (2013) explored myths about language confusion in bilingual children. However, there is less research focusing on the prevalence of misconceptions among SLPs. As a result, little is known about the extent to which SLPs endorse or reject misconceptions related to their field. Only McDaniel et al. (2023) recently addressed this gap by assessing the acceptance of misconceptions across various SLP topics. Their study identified areas of relative weakness, including knowledge of grammatical and speech production (articulation) skills in typically developing children and the etiology of developmental language disorder (DLD).

Other research has focused on specific areas and topics believed to be surrounded by misconceptions. For example, Hux et al. (1996) examined SLPs' perceptions of the characteristics and behaviors of individuals with traumatic brain injury (TBI). Their findings reflected earlier trends and conceptualizations prevalent in literature. While they identified correct beliefs about the characteristics of students with TBI, they also uncovered misconceptions regarding their di-

agnostic and intervention needs. In response to earlier research on misconceptions about TBI (Hux et al., 1996, 2006), Evans et al. (2009) investigated the impact of education and found that some misconceptions persist despite educational efforts. Conversely, Schwarz & Drager (2008) found that SLPs generally do not share most misconceptions about individuals with autism spectrum disorder (ASD).

Moreover, empirical research has led to a reconceptualization of fundamental aspects of ASD, such as its definition and etiology (American Psychiatric Association, 2014), resulting in the abandonment of previously prevailing expert opinions (Stone, 1987). Some studies have reported SLPs' beliefs about specific disorders related to their work settings. For example, Krimm et al. (2023) evaluated misconceptions among school-based SLPs regarding dyslexia. Additionally, there are studies focused on individual disorders within SLP that examine public misconceptions (e.g., Dillenburger et al., 2013; Thordardottir et al., 2021; Ying Chu et al., 2019). One such study investigated misconceptions about developmental language disorder (DLD) in Croatia, Italy, and Slovenia, which share some cultural and educational similarities. This study found certain misconceptions about the characteristics of DLD (Matić et al., 2021). These findings could significantly impact individuals with DLD and the challenges they face throughout their lives (Law et al., 2009; Conti-Ramsden et al., 2018; Bartlett et al., 2019). Furthermore, this underlines the need for efforts to raise awareness of specific disorders and address the misconceptions held by both professionals and the public.

Present Study

The aim of this study is to investigate whether misconceptions exist among Croatian SLPs and to determine if work experience and the work system affect their occurrence. The objectives of this study are:

1. To identify the most common misconceptions among SLPs, both individually and within specific domains (speech, language, voice, communication, hearing, feeding and swallowing disorders, and SLP in general).
2. To assess whether SLPs' work experience and work system influence the development of item- and domain-level misconceptions.

Method

Participants

A total of 205 Croatian SLPs (200 women, five men) completed the questionnaire. Most participants were between 25 and 39 years old (70.3%). They represented all 20 counties in Croatia, with the majority from the city of Zagreb (38%). Most participants had fewer than ten years of work experience (62%), 20% had between ten and 19 years, and 15% had more than 20 years of

experience. Regarding the work system, 41.9% work in education, 34.1% in healthcare, 17.1% in private practice, 4.9% in the social welfare system, and only 2% in non-governmental organizations and special institutions. In addition, 65.4% of SLPs work with preschool-aged children, 25.4% with school-aged children, 5.9% with adults, and 3.4% with infants and toddlers. The most common disorders SLPs address are developmental disorders (50.2%), while fewer than 5% work with voice disorders, acquired language disorders, feeding and swallowing disorders, and hearing disorders.

Measures

To investigate the acceptance or rejection of misconceptions among SLPs, we developed a questionnaire consisting of 36 items. Misconceptions were selected using a comprehensive research-consultant approach. This involved an extensive literature review to identify commonly reported misconceptions related to specific SLP domain, expert consultations with professionals in the specific field to gain insights into prevalent misconceptions, and the evaluation of the importance and potential impact of these misconceptions that may have significant consequences or impede progress in the field. We then selected a manageable number of misconceptions that aligned with the research objectives and reviewed the statements with professors from the Department of Speech and Language Pathology and the Department of Hearing Impairments at the Faculty of Education and Rehabilitation Sciences, University of Zagreb.

Finally, we created clear and concise statements addressing specific misconceptions and piloted the questionnaire with a small sample before broader distribution. The items were divided into seven domains: language disorders (seven items), speech and sound disorders (six items), communication and augmentative and alternative communication (six items), feeding and swallowing disorders (four items), hearing disorders (five items), voice disorders (two items), and SLP in general (e.g., speech-language therapy and support) (six items; see Table 2 for the full list of statements). Approximately half of the statements were worded as true and the other half as false. Participants indicated their level of agreement using a 5-point Likert scale: 1 = strongly disagree, 2 = partially disagree, 3 = neither agree nor disagree, 4 = partially agree, and 5 = strongly agree.

Procedure

Several procedures were implemented to ensure the accuracy and reliability of the data. The questionnaire was designed in a user-friendly, online format with a logical flow of misconceptions, brief instructions, and assurances of confidentiality. Recruitment was conducted via direct emails sent through the Croatian Speech-Language Pathologists Association (CLA) and an online questionnaire distributed through a closed social media group for Croatian SLPs. The online questionnaire was available for three weeks in February 2023, and completion took up

to ten minutes.

Participants first provided consent to take part in the study. Then they answered demographic questions, including sex, age, place of residence, seniority, work system, and the disorders they most frequently address in their work. This was followed by the main section of the questionnaire, where SLPs rated statements about misconceptions on a scale of 1 to 5.

Data Analysis

The first step of the analysis involved reversing the scores for items worded as true statements. This adjustment ensured that a higher score reflected agreement with the misconceptions, while a lower score indicated lesser belief in them. Descriptive statistics were used for both the item- and domain-level analyses. Any level of agreement with a statement or any indication of uncertainty about it was interpreted as agreement with the misconceptions (“strongly agree”, “partially agree”, and “neither agree nor disagree”). Conversely, any level of disagreement was considered as rejection (“disagree” and “partially disagree”). Therefore, for further analyses, misconceptions were recoded as a dependent variable with 0 representing rejection or uncertainty about the misconceptions and 1 representing agreement with the misconceptions.

Before conducting the main analyses, the data for each group, defined by work experience and work system, were examined separately for outliers and homogeneity of variances to ensure that the assumptions required for the analyses were met. To identify outliers, results were converted to z-scores. Three extreme results (with absolute values greater than 3.29) were identified in the group with up to ten years of work experience in the health system and were therefore excluded from further analysis. The remaining results fell within the expected critical values for a normal distribution. The test of assumptions using Hartley’s Fmax confirmed that the assumption of homogeneity of variances was met. Although normality of distribution was not observed at all levels of the independent variables, the analysis of variance (ANOVA) is robust to violations of normality assumptions when the sample size is $N \geq 30$ (Petz et al., 2012; Tabachnick & Fidell, 2013).

Subsequent analyses examined the influence of SLPs' work experience and work system on their acceptance or rejection of misconceptions. A one-way ANOVA was conducted to assess the acceptance of misconceptions among SLPs, divided into three groups: 1) those with up to ten years of work experience ($n = 124$), 2) those with between ten and 20 years of work experience ($n = 45$), and 3) those with 20+ years of work experience ($n = 33$). This classification reflects research findings suggesting that years of experience are crucial in providing services to children with speech and language disorders (e.g., Southwood and van Dulm, 2015). SLPs with more experience (20+ years) are generally more skilled and knowledgeable than those with fewer years of experience in supporting children with needs.

Next, a 7 x 2 mixed ANOVA was conducted to examine how SLPs, divided into two groups (up to ten years of work experience and 10+ years of work experience), accept misconceptions across seven SLP domains. Then, a one-way ANOVA was performed to investigate the acceptance of misconceptions in relation to the work system: 1) education (n = 86), 2) health system (n = 68), and 3) private practice (n = 35). Although a few respondents were from other systems (e.g., the social welfare system, associations, and non-governmental organizations), their numbers were too small for meaningful comparisons. A 7 x 3 mixed ANOVA was used to explore how SLPs accept misconceptions across the seven SLP domains in relation to the three work systems. Sphericity assumptions were not violated, but routine corrections were applied, and Huynh-Feldt corrected values were reported. Effect sizes were interpreted according to Cohen's conventions (1988). All statistical analyses were performed using IBM SPSS 26.0.

Results

In this part of the analysis, we present the response trends for each individual statement (item). Items written as true statements were reverse scored so that a higher score indicates a stronger belief in the misconceptions. As shown in Table 1, for each statement rated on a Likert scale from 1 to 5, the mean agreement with misconceptions and the corresponding standard deviation were calculated. Mean scores ranged from 1.07 to 3.57. Following previous research (e.g., Brown, 1983; Furnham & Hughes, 2014), 50% of the highest mean scores were used as the threshold for classifying statements as misconceptions. Thus, the cut-off point for classifying statements as misconceptions was set at 2.3, representing 50% within the range of 1.07 to 3.57. Statements with a mean score of 2.3 or above were classified as misconceptions. This item-level analysis revealed that of the 36 statements, six (or 17%) were classified as misconceptions.

Table 1. *Item-level analysis, with statements classified as misconceptions highlighted.*

Statement	M	SD	Statement	M	SD
Counselling is part of the SLP work. (SLP_general4)	1.07	.33	At an early age, stuttering is always just a passing developmental phase. (SSD4)	1.67	1.18
Aphasia is a disorder that occurs only in people over the age of 60 years. (LD3)	1.08	.41	Sign language consists of gestures. (HD1)	1.77	1.17
The use of augmentative communication slows down the development of language and speech in children. (COM&AAC2)	1.14	.56	Group language therapies can be more effective than individual ones in achieving some pragmatic goals. (SLP_general1)	1.81	.89
A phonological disorder is exclusively a disorder of the pronunciation of sounds. (SSD3)	1.17	.51	Therapy for articulation disorders can be provided only from the age of 4 years. (SLP_general2)	1.85	1.00
A reading disorder is a disorder only in the accuracy and speed of reading. (LD5)	1.17	.51	Videofluoroscopy is an evaluation of the act of swallowing. (F&S4)	1.95	.98
Only trauma without other risk factors causes stuttering. (SSD6)	1.20	.56	Acquiring sign language encourages the development of spoken language. (HD3)	1.96	1.06
Acquired hearing loss can also be present in younger people. (HD5)	1.31	.68	All children who use a cochlear implant eventually achieve the language and speech outcomes of their peers. (HD2)	2.00	1.07
Augmentative communication is introduced only when speech and language development has not been achieved through speech-language therapy. (COM&AAC1)	1.34	.75	Children with autism mostly have intellectual disabilities. (COM&AAC4)	2.08	1.18
The absence of language and speech in boys at the age of 2.6 years is worrying. (LD1)	1.34	.67	Childhood apraxia of speech (CAS) is a permanent disorder that requires long-term therapy. (SSD5)	2.09	1.07
Childhood apraxia of speech (CAS) is caused by difficulties in planning and coordinating speech movements. (SSD2)	1.45	.81	People with dementia should be included in speech-language therapy. (SLP_general5)	2.20	1.04
Sign language is universal. (HD4)	1.45	1.06	Language disorder as a result of traumatic brain injury (TBI) can manifest several hours after the brain injury. (LD6)	2.23	.95
Speech and language pathologists support communication, language and speech development in children with intellectual disabilities. (SLP_general6)	1.51	.86	Most patients with laryngopharyngeal reflux (LPR) develop hoarseness. (VD2)	2.28	.93
People with autism may need to socialize with other people. (COM&AAC3)	1.55	.85	All children with autism have difficulties with vocabulary and grammar. (COM&AAC5)	2.37	1.26
In addition to neurological, dysphagia can be caused by neck and head tumors. (F&S2)	1.55	.81	Developmental language disorder persists into adulthood. (LD4)	2.56	1.57
Childhood apraxia of speech (CAS) can also occur in comorbidity with other disorders. (SSD1)	1.56	.92	The main symptom of dysphagia is painful swallowing. (F&S3)	2.58	1.14
A bilingual child who uses two different languages in one utterance has a language disorder. (LD2)	1.57	.81	A person with dysphagia has difficulty swallowing food and liquids of all consistencies. (F&S1)	2.86	1.41
The pointing gesture occurs before the first word. (COM&AAC6)	1.63	1.02	Among all language, speech and communication disorders in kindergarten age, DLD is the most common. (LD7)	2.86	1.21
The progress of communication skills in all persons with aphasia is visible only after one year of therapy. (SLP_general3)	1.66	.86	An esophageal voice is speech through burping. (VD1)	3.57	1.43

The next step was to perform a domain-level analysis. Table 2 shows the response trends across all seven domains. In three domains where no statements were rated as incorrect, SLPs demonstrated a relatively high level of knowledge. These domains are speech and sound disorders, hearing disorders, and SLP in general. The domain with the highest number of misconceptions is feeding and swallowing disorders (see Table 2). In terms of percentages, misconceptions were found in 50% of statements in feeding and swallowing disorders, 50% in voice disorders, 28.6% in language disorders, and 16.7% in communication and AAC.

Table 2. *Domain-level analysis.*

Domain	Language disorders (LD)	Speech and sound disorders (SSD)	Communication and augmentative and alternative communication (COM&AAC)	Feeding and swallowing disorders (F&S)	Hearing disorders (HD)	Voice disorders (VD)	SLP in general
<i>N</i> of items	7	6	6	4	5	2	6
<i>N</i> of misconceptions	2	0	1	2	0	1	0

For the second research question, we investigated the influence of work experience and the work system on the development of misconceptions among SLPs. The analyses were conducted both at the total item level and within specific domains of SLP. Descriptive statistics, including the number of participants in each group, mean, standard deviation, and ranges for the SLPs' years of work experience for the total score of each item, are presented in Table 3.

Table 3. *Descriptive data for the variable 'years of work' of SLPs with respect to the overall acceptance of misconceptions.*

Years of work	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
< 10 years	124	6.95	2.92	1	14
from 10 to 20 years	45	10.00	4.29	3	22
20+ years	33	11.00	4.36	4	20

Group differences in the acceptance of misconceptions, defined by work experience, were examined using a one-way ANOVA. This analysis revealed a significant effect of work experience on the acceptance of misconceptions ($F(2, 199) = 24.07, p < .01$). Post hoc comparisons using Scheffe's method showed that the group with less than ten years of work experience differed significantly from both the group with ten to 20 years of work experience ($p < .01$) and the group with more than 20 years of work experience ($p < .01$). SLPs with up to ten years of experi-

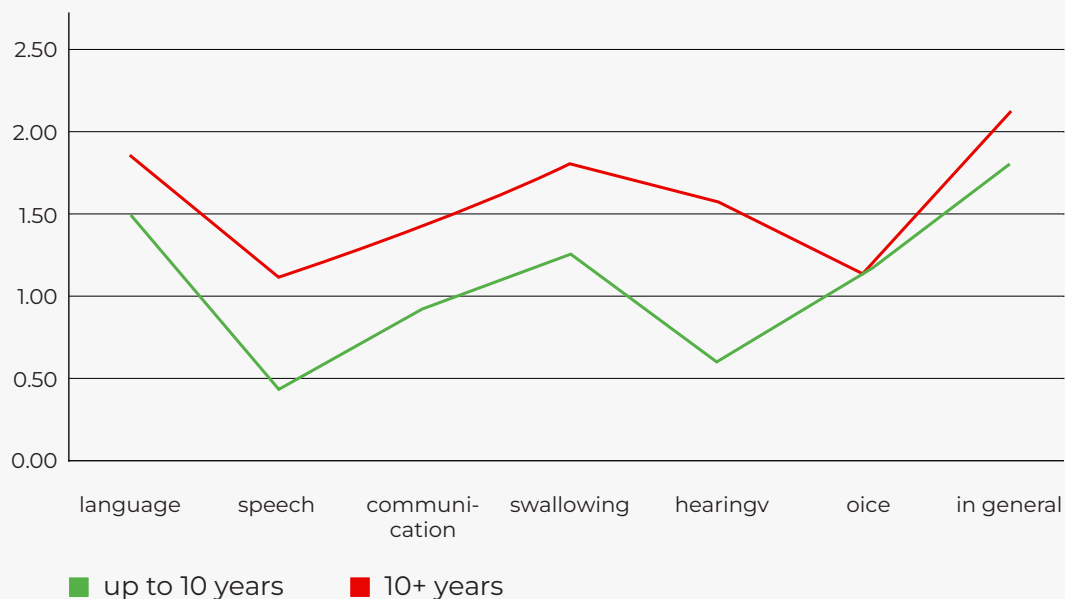
ence accepted significantly fewer misconceptions than those in the other two groups (Table 3). However, no significant differences were found between the group with ten to 20 years of work experience and the group with more than 20 years of work experience ($p = .47$).

Since there were no statistically significant differences between the group with ten to 20 years of work experience and the group with more than 20 years of work experience, these two groups were combined for further analysis. Table 4 presents descriptive statistics, including the mean and standard deviation, for two groups of SLPs: those with up to ten years of work experience and those with more than ten years of work experience, across all seven domains. To examine the influence of work experience on misconceptions within each domain, a 7 x 2 mixed ANOVA was conducted, considering both the seven SLP domains and the length of work experience (up to ten years, ten or more years of work experience).

Table 4. Descriptive data for the variable 'years of work' with respect to the seven SLP domains.

SLP domains	< 10 years	10+ years
	M (SD)	M (SD)
Language disorders	1.51 (.91)	1.87 (1.06)
Speech and sound disorders	.44 (.63)	1.13 (1.13)
Communication and AAC	.94 (.95)	1.45 (1.21)
Feeding and swallowing disorders	1.27 (.94)	1.82 (.99)
Hearing disorders	0.61 (.74)	1.59 (1.36)
Voice disorders	1.15 (.60)	1.15 (.63)
SLP in general	1.82 (1.20)	2.14 (1.17)

Figure 1. Average values of misconceptions for each domain with regard to years of work of SLPs.



Results were analyzed using a mixed 7 x 2 ANOVA, which revealed a significant main effect of work experience ($F(1, 200) = 42.75, p < .01, \eta p^2 = .18$), indicating a large effect size. A main effect of the SLP domain ($F(5.55, 1,110.30) = 40.80, p < .01, \eta p^2 = .17$) was also observed. However, due to the unequal number of items across the different SLP domains, this effect was not further interpreted. A significant interaction between work experience and SLP domain was also found ($F(5.55, 1,110.30) = 5.79, p < .01, \eta p^2 = .03$), albeit with a small effect size. As shown in Figure 1, SLPs with up to ten years of work experience have fewer misconceptions across all domains compared to SLPs with ten or more years of work experience. The only exception is the voice disorders domain, where the two groups have similar average numbers of misconceptions. However, these results should be interpreted with caution due to the smaller number of items in the voice domain.

Descriptive statistics, including the number of participants in each group, mean, standard deviation, and ranges for the SLP work systems concerning the total score of each item, are presented in Table 5. To address whether there are differences between SLPs in their acceptance of misconceptions related to their work system (education, health, and private practice), a one-way ANOVA was conducted. It should be noted that only these three work systems were included in the analysis, as most participants were from these systems, ensuring comparability between the three groups (Table 5).

Table 5. Descriptive data for the variable work system of SLPs with respect to the overall acceptance of misconceptions.

Work system	N	M	SD	Min	Max
Education	86	8.68	3.73	3	22
Health system	68	8.01	4.35	1	20
Private practice	35	8.69	3.52	4	19

The one-way ANOVA showed that there were no significant differences in the development of misconceptions between SLPs from different work systems ($F(2, 186) = .64, p = .53$). SLPs coming from different work systems accepted or rejected misconceptions equally (Table 5).

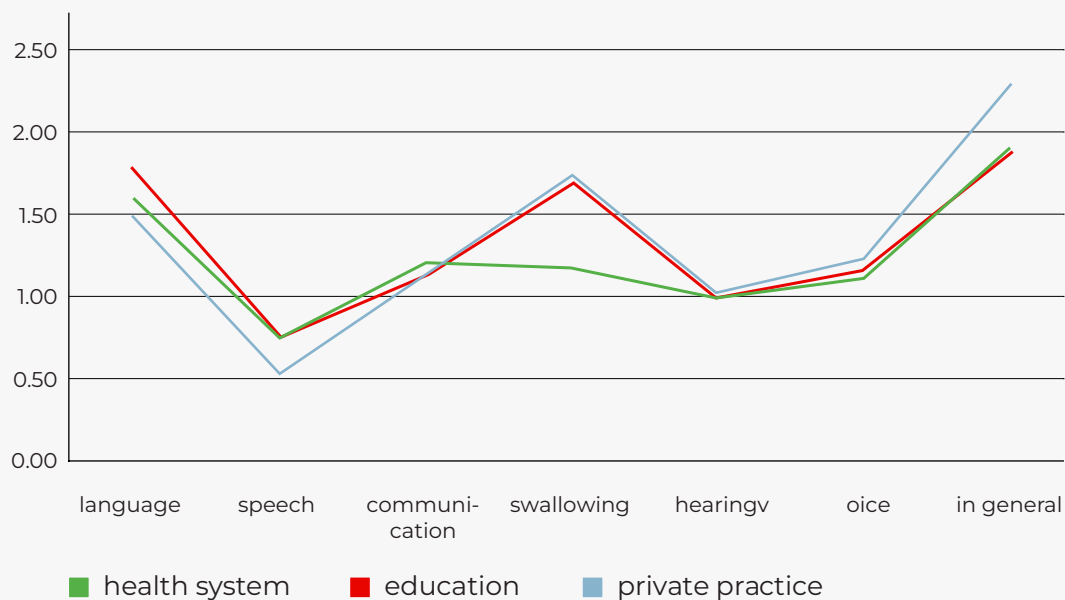
Table 6 presents descriptive statistics, including mean and standard deviations, for three groups of SLPs in relation to their work system across all seven domains. To examine the effect of work systems on misconceptions across domains, we conducted a 7 x 3 mixed ANOVA, focusing on seven SLP domains and three work systems (health, education, and private practice). The analysis revealed a significant main effect of the SLP domain ($F(5.60, 1,041.01) = 39.54, p < 0.01, \eta p^2 = 0.18$). However, this effect was not interpreted due to the varying number of statements

across domains. An interaction was found between the effects of the SLP domain and the work system ($F(11.19, 1,041.01) = 1.92, p < .05, \eta p^2 = .02$), though the effect size was small. No significant effect was observed for the SLPs' work system ($F(2, 186) = .70, p = .50, \eta p^2 = .01$).

Table 6. Descriptive data for the variable work system with respect to the seven SLP domains.

SLP domains	Health system	Education	Private practice
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Language disorders	1.59 (1.01)	1.79 (.97)	1.49 (.98)
Speech and sound disorders	0.75 (1.00)	0.78 (.94)	0.54 (.74)
Communication and AAC	1.21 (1.21)	1.13 (1.02)	1.17 (1.04)
Feeding and swallowing disorders	1.18 (.91)	1.70 (.98)	1.74 (.95)
Hearing disorders	1.00 (1.17)	1.00 (1.14)	1.03 (1.19)
Voice disorders	1.12 (.61)	1.16 (0.63)	1.23 (.60)
SLP In general	1.91 (1.32)	1.88 (1.17)	2.29 (1.05)

Figure 2. Average values of misconceptions for each domain with regard to work system of SLPs.



As shown in Figure 2, the work system does not directly influence the development of misconceptions. However, there is an interaction effect between the work system and the domain to which the misconceptions refer. This means that the development of individual misconceptions depends on the specific work systems, which have their own peculiarities in addition to the common aspects of the work. For example, swallowing disorders are treated exclusively by SLPs from the healthcare system.

Discussion

Misconceptions are false beliefs that persist across various scientific fields, including SLP. While earlier research has documented their existence several years or decades ago (Hux et al., 1996; Schwarz & Drager, 2008; Stone, 1987), it is crucial to assess their current state in the SLP field. Many studies focus on public awareness of SLPs (Dillenburger et al., 2013; Matić et al., 2021; Thordardottir et al., 2021; Ying Chu et al., 2019), but fewer investigate misconceptions among SLPs themselves (McDaniel et al., 2023). In addition, variations in demographic characteristics among participants may influence the prevalence of misconceptions, especially in countries with different SLP education histories, education systems, and economic contexts (Southwood & van Dulm, 2015). This study aimed to identify the most common misconceptions currently held by SLPs and to examine how years of work experience and work system impact the development of misconceptions at both the item and domain levels.

Misconceptions at the Item and Domain Levels

The most common misconceptions uncovered through the item-level analysis among SLPs include weaknesses in addressing the language skills of individuals with ASD, understanding DLD, swallowing and feeding disorders, and voice disorders.

Misconceptions regarding the language skills of individuals with ASD highlight the need for a nuanced understanding of the heterogeneity in language abilities within this population. Research indicates that the language abilities of children with ASD vary widely. While some individuals with ASD may exhibit average language abilities, others may face difficulties primarily in areas such as grammar and pragmatics, despite having a relatively intact vocabulary. Additionally, there are those with low overall language abilities who may struggle with multi-level language processing skills (Wittke et al., 2017).

Formal assessment of language abilities is a crucial component of the diagnostic process for ASD (Hyman et al., 2020). However, it is important to note that the current diagnostic criteria outlined in the DSM-5 (American Psychiatric Association, 2014) do not include formal language disorder as a specific criterion for ASD. This omission can contribute to the misconception that all children with ASD inherently have language difficulties, potentially leading to misdiagnosis for those with average language abilities.

Furthermore, research suggests that many children with ASD, particularly those with mild symptoms and/or average or above-average intelligence, may not receive a diagnosis until school age or later (Hyman et al., 2020). This delayed diagnosis means that children with ASD and average language skills may also go underrecognized or underdiagnosed until later in development, potentially missing out on early intervention services and support that could benefit their social, academic, and communication development.

The misconception that all individuals with ASD have language difficulties can also impact the provision of appropriate intervention and support. SLPs may overlook the specific communication needs of individuals with ASD who have average or above-average language skills, thereby potentially limiting their access to targeted interventions that could enhance their social communication and pragmatic language abilities.

Therefore, addressing misconceptions surrounding the language skills of individuals with ASD requires SLPs to recognize the wide variability in language abilities within this population, advocate for comprehensive language assessments as part of the diagnostic process, and ensure that intervention strategies are tailored to the individual needs of each person with ASD, regardless of their language proficiency level.

The term *developmental language disorder* (DLD) has been proposed to describe children with significant language problems that interfere with social interaction and education, persisting into adulthood (Bishop et al., 2017). Historically, SLPs have used various terms such as specific language impairment, language delay, developmental language disorder, and developmental dysphasia, resulting in inconsistent terminology (Bishop et al., 2016, 2017). This lack of standardized terminology can lead to misconceptions among SLPs, including the belief that DLD does not persist into adulthood.

Despite being one of the most common neurodevelopmental disorders, occurring in approximately 7.5% of cases (Norbury et al., 2016), with some estimates reaching as high as 14% of population (McLeod & Harrison, 2009), DLD is still insufficiently recognized among SLP in Croatia. Studies have shown that DLD is often overlooked or misdiagnosed, leading to inadequate intervention and support for individuals (Bartlett et al., 2019). This lack of recognition can have significant consequences for individuals with DLD, including academic difficulties, social isolation, and mental health challenges (Conti-Ramsden et al., 2018).

Furthermore, research suggests that the impact of DLD extends beyond childhood, with many individuals experiencing persistent language difficulties and associated challenges into adulthood (Bishop et al., 2017). Longitudinal studies have demonstrated that individuals with DLD are at increased risk for academic underachievement, unemployment, and mental health disorders compared to their typically developing peers (Law et al., 2009, Bishop et al., 2017). Despite the substantial burden of DLD across the lifespan, it remains underprioritized in both clinical practice and research, highlighting the need for greater awareness and advocacy within the SLP community.

In summary, the under-recognition of DLD by SLPs in Croatia underscores the importance of unified terminology, comprehensive assessment practices, and ongoing professional development to ensure timely identification and appropriate intervention for individuals with DLD.

Considering misconceptions about swallowing and feeding disorders, it should be noted that symptoms of dysphagia vary depending on the cause and type, with painful swallowing (odynophagia) not being the main symptom. Contrary to some beliefs among SPLs, the primary symptom is difficulty swallowing (Shaker & Koch, 2007). When swallowing food or liquids of different consistencies, issues such as silent aspiration, multiple swallows, bolus leakage, regurgitation, and penetration may occur (Vodanović et al., 2020).

While the esophageal voice may sound similar to burping, the statement that it is produced through burping is highly simplified and incorrect. The esophageal voice, a method of alaryngeal communication, involves controlling air from the oropharynx, directing it into the upper esophagus, and causing vibration in the pharyngoesophageal segment (Graville et al., 2017).

Of the seven different SLP domains, three are not burdened by misconceptions among Croatian SPLs. It appears that Croatian SPLs' beliefs in the areas of speech and sound disorders, hearing disorders, and SLP in general are mainly consistent with established scientific knowledge. This consistency may be attributed to the long tradition of speech and sound disorders and hearing disorders in the Croatian SLP education system, which could explain the scientifically based knowledge and beliefs of SPLs in these areas. The acquired understanding and theoretical knowledge could result from a wide range of courses offered by the faculty in formal SLP education. This may also explain the lack of misconceptions about SLP in general and the low percentage of misconceptions in the field of communication and AAC (14.3%). In addition, other SLP training initiatives likely contribute to the lower misconceptions among Croatian SPLs, such as awareness campaigns about various disorders and the organization of conferences and professional training programs.

Conversely, SPLs have the highest percentage of misconceptions in the areas of voice disorders, swallowing and feeding disorders, and language disorders. The high number of misconceptions related to feeding and swallowing disorders and voice disorders may be influenced by the small number of SPLs working in these areas (less than 5%). Moreover, the SLP curriculum (Faculty of Education and Rehabilitation Sciences, University of Zagreb, 2018a, 2018b) does not seem to cover these disorders sufficiently in compulsory courses. The uneven distribution of statements across SLP domains—some domains containing fewer statements than others – also raises questions about how adequately the total number of items covers each domain.

The finding that misconceptions exist in the area of language and DLD is partially consistent with a recent study by McDaniel et al. (2023), which also identified knowledge about language development and DLD as areas with frequent misconceptions. Finally, 17% of the misconceptions identified across four different SLP domains in our current study suggest that some SPLs still rely on inaccurate evidence, non-scientific sources, or outdated information.

Influence of Work Experience and Work System on Item- and Domain-level Misconceptions

Our study reveals that SLPs with up to ten years of experience exhibit fewer misconceptions across various domains compared to those with ten or more years of experience. This finding aligns with Taylor and Kowalski's (2014) definition of misconceptions as "incorrect prior knowledge," suggesting that outdated information acquired earlier in one's career may contribute to misconceptions. For instance, SPLs with less than ten years of experience often possess more recent theoretical knowledge acquired at university, which is likely to be more aligned with current scientific research compared to their more experienced counterparts. While research has shown the influence of education and training on the rejection of misconceptions (e.g., Hughes et al., 2015), other potential sources of misconceptions have been less explored. In our study, younger SLPs, who are less accepting of misconceptions, may experience rejection of misconceptions due to a range of factors, including cognitive and environmental influences (Hughes et al., 2013b). These factors could encompass openness to new information, adaptability and openness to changes in practice, emphasis on professional development, technological competence and availability of online resources, as well as mentoring and supervision for younger professionals. This suggests that ongoing professional development and exposure to new research findings may help mitigate misconceptions among SLPs.

Our study found no significant difference in the acceptance of misconceptions between SLPs with ten to 20 years of work experience and those with more than 20 years of work experience. This suggests that beyond a certain threshold of professional experience, SLPs may reach a plateau in terms of their susceptibility to misconceptions. Instead, factors such as continuous learning, engagement with evidence-based practices, and openness to updating one's knowledge may play a more significant role in mitigating misconceptions among experienced professionals. These findings are consistent with previous research by Southwood and van Dulm (2015), which indicates that after approximately ten years of professional experience, SLPs generally possess the requisite knowledge, skills, and experience to effectively support individuals with communication, speech, and language needs. However, this does not imply that continuing professional development beyond this point is unnecessary. Rather, it underscores the importance of lifelong learning and staying abreast of advancements in the field to ensure optimal clinical practice.

This study has shown that the work system does not have a direct influence on the general development of misconceptions. Regardless of whether SLPs work in healthcare, education, or private practice, their educational background is the same, which likely contributes to the similar findings across these work systems. It appears that after graduation, external variables such as the work environment do not significantly affect the development and acceptance of misconceptions. Moreover, it is possible that each work system encourages its professionals

to engage in formal, reliable, scientific training, which helps prevent misunderstandings and errors in professional beliefs.

However, the work system does impact beliefs in specific SLP domains. This is not surprising, given that each system places varying levels of emphasis on different SLP domains. For instance, SLPs working in healthcare often have more experience and continuing education related to voice and swallowing disorders, while those in education and private practice are more focused on speech and language disorders. This aligns with previous research that has examined SLPs' conceptualizations of specific disorders within systems that do not primarily focus on these disorders (Hux et al., 1996; Schwarz & Drager, 2008). For example, Hux et al. (1996) found that SLPs within the educational system had misconceptions about the specific functioning of individuals with TBI. Overall, this suggests that SLPs may have fewer misconceptions in areas more closely related to their specific work environment.

Conclusion

In conclusion, this research confirms the presence of misunderstandings and misconceptions among Croatian SLPs, albeit these occur to a lesser extent than might be expected. These misconceptions may arise from insufficient integration of knowledge and reliance on common sense and informal sources. Similar explanations for misconceptions have been documented in studies of other professions and scientific fields (Bensley & Lilienfeld, 2015, 2017; Hughes et al., 2013b).

Younger SLP professionals with less than ten years of experience are less prone to misconceptions, likely due to more recent theoretical knowledge acquired through formal education and ongoing research updates. External factors such as the work environment and differences in work systems do not significantly impact the acceptance of misconceptions.

To address and reduce misconceptions effectively, it is crucial to invest in continuing education, improve training programs, promote new research, and bridge the gap between research and practice. Therefore, this study highlights the importance of ongoing professional development, exposure to new research findings, and a commitment to lifelong learning in maintaining accurate and up-to-date knowledge and practice. By demonstrating the prevalence of misconceptions among Croatian SLPs, this study contributes to the identification of these issues and suggests areas for improvement to reduce them.

Acknowledgements

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We sincerely thank all the speech-language pathologists who participated in this study.

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Portrayal of aphasia in movies and TV Series compared to real-life experiences

SUMMARY

Aphasia is an acquired language disorder caused by damage to specific areas of the brain. Due to the impaired ability to communicate, individuals with aphasia leads offer experience feelings of isolation and loneliness, which can significantly impact their mental health. People with aphasia are frequently misperceived as having an intellectual disability. Therefore, raising awareness about aphasia within the general population is crucial. Studies on aphasia awareness have identified various sources through which individuals can learn about this condition. This study aims to describe how TV series and movies portray aphasia. The following research questions were addressed: (1) How is aphasia portrayed in movies and TV series? (2) How does aphasia in movies and TV series differ from aphasia in real life? These questions are explored through a descriptive analysis of individual movies and episodes in TV series available in the Internet Movie Database. The results indicate that movies often depict aphasia as a disorder of language production characterized by difficulties in recalling words, the occurrence of paraphasias and neologisms, varying levels of fluency, and difficulties in writing. However, aphasia in movies differs from aphasia in real life, with the most significant discrepancies found in the portrayal of language comprehension and non-verbal communication. To effectively use movies for educational and therapeutic purposes or to raise awareness, further analysis is necessary.

Keywords: *aphasia, awareness, TV series/movies, quality of life, speech-language pathology*

Introduction

Aphasia is a language disorder caused by an acquired brain injury in adults (Hedge, 2018). It affects a person's social, personal, educational, and professional lives. People with aphasia (PWA) often face loss of autonomy, stigmatization, isolation, and role changes (Simmons-Mackie, 2001). Brown et al. (2012) state that communication, participation in activities, support, positive attitudes, independence, building and maintaining relationships, and positive interactions are essential for a quality life after acquiring aphasia. This highlights the need for understanding and acceptance from family, friends, and the general population.

Increasing awareness and knowledge of aphasia can lead to positive changes for PWA, their families, clinicians, and researchers (Elman et al., 2000). Several studies on aphasia awareness and knowledge have been conducted in various countries, including Croatia (Došen & Prizl-Jakovac, 2023), Argentina, Canada, Greece, Norway, Slovenia (Code et al., 2016), and the west of Ireland (McMenamin et al., 2021). Most of these studies reveal low public awareness and knowledge of aphasia (Aljenaie & Simmons-Mackie, 2021; Code et al., 2016; Došen & Prizl-Jakovac, 2023; McMenamin et al., 2021; Simmons-Mackie et al., 2020). They also highlight the importance of raising awareness and the benefits of doing so.

Various sources provide information about aphasia, including newspapers/magazines, the workplace, relatives or friends with aphasia, education, TV and radio, the internet and social media, etc. (Henriksson et al., 2019; Hill et al., 2018; McMenamin et al., 2020). The most effective way to raise awareness depends on cultural context and can evolve over time. In Croatia, for example, newspapers and magazines were once the primary sources (Leko & Prizl-Jakovac, 2015), while today, the internet and social networks play a more significant role (Došen & Prizl-Jakovac, 2023). Although the use of the internet has increased in recent years, making information more accessible, its accuracy remains questionable (Aïmeur et al., 2023; Zanatta et al., 2021).

The internet hosts a vast array of movies and TV series across different genres. By watching movies, individuals can acquire a significant amount of knowledge, often unintentionally. Movies present multiple perspectives in an engaging and emotional manner, fostering a better understanding of and empathy for people's life experiences (Ahmadzadeh et al., 2019). Baños and Bosch (2015), for example, view movies as powerful teaching tools in medical schools. Mahendra (2018) pointed out that SLP students found watching and discussing a documentary about a PWA to be a valuable classroom activity. The researcher's focus was on documentary movies, which is understandable for educational purposes, as documentaries are fact-based and depict reality. However, genres like action, drama, or comedy are less frequently associated with education. In these genres, the reality depicted is shaped by the filmmakers, leaving acceptance and interpretation up to the viewers. This raises the question of how aphasia is portrayed in such movies and TV series.

The Aim and Research Questions

The general aim of this study was to describe how TV series and movies portray aphasia, with the following research questions: (1) How is aphasia portrayed in movies and TV series? (2) How does the portrayal of aphasia in movies and TV series differ from aphasia in real life?

Methods

To achieve the aim of this study, it was necessary to compare two situations: *aphasia in movies*

and TV series versus aphasia in real life. A descriptive qualitative research method was chosen for this purpose.

The first step in data collection involved searching the Internet Movie Database (IMDb) using the keyword “aphasia.” This search yielded 33 pieces of content. The next step was to filter the content according to the following criteria: (1) English subtitles, (2) action movie, (3) acquired brain injury in adults, and (4) free online access to the movie or availability on Netflix. Applying these criteria reduced the total number of selected movies and TV series to eight (Table 1). The final step in data collection involved analyzing the selected movies and episodes. For simplicity, the term “aphasia in movies and TV series” will hereafter be abbreviated as “aphasia in movies.”

Table 1. List of movies and TV series (episodes) considered in the study.

	Name
1	House M.D. – Failure to Communicate (2006)
2	House M.D. – Love Hurts (2005)
3	The Rookie – Casualties (2020)
4	The Resident – The Unbefriended (2019)
5	The Ice Road (2021)
6	Marcus Welby, M.D. – A Matter of Humanities (1969)
7	Star Trek: Deep Space Nine – Babel (1993)
8	The Blacklist – The Pawnbrokers (2019)

The data was collected following specific guidelines and through qualitative observation while watching the movies. The list of general symptoms of aphasia, as described by Hedge (2018), was utilized. Figure 1 shows the form used for recording observations during the viewing of movies and TV series. The general symptoms of aphasia include potential changes in the following abilities and skills: fluency, auditory comprehension, repetition, naming, writing, reading, gestures and facial expressions, and the occurrence of paraphasias (Hedge, 2018). While the clinical presentation of aphasia can vary depending on the type and severity, this study did not investigate these variations further.

Figure 1. Form for recording observations when watching movies and TV series.

General symptoms of aphasia	Movies and episodes of TV series							
	1	2	3	4	5	6	7	8
Fluency (speech rate, word output, length of sentences, melodic contour) <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								
Paraphasia <ul style="list-style-type: none"> • Semantic (S) • Phonemic (Ph) • Neologism (N) 								
Auditory comprehension <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								
Repetition <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								
Word retrieval (naming or finding correct words during verbal expression) <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								
Writing <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								
Reading <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								
Gestures and facial expressions (understanding, using, or imitating) <ul style="list-style-type: none"> • Impaired (Im) • Preserved (P) 								

The symptoms of aphasia were recorded while watching the movies. The presence or absence, as well as the impairment or preservation of specific skills or abilities, were recorded. Additionally, other characteristics not included in the Form, but which could influence the interpretation of the results (e.g., type of aphasia, cognitive difficulties, etc.), were noted by the researcher. A simplified clinical picture of aphasia was considered separately for each movie. It was also possible to draw general conclusions about aphasia in movies for each symptom and compare these findings with real-life presentations of aphasia.

Results and Discussion

The first question explored how aphasia is portrayed in movies and TV series. To address this, the general symptoms of aphasia depicted in movies were observed. However, data on certain skills and abilities mentioned in the form were not collected, as no scenes were recorded where these skills and abilities could be observed. This was particularly true for reading, which was only documented in one of the eight movies, while writing was observed in four movies. Similarly, the ability to repeat was only recorded in two movies.

All the movies contained scenes in which speech fluency could be observed. Impaired fluency, as a symptom of aphasia, was depicted in four of the movies, while paraphasias and neologisms were present in six of the movies. Semantic paraphasias appeared most frequently, followed by phonemic paraphasias and neologisms. Auditory comprehension, gestures and facial expressions, and word retrieval were observed in all the movies. Word retrieval was impaired in every movie, whereas auditory comprehension and the understanding and production of gestures and facial expressions were consistently shown to be fully preserved.

As mentioned earlier, reading and writing were not depicted in all the movies, so the assessment of these skills is based on a smaller sample. Writing impairments were observed in four movies, while reading ability was depicted in only one movie and was shown as fully preserved. The ability to repeat was recorded in two movies—impaired in one and preserved in the other. The results are summarized in Table 1.

Overall, aphasia is portrayed in movies as a disorder primarily affecting language production. The detailed characteristics of aphasia in movies include normal or impaired fluency, the production of paraphasias and neologisms, and difficulties in word retrieval and writing. Conversely, auditory comprehension and non-verbal communication are generally depicted as fully preserved.

Table 2. Symptoms of aphasia portrayed in movies and TV series.

General symptoms of aphasia	Movies and episodes of TV series							
	1	2	3	4	5	6	7	8
Fluency	Preserved	Impaired	Preserved	Impaired	Impaired	Impaired	Preserved	Preserved
Paraphasia	Semantic, Phonemic	/	Semantic, Neologism	Semantic, Neologism	Semantic	Semantic	Semantic, Phonemic	/
Auditory comprehension	Preserved	Preserved	Preserved	Preserved	Preserved	Preserved	Preserved	Preserved
Repetition	Preserved	/	/	/	/	Impaired	/	/
Word retrieval	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired
Writing	Impaired	/	/	/	/	Impaired	Impaired	Impaired
Reading	/	/	/	/	/	/	/	Preserved
Gestures and facial expressions	Preserved	Preserved	Preserved	Preserved	Preserved	Preserved	Preserved	Preserved

Another question explored whether aphasia in movies and TV series differs from aphasia in real life. First, it is important to note that many movies listed under the “aphasia” category in IMDb actually depicted other disorders, such as motor speech disorders or intellectual disabilities. This suggests that the characteristics of aphasia are not well-recognized. This observation is supported by McMenamin et al. (2020), whose study found that only 19.67% of respondents had heard of aphasia, compared to much higher awareness of dyslexia (96.17%) and stuttering (97.67%).

The first step in understanding aphasia is to recognize its causes and general symptoms. Among the movies included in the study, only two depicted strokes as the cause of aphasia. One movie portrayed a brain infection, while the remaining movie attributed aphasia to traumatic brain injury.

Speech fluency is one of the primary characteristics of aphasia to be noticed and assessed. Fluent speech in aphasia is described as normal or abundant, with typical phrase length and prosody and good articulation. Half of the movies depicted good fluency, which aligns with the fact that PWA can exhibit normal fluency in real life. However, fluent speech in aphasia does not necessarily indicate normal language function. Even with fluent speech, PWA may pro-

duce meaningless words. This type of aphasia differs from non-fluent aphasia, where speech flow is impaired.

More than half of the movies depicted paraphasias and neologisms as symptoms of aphasia. Paraphasias involve the substitution of phonemes or entire words, while neologisms are completely made-up words. These symptoms are primarily associated with Wernicke's aphasia but can also occur in other types of aphasia. In the episode *Failure to Communicate* (Alexander, 2006), this symptom of aphasia is described as follows: "He knows what he wants to say, but when he reaches for a word, he finds something else." This is linked to fluent aphasia, where "a fluent aphasic retrieves words that are stored somewhere close to the one he wants. They can be filed by sounds or by meaning. So if he wants to say 'table', he could say... 'label', or he could say 'chair'. Or he could just say 'Jabberwocky'."

Difficulties in word retrieval are a common symptom of various types of aphasia, so it is not surprising that all the movies portrayed this symptom of aphasia. In the episode *Love Hurts* (Spicer, 2005), a person with aphasia struggles to recall a word and attempts to describe it: "I started grinding my, my... you know, in your mouth, you get, you chew with them." This word-finding strategy, known as circumlocution, frequently occurs in real-life situations.

Repetition is a crucial diagnostic indicator, as it can be impaired to varying extents in different types of aphasia. The movies generally did not include scenes where repetition could be observed. One movie depicted problems with repetition, while another showed it as a preserved ability. In real life, PWA may exhibit either impaired or preserved repetition abilities. For example, impaired repetition is characteristic of Wernicke's aphasia, while good repetition is typical of transcortical sensory aphasia. Both types of aphasia are classified as fluent.

Writing difficulties as a symptom of aphasia are depicted in four movies. For example, in the episode *Babel* (Lynch, 1993), the person with aphasia writes easily but meaninglessly. In episode *A Matter of Humanities* (Lowell Rich, 1969), the individual with aphasia cannot cross out a given shape. In episode *Failure to Communicate* (Alexander, 2006), the person with aphasia struggles to write their name or draw a circle. In episode *The Pawnbrokers* (Oeding, 2019), the individual substitutes numbers while writing. In real life, most PWA experience difficulties with writing, which often reflect problems in oral production.

Reading skills were depicted in only one movie, where they were portrayed as normal. In real life, reading difficulties in aphasia often accompany writing difficulties and occur in approximately 68% of PWA (Brookshire et al., 2014). As demonstrated, movies tend to neglect this symptom of aphasia.

No movie portrayed difficulties with auditory comprehension. This lack of representation is not an accurate reflection of aphasia, as auditory comprehension difficulties are present in all types

of aphasia. One possible explanation for this is that the general public associates language ability primarily with production rather than comprehension. Therefore, the presentation of comprehension difficulties might be misinterpreted by the audience and perceived as unrelated to the language disorder.

Došen and Prizl-Jakovac (2023) investigated awareness and knowledge of aphasia among the general public in Croatia. Their study included 300 participants. Interestingly, they found that 89.43% of participants believe aphasia is associated with problems in pronunciation, 72.36% believe language production is affected, and only 49.6% recognized that aphasia involves problems with language comprehension. This indicates that comprehension issues faced by PWA are often overlooked, which likely complicates efforts for PWA to be understood and accepted in society.

In addition to auditory comprehension, the production and understanding of gestures and facial expressions are symptoms that distinguish real-life aphasia from its portrayal in movies. In real life, PWA can experience difficulties with non-verbal communication. Interestingly, in movies, the understanding and production of gestures and facial expressions are often portrayed as fully preserved and sometimes as the only means of communication for PWA.

In summary, aphasia as depicted in movies differs from aphasia in real life, which is not surprising given the adage that *life is not a movie*. A more accurate portrayal of aphasia and the experiences and struggles of PWA is often found in documentaries, as they are based on real-life events. However, despite the observed differences, the portrayal of aphasia in movies across various genres still provides valuable insights into the disorder.

Research Limitations

This is the first study of its kind, and several limitations should be noted that could be addressed in future research. Due to financial constraints, only a small number of movies were included. Future research should incorporate a larger sample to provide a more comprehensive understanding of how aphasia is portrayed in movies. Additionally, they could explore in greater depth how different types of aphasia are depicted in movies. While this study focused on the general symptoms of aphasia as outlined by Hedge (2018), other features of aphasia present in movies were not examined. Investigating these additional aspects could offer a clearer picture of aphasia in cinematic portrayals.

Conclusion

This study demonstrates that the portrayal of aphasia in movies often lacks objectivity. However, some characteristics depicted in movies, particularly those related to difficulties in language production, offer useful insights into aphasia. While documentaries are likely the go-to

resource for those seeking an in-depth understanding of aphasia, many people may not be aware of aphasia's existence in the first place. This is where action movies and TV series play a crucial role in raising public awareness. They offer an engaging and incidental way to introduce the concept of aphasia to a broader audience.

Such movies can serve various purposes: educational, therapeutic – by helping families of PWA understand the condition – or simply to raise general awareness. Movies featuring aphasia are readily available on the internet and are often recommended on websites dedicated to educating SLPs and supporting PWA and their families (e.g., the Tactus Therapy website). It would be worthwhile to explore how these movies were created and whether PWA and their families are involved in their production. This approach aligns with the slogan “Nothing about us without us,” which aims to involve individuals with the disability or their families in representing the condition, such as aphasia.

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Gender differences in the experience of stuttering

SUMMARY

Stuttering is a speech fluency disorder that primarily affects speech production, but its impact extends beyond obvious speech disfluencies. In adulthood, this disorder can negatively affect various aspects of an individual's life. Stuttering occurs statistically more often in men, but very little research addresses the differences between women and men in this area. This study aims to investigate whether there is a difference in the impact of stuttering on women who stutter and men who stutter and to identify possible differences in their experiences of stuttering. For this study, a questionnaire containing 39 items was created. The items were divided into a section on basic data about the respondents, three subscales that examined the impact of stuttering on professional life, everyday situations, and social aspects, and one open question about the experience of stuttering. The questionnaire was conducted online with 34 respondents participating, aged 20 to 60. The collected data was processed using descriptive analysis and a parametric test. The results showed no statistically significant difference in the impact of stuttering between women and men who stutter in the examined aspects of life. Additionally, the study found that stuttering negatively affects daily social communication situations for people who stutter but does not significantly impact their professional and social aspects. Furthermore, participants' longer written responses revealed how women and men who stutter perceive their own stuttering.

Keywords: *stuttering, women who stutter, men who stutter, impact of stuttering, gender*

Introduction

It is well known that measurements of the primary features of stuttering, i.e., disfluencies, do not necessarily reflect the impact of the overall stuttering disorder on individuals who stutter. For example, some individuals exhibit severe stuttering but perceive it as a mild condition. In contrast, others exhibit mild stuttering but experience it as a profound and distressing condition (Freud et al., 2017). Studying the impact of stuttering on individuals is very important, as stuttering can be a communication disorder that poses a major challenge in life for many

individuals. For example, the results of a study conducted by Kasbi et al. (2015) showed that the quality of life of adults who stutter was significantly lower than that of adults who do not stutter in the domains of mental and emotional health, social functioning, vitality, and adaptation to emotional roles. A review of the literature shows that many people who stutter view their fluency disorder negatively and believe it has affected many aspects and experiences in life (Blood et al., 2011; Boyle, 2013; Bricker-Katz et al., 2013; Craig et al., 2009; Rice & Kroll, 2006; Koedoot et al., 2011).

When discussing the experience, i.e. the effects of stuttering, it is important to mention gender as one of the basic factors that could influence this. Gender differences in stuttering are a much discussed and researched topic, especially in Western countries (Craig et al., 2002; Boyle et al., 2011; Yairi & Ambrose, 2013; Bloodstein et al., 2021). However, only a few studies have investigated gender differences in the self-concept of stuttering.

In one such study, Klein and Hood (2004) examined the effects of stuttering on work performance and employability. The results showed that women perceive stuttering less as a handicap than men and that women are less likely to believe that stuttering limits employability and hinders general work performance. The study by Freud et al. (2017), on the other hand, shows a different perspective. They investigated the relationship between age, gender, and marital status and the experience of stuttering using the Hebrew version of the OASES (an instrument designed to assess and quantify different dimensions of the experience of stuttering). The results showed that age and marital status were significantly related to the personal experience of stuttering, whereas gender was not.

Previous studies using the OASES instrument have shown similar results. For example, an Australian study from 2012 (Blumgart et al., 2012), which analyzed the effects of age, gender, and stuttering frequency on OASES scores, found no significant correlation between OASES scores for gender and age. An adapted version of the OASES was also translated into the Brazilian-Portuguese language, and the results showed that there were no gender differences in the variables examined: General Information, Reactions to Stuttering, Communication in Everyday Life, Quality of Life, and Total Impact (Braggato, 2012). Overall, one could conclude that the number of studies looking at the differences between women and men who stutter in terms of how they experience stuttering and how it affects their daily lives is quite limited.

Objectives

The purpose of this paper is to examine whether there are differences in the effects of stuttering between women and men who stutter in areas related to business and personal life. Specifically, this paper will explore how the challenges stemming from stuttering impact everyday speech situations and social interactions. It will also investigate how women and men who

stutter experience their stuttering and whether significant differences exist between them in this regard.

Research Problems and Hypothesis

Aligned with the aforementioned research objectives, the research problem aims to determine the following:

Q1: Are there differences between women who stutter and men who stutter in terms of the impact of stuttering on the occupational aspect of life?

Q2: Are there differences between women who stutter and men who stutter regarding the impact of stuttering on everyday speech situations?

Q3: Are there differences between women who stutter and men who stutter regarding the impact of stuttering on the social aspect of life?

Based on the above research questions, the following hypotheses were formulated:

H1: There is no statistically significant difference between women who stutter and men who stutter regarding the impact of stuttering on the occupational aspect of life.

H2: There is no statistically significant difference between women who stutter and men who stutter regarding the impact of stuttering on everyday speech situations.

H3: There is no statistically significant difference between women who stutter and men who stutter regarding the impact of stuttering on the social aspect of life.

Methods

For the purposes of this study, a questionnaire titled "Questionnaire on the Experience of Stuttering in Women Who Stutter and Men Who Stutter" was created using the Google Forms web application. All participants were required to read the instructions and give informed consent before completing the questionnaire themselves.

The introductory section of the questionnaire includes 11 general questions necessary to gather key information about the respondents (gender, age, place of residence, educational background, age of onset of stuttering, etc.). Following this, the questionnaire is divided into three parts or subscales.

The first part consists of 11 statements assessing the impact of stuttering on professional life, such as *Stuttering influenced my choice of profession* and *I would be better at my job if I didn't stutter*.

The second part consists of six statements related to the impact of stuttering on everyday speech situations, such as *Stuttering makes it difficult for me to talk on the cell phone or the phone* and *Stuttering is a problem for me when meeting new people*.

The third part includes 12 statements concerning social functioning and interpersonal rela-

tionships, for example, *Stuttering has a negative effect on my social life* and *Stuttering has a negative effect on my love relationships*.

Participants rated their responses to these statements on a Likert scale from 1 to 5, where a higher rating indicated a greater impact of stuttering on a particular aspect of their lives. At the end of the questionnaire, there is an open-ended question inviting participants to describe their personal experience with stuttering. This question serves as the basis and rationale for the study.

Data collection took place in May and June 2022, and the entire questionnaire consisted of a total of 41 items. Participants were men and women who identified themselves as people who stutter. A link to the questionnaire was distributed to groups on social networks that cater to people who stutter. The study focused on individuals over the age of eighteen who stutter, have completed a certain level of education, and are employed.

The data analysis was based on responses from 34 respondents. The study included 14 women and 20 men, with an average age of 30 years. Female participants ranged in age from 20 to 60 years, while male participants ranged from 20 to 55 years. Most respondents were from the Republic of Croatia (64.4%), with others coming from neighboring countries.

In terms of education, 29.4% of respondents completed secondary vocational education, 11.8% completed higher vocational education, 47.1% held a professional degree, 8.8% had a Master of Science degree, and 2.9% had a PhD. The majority of participants began stuttering during pre-school years (76.4%), with eight respondents starting stuttering between seven and nine years old, consistent with existing literature (Yairi and Ambrose, 2013).

Regarding therapy participation, 26 respondents reported undergoing speech therapy at some point in their lives, with 68% reporting it as successful. Less than one-third (29.4%) had received psychological treatment for stuttering, and only 17.6% were currently undergoing stuttering therapy.

Results and Discussion

The collected data were statistically analyzed using the IBM SPSS Statistics software. Initially, internal consistency reliability was assessed for each of the three subscales to determine if all items measured the same construct. High internal consistency was found for all three subscales of the questionnaire.

In addition to the Cronbach's alpha coefficient, this analysis also examined correlations between the items within each subscale. Due to correlations higher than 0.85 between items in the first (Occupational Aspect) and the third (Social Aspect) subscales, one item from each subscale-specifically, *Stuttering influenced my choice of job* from the first subscale and *I'm afraid*

to stutter in front of someone important to me from the third subscale—were excluded from the questionnaire for further statistical processing. Such high correlations suggest redundancy within each subscale.

The second subscale (Everyday Situations) remained unchanged. Normality of the distribution was assessed using the Shapiro-Wilk test, which indicated that the scores on all subscales were normally distributed in both groups (women who stutter and men who stutter).

The results of the independent samples t-test for the section of the questionnaire examining the impact of stuttering on the **occupational aspect** of life indicate no statistically significant difference between women who stutter and men who stutter ($t = 0.803$, $df = 32$, $p > 0.05$). Descriptive statistics for the variable “Occupational Aspect” for both men and women who stutter are presented in Table 1.

Table 1. Indicators of descriptive statistics for the variable “Occupational Aspect” with respect to the division of respondents by gender.

Group	M	SD
Women	31.14	10.883
Men	27.90	12.039

More than half of women (64.3%) and half of men do not agree with the statement that stuttering influenced their career choice. The majority (64.3%) of women and half of men disagree with the statement that stuttering reduces their chances of getting a job. It makes sense that the majority (64.3%) of women and 45% of men agree with the statement that stuttering affects their performance during a job interview, as people who stutter often experience anxiety when meeting new people or during job interviews (Yairi and Seery, 2021).

More than a third (35%) of men agree that stuttering has affected their performance at work from time to time, and 42.9% of women agree that stuttering interferes with their work. However, the majority (55%) of men and 42.9% of women disagree with the statement that they would be better at their job if they did not stutter.

Half of women and the majority (65%) of men agree that they have sometimes looked for a job that requires little speaking, indicating that many people who stutter perceive limitations in their effectiveness at jobs requiring high levels of verbal communication.

The majority (57.2%) of women and half of men also agree with the statement that stuttering

makes it difficult to talk to superiors, which aligns somewhat with Klompas and Ross's (2004) findings where 43.75% of participants reported that their stuttering interfered with relationships with superiors at work.

A large percentage of both women (71.4%) and men (85%) disagree with the statement *I refused a new job or promotion because I stutter*, indicating that most participants do not consider stuttering an obstacle to advancement in their chosen profession. As evidenced by the results, for the majority of respondents, stuttering generally does not have a significant impact on their decisions regarding profession choice, employment opportunities, and promotions.

The results of the independent samples t-test indicate no statistically significant difference between women who stutter and men who stutter ($t = -0.269, df = 32, p > 0.05$) in the section of the questionnaire examining the impact of stuttering on **everyday speech situations**. Descriptive statistics for the variable "Everyday Speech Situation" for both men and women who stutter are presented in Table 2.

Table 2. Indicators of descriptive statistics for the variable "Everyday Speech Situations" with respect to the division of respondents by gender.

Group	M	SD
Women	20.29	7.630
Men	20.95	6.700

Half of women and the majority (65%) of men agree with the statement that stuttering makes it difficult for them to order food and drinks in restaurants and cafés. The majority (56.6%) of women and the majority (65%) of men also agree with the statement that stuttering makes it difficult to talk on a mobile phone or telephone. Furthermore, the majority (57.1%) of women agree with the statement that they avoid talking on a mobile phone because of stuttering. These data align with findings from Connery et al. (2020) and Yairi and Seery (2021), who observed that talking on the phone specifically causes situational anxiety for many people who stutter.

Half of women and half of men agree with the statement that stuttering makes it difficult for them to get information from other people. A large percentage (75%) of men and the majority (57.2%) of women agree with the statement *I usually avoid situations where I know I might stutter*. Based on the presented data, it can be concluded that stuttering has a negative impact on the quality of communication in everyday speech situations for both women and men who stutter.

The results of the independent samples t-test for the section of the questionnaire examining the impact of stuttering on the **social aspect** of life indicate no statistically significant difference between women who stutter and men who stutter ($t = -0.768$, $df = 32$, $p > 0.05$). Descriptive statistics for the variable “Social Aspect” for both men and women who stutter are presented in Table 3.

Table 3. Indicators of descriptive statistics for the variable “Social Aspect” with respect to the division of respondents by gender.

Group	M	SD
Women	29.50	11.863
Men	32.70	12.018

Regarding the general impact of stuttering on social life, the majority (71.4%) of women disagree with the statement that stuttering negatively affects their social life. Similarly, the majority (57.1%) of women and the majority (55%) of men disagree with the statement *I only get involved in a conversation with an unknown person when I really have to*. Additionally, the majority (64.3%) of women and half of men disagree with the statement *I find it harder to talk to people of the opposite sex*. These data suggest that stuttering does not significantly impact conversations with strangers or with people of the opposite sex for individuals who stutter.

A large percentage (75%) of men and the majority (57.1%) of women agree with the statement *I rarely talk to my friends about my stuttering*. These data are consistent with literature reporting that adults who stutter often refrain from discussing their stuttering with friends, colleagues, or even spouses and children (Yairi and Seery, 2021).

Half of men agree with the statement *Stuttering makes it difficult for me to ask someone out*, while the majority (57.1%) of women disagree with this statement.

The majority (64.3%) of women and the majority (55%) of men disagree with the statement that stuttering has negatively affected their love relationships. Similar results were observed for the statement *Stuttering is an obstacle in communication with my partner*, with 55% of men and 57.2% of women disagreeing. This aligns with research findings by Klompas and Ross (2004), where the majority of participants also reported that their stuttering did not negatively impact their relationship with their spouse or partner.

In contrast, the majority (57.2%) of women and the majority (55%) of men agree with the statement *I am ashamed to stutter in front of someone I care about*. These data support previous findings on the intense negative emotions experienced by people who stutter, with shame being a significant aspect (Logan, 2020). Overall, these findings suggest that stuttering does not significantly affect the social and romantic relationships of women who stutter and men who stutter.

As mentioned earlier, the last question of the questionnaire (*I experience my stuttering...*) serves as the cornerstone of this study. The purpose of this question was to encourage participants to elaborate beyond a single word on how they perceive their stuttering and their personal experiences with it. Tables 1 and 2 present the respondents' answers to this question.

Table 4. Male respondents' answers to the question I experience my stuttering...

I experience my stuttering...
<ul style="list-style-type: none"> • as a problem that is already seriously affecting my life and may turn it even further in the wrong direction if I don't solve it. • as something that annoys me greatly. • as a problem without which my life would have gone in a very different, better direction. • like a weight on my shoulders that doesn't allow me to reach my full potential and forces me to exert myself to the maximum to perform some moderately difficult act, occasionally making me feel less worthy than I am while encouraging me to work on and invest in myself as much as possible. • as a big problem. • as a kind of small but ever-present obstacle in your life. • on the one hand as a simple speech impediment, on the other hand stuttering has taught me how to handle certain situations quickly. • as a burden. • I don't think about stuttering, I don't have thoughts on the subject, and I don't see it as an obstacle in normal life. The only thing I told myself was that I wouldn't be able to give a speech longer than two minutes, and maybe I could if I tried. • I see it as a companion that I can work with. Stuttering is a part of me, and I wouldn't be the person I am today without it. • I have accepted stuttering as a part of me and it has not been difficult for me to stutter, people like it. Since I started my new job (police officer), I'm more aware of my stuttering than ever and it makes my job a lot harder. • Currently, at this age, I have accepted my stuttering as a companion in life and a friend with whom I learned to cope, mostly by myself. Stuttering has helped me accept myself for who I am, but it has also given me the insight that other people also have problems they do not want to talk about. In my younger years, I had a harder time dealing with this problem. I often did not value myself enough. Therefore, it was difficult for me to develop social skills. I believe that the main thing with this problem is to accept yourself and overcome your fears. For young people who have problems with stuttering, I would advise them not to let anyone tell them that they cannot do something or that they are not ready for something. Stuttering is not a handicap and should be accepted as a gift. • as an unpleasant circumstance that I unfortunately have to live with and deal with. • it is very difficult to describe. It's like a switch is flipped in my head. When I read a text, I know exactly which word will present me with a problem. I have to picture it exactly in my mind so that I can pronounce it without difficulty on the first try. • as a fellow traveler, it bothered me for a long time, and I avoided various situations because of my stuttering because I felt that I came across as less professional/smart/funny/whatever because I stutter. However, after doing psychotherapy, I realized that my stuttering does not define me as a person, which helped me to engage in situations that normally scared me. • I have found my stuttering to be a burden. • I've found my stuttering to be a difficult obstacle, especially in education and with kids who aren't aware of it, but it's also taught me to be a better person and not hurt anyone. • nothing special. I've learned to deal with it, and it doesn't bother me one bit when I'm stuck. • mostly it's harder at the beginning of the conversation (no matter with whom) and then later it gets better... sometimes the first 15 seconds or so, sometimes half a minute, sometimes a minute, but mostly it gets better the longer I talk. • as an obstacle.

Table 5. Female respondents' answers to the question I experience my stuttering...

I experience my stuttering...
<ul style="list-style-type: none"> • very difficult at the moment. There are better days and worse days, but the worse days are harder to bear the older I get. I'd like to try hypnosis, but my current financial situation does not allow me to. • as a shame, that I am incapacitated in life. I am limited in performing my daily duties. • as a part of me that I try to influence. • as a lifestyle. • currently as something I want to correct. • as something that is still hard for me to accept. When I was a girl, this problem was not given as much attention and sometimes it was really difficult, and it defines you as a person. Because I didn't get the help I needed back then, you learn to live with the stigma and it's hard to expose yourself to others. I am glad there are groups like this today and that there is a lot more work being done in this area than there was 20 years ago. A few months ago, I might not have even paid attention to this questionnaire, but I think it's time and it's never too late to come to terms with stuttering, accept it as such, and still do your best. • as a reminder to slow down. Although I believe I have had a mild form of stuttering all my life, a few years ago I would have answered most of the questions in your questionnaire with a 4 or 5 (except for the part affecting my career choice, because that would never have been the case). I would avoid everyday situations that I would classify as a "threat" to stuttering, try to find an alternative way or change words (use synonyms for words I know I will not say). The biggest problem was speaking in front of several people and speaking on the phone (very pronounced stuttering). Today, with the help of the techniques I learned and practiced, I can control the stuttering quite well in stressful (for me) situations. The stuttering is still there sometimes, but my attitude towards stuttering has changed. I no longer see it as an obstacle or a threat. I wholeheartedly wish this feeling to all people who stutter. I salute you. • I experience stuttering as a part of me. It has taught me some things in life and even as a child I had to face some fears. I think that's why I am a happy person today who has accepted it and lives with it. Even though I am not happy that I stutter, I am just as happy because I have learned to love myself regardless of some flaws, and I will never be ashamed of that part of me. • I see it as part of my personality and something that sets me apart from others. • I still see it as a burden and hardly find anything positive about it. Faith and sacramental life help me deal with stuttering. Speech therapy with elements of psychotherapy has also helped me a lot, and I find this combination of therapies extremely useful. I have learned that it is important to talk about my feelings in general and about stuttering in particular, as it permeates my life daily. I am still working on accepting my stuttering. Having a positive attitude about communicating with others and the cancellation technique help me with daily communication. • as a part of my life that makes me realize that if I can fight the stuttering, I can fight everything else. • as a challenge. • as a burden that I carry around with me every day and because of which I feel completely exhausted mentally and physically every day. • I try to accept it as a part of me, even though it's harder. With time, I am convinced that I will accept it.

As evident, some participants provided detailed responses, while others were more succinct. From these descriptions, it can be inferred that half of the participants view stuttering negatively, frequently using terms like “burden”, “difficult”, and “problem.” These responses do not clearly indicate whether women who stutter perceive stuttering as a greater challenge compared to men who stutter. However, it is evident that there are differences in how women and men approach stuttering. Women who acknowledged struggling with stuttering exhibited a

more positive outlook towards accepting stuttering in the future, whereas men who viewed stuttering as a problem or a burden tended to express less optimism.

Conclusion

Many of the studies mentioned earlier have demonstrated that stuttering can significantly impact various aspects of an adult's life (Klein & Hood, 2004; Klompas & Ross, 2004; Rice & Kroll, 2006; Craig et al., 2009; Koedoot et al., 2011; Kasbi et al., 2015; Connery et al., 2020). This study has found that stuttering negatively affects the quality of communication in various everyday situations but does not disproportionately affect the occupational and social aspects of the lives of people who stutter.

The results from the statistical analysis of the questionnaire specifically designed for this study indicate no statistically significant difference in the impact of stuttering between women who stutter and men who stutter across the studied areas of life: occupational and social aspects and everyday situations. These findings, suggesting that women and men are equally affected by stuttering, are consistent with some previous research (Blumgart et al., 2012; Bragatto et al., 2012; Freud et al., 2017).

Regarding how people who stutter perceive their stuttering, it is not possible to determine whether there is a difference between genders in terms of which group perceives stuttering more negatively or positively.

It is important to emphasize that this research has shown that stuttering does not always have a negative impact on the life of a person who stutters. Some individuals perceive their stuttering as something that has helped them discover their own strength. For instance, *a part of life that makes me realize that if I can fight stuttering, I can fight with everything else; I experience stuttering as a part of me. It has taught me some things in life and even as a child I had to face some fears. I think that's why I am a happy person today who has accepted it and lives with it; Stuttering has helped me to accept myself as I am, but it has also shown me that other people also have problems they do not want to talk about... Stuttering is not a handicap and should be accepted as a gift.*

Finally, it is important to mention some limitations of this research. Since the questionnaire was created specifically for this study, it lacks standardization, and this should be considered when interpreting the results. Furthermore, the data collection relied on anonymous responses, depending solely on the honesty and objectivity of the participants. Therefore, it is uncertain whether participants had received a formal stuttering diagnosis from a speech-language pathologist.

Moreover, a different sampling method could potentially yield a larger and more diverse respondent pool, which would be advantageous for future research on this and related topics. For these reasons, the findings of this study should be interpreted with caution.

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Public awareness of speech-language pathologists' professional and scientific work

SUMMARY

Speech–language pathology is both a profession and a scientific field. The professional work

of speech–language pathologists (SLPs) has a “history of low public awareness” (Janes, 2020, p. 1). Several public awareness studies conducted in countries such as Canada (Breadner et al., 1987), Australia (Janes et al., 2020), and Jordan (Mahmoud et al., 2014) have confirmed this. In contrast, public awareness of the scientific work of SLPs has not been investigated. This research gap is significant because findings on the awareness of social sciences are relevant to broader public discussions. To gather information on public awareness of the professional and scientific work of SLPs, we disseminated a questionnaire created for this study through various social media platforms, targeting the general public. A total of 975 participants completed the questionnaire (82.2% F and 17.6% M; age range 18-80 years). The results indicate that the public is highly aware of SLPs’ area of expertise (99.2%). They are also highly aware of the potential workplaces of SLPs, apart from nursing homes (36.3%). The majority of the public knows that SLPs work with people of all ages, except infants and elderly individuals (7.9% and 38.5%, respectively). Regarding specificities of SLPs’ work practices, the public is least aware of the following facts: SLPs are educated to provide therapy to people with dysphagia (22.7%), SLPs offer screening for disorders (29.5%), and SLPs provide legal reports (17.1%). Considering the general public’s awareness of SLPs’ scientific work, the most notable finding is that the majority believes speech-language pathology is a scientific area within medical sciences (64.3%). The results of this study will provide a foundation for developing educational campaigns about the role of SLPs in the prevention, assessment, diagnostics, and intervention of communication and swallowing disorders, as well as the importance of research in this scientific discipline.

Keywords: *public awareness, speech-language pathology, survey research*

Introduction

Awareness is defined as the knowledge that something exists or the understanding of a situation or subject at the present time based on information or experience (Cambridge Advanced Learner’s Dictionary and Thesaurus, 2015). In public awareness research, this term is often used interchangeably with the term *knowledge* (Trevethan, 2017). Although these terms are synonyms, certain differences in their meanings need to be explicitly defined. So, while *awareness* represents a lower level of informedness and general familiarity with the subject, *knowledge* refers to a more detailed and factual informedness (McCallum et al., 2006, as cited in Trevethan, 2017).

Speech-language pathology is a scientific and professional field. The scientific field of speech-language pathology research focuses on studying the normal functions of human communication and swallowing, the processes underlying impaired function, and developing new techniques for assessment and treatment (ASHA, n.d., a). The term *communication* encompasses speech, language, social communication, voice, speech fluency, and cognition, while the term *swallowing* encompasses all aspects of swallowing and related feeding behav-

iors (ASHA, 2016). The speech-language pathology profession is focused on the clinical management of communication and swallowing disorders, including their prevention, screening, assessment, treatment (ASHA, 2016), and counselling users and their families. Clinical practice is always based on evidence-based research.

Speech-language pathologists (SLPs) working in clinical practice are autonomous professionals and primary care providers for individuals with communication and swallowing disorders (ASHA, 2016). The type of service delivery by SLPs varies and includes in-person treatment, counselling for individuals with communication and/or swallowing disorders and their caregivers, teletherapy, and visitation services (Janes, 2020). SLPs work in a variety of settings, such as hospitals, schools, private practices, colleges and universities, rehabilitation centers, and healthcare facilities, and with people of all ages, from infants to the elderly (ASHA, n.d., b). Due to the variety of workplaces and age groups SLPs work with, they often collaborate with other professionals, such as teachers, doctors, nurses, psychologists, and occupational and physical therapists. Since clinical practice is evidence-based, SLPs working in clinical settings must continuously evaluate the quality of evidence appearing in journal articles and incorporate new and high-quality research evidence into clinical practice (ASHA, 2005).

Speech-language pathologists working in academia conduct basic and applied research related to communication and swallowing (ASHA, 2016). The workplaces of SLP researchers vary and include colleges and universities, research laboratories and institutes, state and federal agencies, and/or private industry (ASHA, n.d., a). Research may be conducted in universities, hospitals, and public health agencies and industries (ASHA, n.d., a).

Although communication and swallowing disorders have a high prevalence in the general population (e.g. Black et al., 2015; WHO, 2023), public awareness of speech-language pathology is low. This has been confirmed in several studies conducted in different countries. In general, low awareness and a lack of knowledge about the clinical aspect of speech-language pathology have been found in Jordan (Al Rjooob et al., 2022; Mahmoud et al., 2014), Canada (Breadner et al., 1987), Australia (Janes et al., 2020; Parsons et al., 1983), and Saudi Arabia (Alanazi & Fraih, 2021). In contrast, only the public of Malaysia had high awareness of this profession (Chu et al., 2019).

However, public awareness and knowledge vary depending on the aspects of the speech-language pathology profession being studied. For example, the public is aware of the treatment of fluency and speech sound disorders by SLPs (Alanazi & Fraih, 2021; Mahmoud et al., 2014), while awareness of the treatment of voice and swallowing disorders is low (Aj Rjooob et al., 2022; Janes et al., 2020). The most recognized age groups that SLPs work with are children and adults, while awareness of SLPs working with infants and the elderly is limited (Breadner et al.; Chu et al., 2019; Mahmoud et al., 2014). In addition, awareness of SLPs working in healthcare and education is high, while awareness of nursing homes as a workplace for SLPs is low (Breadner et

al., 1987; Janes et al., 2020; Mahmoud et al., 2014). Demographic factor analysis revealed that, in general, men, the elderly, people with lower levels of education, people living in rural areas, and people without children have limited awareness of SLPs' professional work and speech-language pathology as a professional field (Breadner et al., 1987; Chu et al., 2019; Code et al., 2016; Mahmoud et al., 2014).

All the reported studies addressed public awareness or knowledge of speech-language pathology as a professional field or SLPs' professional work, and there is a lack of research on the public's understanding of the scientific aspect of speech-language pathology. In one study, Greenwood et al. (2006) reported that speech-language pathology was not a career option for students because they did not know that this profession was also a scientific field. The low academic attention to public understanding of the social sciences is insufficient because the findings of the sciences dealing with human behavior, interaction, and activities are of more immediate relevance to a much broader public discussion (Lewis et al., 2023). Awareness of scientific findings is important in the digital age, where misinformation and redundancy abound, making it difficult for laypeople to obtain important information. It is also important to understand what contributes to scientific learning and how to access reliable sources of information.

Furthermore, all mentioned studies were conducted in non-European countries. Since cultural factors and the tradition of speech-language pathology in a given country impact the level of public awareness (Topbas 2006; Thordardottir & Topbas, 2021), it is possible that public awareness and knowledge of the professional and scientific work of SLPs vary across European countries. Studies conducted in Europe to date have mainly focused on awareness of specific disorders that SLPs work with (Code et al. 2016; Simmons-Mackie et al., 2002; Kuvač Kraljević et al., 2022). Only a few studies conducted specifically with the Croatian public have addressed awareness of some disorders that SLPs work with. Matić et al. (2021) and Kuvač Kraljević et al. (2022) reported that awareness of DLD in Croatia is less than desirable and lower compared to other (neuro)developmental disorders, such as autism. Higher awareness of aphasia was found by Leko Krhen & Prizl Jakovac (2015), but the authors stated that the research findings should be interpreted with caution as participants were healthcare professionals.

In addition, few studies have been conducted in Croatia to raise awareness among specific target groups. Grgić (2021) reported that parents in Croatia are more aware of stuttering compared to cluttering. Magdić (2022) reported that awareness of voice disorders among preschool- and schoolteachers in Croatia is low, while Pleško (2022) stated that pediatricians are aware of these disorders and are familiar with the role of SLPs in their diagnosis and treatment. However, none of the existing studies examined the extent to which the general public in Croatia is aware of the professional and scientific work of SLPs. Since public awareness influences the development of the profession and research investment in the field (Breadner et al., 1987; Code et al.,

2016; Spicko, 2007), obtaining empirical data on the level of public awareness of these issues in Croatia is a crucial first step for further planning of awareness-raising activities.

Research Aim and Questions

The aim of this study was to investigate public awareness of the professional and scientific work of SLPs through informedness of basic facts about these two areas. Awareness of SLPs' professional work was assessed by using nine questions, covering SLPs' areas of expertise, workplace, clients, types and forms of work, collaboration, and education. The level of awareness of SLPs' scientific work was assessed through four questions regarding evidence-based practice, the scientific field of speech-language pathology, potential research settings, and the existence of a Croatian journal for disseminating speech and language pathology research. Three research questions were posed for this study:

Q1. To what extent is the public aware of various aspects of SLPs' professional work? More specifically, what percentage of the public is aware of SLPs' areas of expertise, workplace, clients, types and forms of work, collaboration, and education?

Q2. To what extent is the public aware of various aspects of SLPs' scientific work? More specifically, what percentage of the public is aware of the basis for SLPs' work, the scientific field of speech-language pathology, potential research settings, and the existence of a Croatian journal for disseminating research in the speech-language pathology discipline?

Q3. Is there a difference in the level of awareness of SLPs' professional and scientific work based on respondents' age, gender, personal experience with SLPs, and parenthood?

The research findings aim to provide insights into public awareness of different areas of SLPs' professional practice and scientific work.

Methods

Instrument and Data Collection

A questionnaire was designed to collect data on public awareness of SLPs' professional and scientific work. The items were developed based on the study's objectives after an extensive literature review on the subject. The questionnaire consisted of four sections:

- a) Demographic information,
- b) Awareness of SLPs' professional work,
- c) Awareness of SLPs' scientific work,
- d) Personal experience with SLPs.

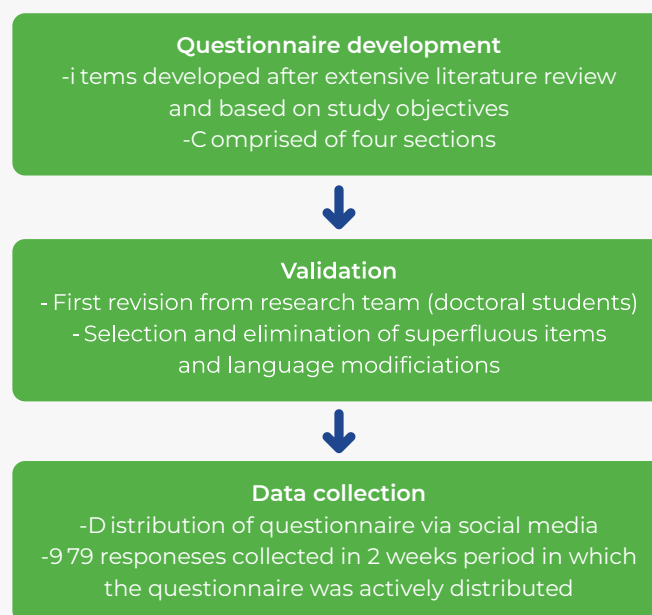
The questionnaire was developed in Croatian and distributed using the Google Forms platform. The final version of the questionnaire included a total of 40 questions. Most questions required

participants to select one or more answers from a closed set of options, while a few included free-text options. The demographic information comprised nine questions, covering age group, sex, education level, occupation, employment status, residence, and number of children. The section on SLPs' professional work included 12 questions in the distributed version, which were later revised due to construct validity issues (three excluded questions did not measure awareness as defined for this study). For all but one of the questions in this section, respondents could select multiple answers from a checkbox list containing both correct and incorrect answers. Each correct answer selected earned the respondent one point. For example, for the question "In which institutions can SLPs work?" there were ten possible answers. Selecting a correct answer, such as *Schools*, earned the respondent one point. The total number of correct answers for this section was 48, corresponding to the number of items in this section. Cronbach's alpha for the remaining nine questions was .913.

The section on SLPs' scientific work also included 12 questions in the final version. However, only four questions remained for analysis, as the others did not measure awareness but were posed as belief statements. The total number of items in this section was 11, with Cronbach's alpha for the remaining questions of .356. Due to a large discrepancy in the number of items between sections, Cronbach's alpha was also calculated for all items combined, resulting in a value of .911.

The estimated time required to complete the questionnaire was 10-15 minutes. The procedure for developing the questionnaire is shown in Figure 1.

Figure 1. *Development and distribution of the questionnaire on public awareness of SLPs' professional and scientific work*



To recruit respondents, the research team distributed the questionnaire to various groups of people through social media (WhatsApp, Facebook, email) to ensure a diverse sample. All potential participants received the same instructions to read before completing the questionnaire, including information about the study's purpose and the dissemination of its results. All adults residing in the Republic of Croatia who were not enrolled in a university degree program in Speech and Language Pathology were eligible to participate. All participants were informed that their participation was voluntary and that they could withdraw from the study at any time. They were also assured that their participation would remain anonymous.

Respondents' Characteristics

During the two-week period in which the survey was actively distributed, 979 questionnaires were collected. Four respondents were excluded from the sample because they reported working as SLPs. The demographic information and personal experience sections of the questionnaire were used to compare the characteristics of our sample with known characteristics of the general population (see the limitations section of the article). The demographic information and personal experiences are summarized in Table 1.

Table 1. *Demographic information of respondents*

Variables	N = 975 (%)
Gender	
F	801 (82.2)
M	172 (17.6)
Age	
Young adults (18-34)	327 (33.6)
Early middle age (35-44)	329 (33.8)
Late middle age (45-64)	299 (30.7)
Older adults (65+)	19 (2.0)
Region*	
Pannonian Croatia	212 (21.7)
Adriatic Croatia	205 (21.0)
City of Zagreb	360 (36.9)
Northern Croatia	198 (20.3)
Education	
Primary school graduate	6 (0.6)
High school graduate	257 (26.4)

Bachelor's degree	166 (17.0)
Master's degree	485 (49.7)
Master of science	33 (3.4)
Doctorate degree	28 (2.9)
Employment	
Employed	785 (81.9)
Unemployed	173 (18.1)
Parenthood	
Yes	645 (66.2)
No	330 (33.8)
Personal experience	
Yes	417 (42.8)
No	546 (57.2)
Not certain	12 (1.2)

Note: *Regions are classified in the Nomenclature of Territorial Units for Statistics (NUTS) of the European Union.

Data Analysis

IBM SPSS Statistics 27 was used for statistical analysis. Percentages were calculated for all multiple-choice questions on the SLPs' professional and scientific work. Nonparametric Mann-Whitney U and Kruskal-Wallis H tests were employed to analyze differences in the level of awareness with respect to age, gender, personal experience, and parenthood.

Results and Discussion

To better understand how the public perceives the professional and scientific work of SLPs, an online survey with a total of 40 questions was developed and distributed to adults residing in the Republic of Croatia. Most respondents were from the City of Zagreb, which reflects the city's high population density, as it is the most populated region in Croatia. The main findings focused on the quantitative responses regarding SLPs' professional and scientific work.

Awareness of SLPs' Professional Work

The section on SLPs' professional work was revised prior to analysis due to construct validity issues, resulting in the further analysis of nine questions. For the first research question, responses from all participants were grouped based on four criteria: 1) high awareness, 2) low awareness, 3) moderate awareness, and 4) incorrect responses. If more than 70% of respon-

dents answered correctly about a particular aspect of SLPs' professional or scientific work, the sample was considered to have high awareness (similar criteria were used in Chu et al., 2019). If 40-69% of respondents answered correctly, the sample was deemed to have moderate awareness. If less than 40% answered correctly, the sample was classified as having low awareness. All data on responses from the section about awareness of SLPs' professional work can be found in Table 2.

Table 2. Results from section about awareness of SLPs' professional work

Variables	Questions	High awareness	Medium awareness	Low awareness	Incorrect
Area of expertise	Who are SLPs?	communication, language, speech, voice, swallowing and hearing disorders experts 99.2%		/	cognitive processes, behavior, and socio-emotional functioning 7.4%
Workplaces	In which institutions can SLPs work?	schools 92.4%, kindergarten/preschool 92.2%, hospitals 90.9%, rehabilitation centers and institutions 89.4%, children's homes 79.2%	NGO 41.5%, private therapy providers 59.6%	nursing homes 36.3%	foreign language schools 24.6%
Clients	What groups of people do SLPs work with?	preschool children 98.9%, school children 96.2%	students 47.8%, adults 55.7%	newborns 7.9%, older adults (65+) 38.5%	/
	SLPs are trained to work with people who have:	problems making sounds (articulation disorders) 99.5%, stuttering 94.3%, language comprehension and expression difficulties (language disorders) 85.8%, reading and writing difficulties 73.1%	hearing impairment 54.2%, cleft lip and/or palate 43.7%, autism spectrum disorder 49.3%	swallowing difficulties (dysphagia) 22.7%, removed vocal cords and/or larynx by surgery (laryngectomy patients) 37.1%	bone diseases 0.6%, laryngitis 0.9%

Types and forms of work	Mark the type of services you think SLPs provide.	diagnostics and assessment 88.9%, providing support/therapy 75.6%	prevention of disorders 65.4%, counseling work 56.5%	screening 29.5%,	teaching assistant for special needs 64.6%, Croatian language and mathematics tutoring 1.5%
	What are possible forms of SLP's work?	direct work 99.2%, educating preschool teachers, schoolteachers, and hospital workers 78.7%	teletherapy 53.2%	providing legal reports 17.1%	/
Collaboration	Which specialists do SLPs cooperate with?	preschool teachers 92.7%, schoolteachers 92.1%, doctors 92.3%, psychologists 90.2%	nurses 42.7%, occupational therapists 55.3%, social workers 50.5%	librarians 11.8%, physiotherapists 21.6%	/
Education	Where can SLPs get an education in Croatia?	Faculty of Education and Rehabilitation Sciences 88.3%			Faculty of Medicine 9.1%

The results show that our sample is highly familiar (more than 90%) with SLPs' areas of expertise and traditional workplaces of SLPs, such as schools and preschools. It is not surprising that a very high proportion of the sample knew that SLPs work with preschool and school children (98.9% and 96.2%, respectively). Respondents were also more likely to be aware that SLPs work with articulation disorders (99.5%), stuttering (94.3%), and language disorders (85.8%). However, fewer than 50% of the sample knew that SLPs could work in nursing homes, conducting screenings for disorders, or provide legal reports. Only a very small proportion of the sample was aware that SLPs work with newborns (7.9%).

Some interesting insights emerged from participants' incorrect responses, revealing misinformation about some aspects of SLPs' work, such as the types of services they provide and the limits of the interdisciplinary relationship between SLPs and physicians. An open-ended question (not listed in Table 2) about awareness of SLP organizations or associations in Croatia revealed that most respondents (88.3%) were not aware of such organizations or associations, and only 5.23% could name them correctly.

A very high level of awareness was found regarding most potential workplaces of SLPs. Over 90% of the sample was aware that schools, preschools, and hospitals may employ SLPs, consistent with previous survey research on awareness of SLPs' professional work (Breadner et al., 1987; Janes et al., 2020; Mahmoud et al., 2014). The current survey also found that the public is

aware that SLPs work with articulation and speech fluency disorders, which aligns with previous research (Alanazi & Fraih, 2021; Mahmoud et al., 2014). Additionally, the public is aware that SLPs work with language disorders, which is noteworthy given previous research in Croatia that reported relatively low awareness of SLPs working with individuals with language disorders (Matić et al., 2021; Kuvač Kraljević et al., 2022).

However, this study also found that the public is only moderately aware of SLPs' work with autism spectrum disorder. Also consistent with previous research, the public is generally less aware of SLPs' treatment of voice and swallowing disorders (Aj Rjoob et al., 2022; Janes et al., 2020). While there is moderate awareness that SLPs work to prevent disorders (65.4%), it is surprising that only 7.9% thought that SLPs could work with newborns. In addition, fewer than 60% of the sample indicated that the SLPs work with students, adults, and the elderly, suggesting that the public primarily associates SLPs' work with the education system. This finding is significant, as understanding that SLPs work with all age groups is crucial for timely treatment.

These results show slightly higher levels of awareness regarding SLPs' professional work compared to previous reports (Breadner et al., 1987; Mahmoud et al., 2014). However, the overall trend indicates that there are still aspects of SLPs' professional work where awareness remains low, such as working with infants and the elderly.

To summarize, from the public's perspective, the work of SLPs in Croatia is still primarily defined by their work with children and treatment of disorders that are easily recognizable, such as articulation disorders and stuttering. There is minimal awareness of other user groups, such as newborns and adults, whose very sensitive health conditions often require teamwork. It remains unclear whether this low level of awareness is due to the public's perception that SLPs work with these groups only as part of a team or if SLPs are not perceived as integral members of such teams.

Awareness of SLP as a Scientific Discipline

The section on SLPs' scientific work was revised both before and after analysis due to construct validity issues, resulting in only four questions being considered for further analysis. The same criteria for grouping responses were applied to this part of the results. All data on responses from the second section of the questionnaire are presented in Table 3. The results indicate that our sample was highly aware that SLPs' work is based on scientific evidence (87.7%). Additionally, there is high awareness of schools and preschools as potential research sites.

Table 3. Results from section about SLPs' scientific work

		High awareness	Moderate awareness	Low awareness	Incorrect
Basis for SLPs' work	SLPs' work is based on:	scientific evidence 87.7%, SLP's experience 80.3%	/	users' preference 18.8%, resources 19.2%	religious beliefs 0.3%
Scientific field	Speech-language pathology is a scientific field within:	/	/	social sciences 26.4%	medical sciences 64.3%, humanities 16.1%, natural sciences 4.0%
Research setting	Scientific research in the field of speech-language pathology can be conducted in:	schools 97.2%, preschools 97%, hospitals 71.3%		laboratories 13.1%	shops 2.1%, hotels 2.1%
Croatian scientific journal	There are scientific journals about speech-language pathology which are edited and published in the Republic of Croatia.	/	/	yes 9.4%	no 1.3%

This study included questions about the SLPs' scientific work, a novel approach for this type of research. The findings reaffirm that the public primarily associates SLPs with educational settings. Over 90% of respondents indicated that scientific research can be conducted in schools and preschools. Interestingly, despite more than 90% of respondents acknowledging that SLPs could work in hospitals (see Table 2), only 71.3% believed that SLPs could conduct scientific research in hospitals. Furthermore, only 13.1% of respondents associated laboratories with SLPs' scientific work. These results suggest a general preconception about SLPs' scientific work and potentially about the social sciences in general, indicating that there may be a belief that strictly controlled conditions are not necessary for experiments in this field.

It is noteworthy that a relatively high percentage of respondents believe that SLPs' work is based on scientific evidence (87.7 %) and SLPs' work experience (80.3 %). Despite this high level of awareness, there is a need to further educate the public about the importance of scientific research in SLPs' work. In addition, there remains significant room for improvement in this area, as less than 20% of the sample felt that user preferences and resources influence the professional delivery of SLPs.

Differences Based on Age, Gender, Personal Experience, and Parenthood

To determine the differences in public awareness of the professional and scientific work of SLPs, questions were categorized into correct and incorrect responses. The maximum score for awareness of SLPs' professional work was 48, while for awareness of SLPs' scientific work, it was 11. A nonparametric test was employed due to unequal group sizes and the non-normal distribution of variables, which exhibited high variability in correct answers.

A Mann-Whitney U test was conducted to assess whether awareness of SLPs' professional and scientific work differed by gender. The results revealed a significant difference in awareness of SLPs' professional work between men and women ($U = 53167$, $z = -4.703$, $p < 0.001$), with women demonstrating significantly higher awareness than men (mean ranks = 506.62 for women and 395.61 for men).

A Kruskal-Wallis H test revealed a statistically significant difference in awareness of SLPs' professional work among different age groups ($H = 8.496$, $p = .037$). The mean rank scores were 517.17 for young adults, 486.51 for early middle-aged adults, 462.63 for late middle-aged adults, and 385.32 for older adults. Young adults demonstrated the highest awareness of SLPs' professional work compared to other age groups. A post-hoc analysis showed that the differences were statistically significant between young adults and older adults ($p = .047$) as well as between young adults and late middle-aged adults ($p = .015$), with young adults scoring higher in both cases.

Respondents were also grouped based on their personal experience with speech and language therapy, either directly or through relatives. Just over 40% ($N = 417$) of respondents reported having such personal experiences with SLPs. A Mann-Whitney U test was conducted to determine whether awareness of the professional and scientific work of SLPs differed based on personal experience. The results indicated a significant difference in awareness of SLPs' professional work related to personal experience ($U = 101372.5$, $z = -2.917$, $p < 0.01$), with the group having personal experience scoring higher than the group without such experience (mean ranks = 511.90 for the group with personal experience and 459.16 for the group without personal experience).

Another Mann-Whitney U test was conducted to determine whether awareness of SLPs' professional and scientific work differed based on parenthood. The results indicated a significant difference in the awareness of SLPs' scientific work between parents and non-parents ($U = 91361$, $z = -3.709$, $p < 0.001$), with non-parents demonstrating higher awareness score (mean ranks = 533.65 for non-parents and 464.64 for parents).

The analysis of demographic factors revealed differences in awareness of SLPs' professional work among various groups and offered guidelines for further research and the development of awareness campaigns. Men and older respondents in our sample demonstrated lower

awareness of SLPs' professional work, which aligns with some previous research (Breadner et al., 1987; Mahmoud et al., 2014). On the other hand, Chu et al. (2019) found no gender differences in awareness. Societal factors may contribute to these gender differences, as speech-language pathology in Croatia is predominantly a female profession, potentially influencing public perception and making the field seem more relevant or interesting to women.

Younger adults showed the highest levels of awareness of SLPs' professional work. This result should be interpreted cautiously, as it may be influenced by other characteristics of this group, such as higher education levels or more personal experience with SLPs. Personal experience with speech-language therapy was also an important factor, as individuals with such experience exhibited significantly higher awareness of the profession.

Interestingly, non-parents showed higher awareness of SLPs' scientific work, while there were no differences between groups concerning awareness of SLPs' professional work. This may be influenced by characteristics such as age or educational level, with non-parents possibly being younger or having higher educational levels.

Further analyses with larger and more balanced samples are needed to draw stronger conclusions about the interaction of different demographic characteristics on awareness levels.

Limitations

The findings of this survey are limited by certain features of our sample. There was a significant gender imbalance, with over 80% of respondents being women. In addition, more than 70% of participants had higher education, compared to only about 20% of the general Croatian population (Croatian Bureau of Statistics, 2023).

This is the first survey to extend awareness research to the field of speech-language pathology as a scientific discipline. Although it included only four questions with low reliability, and thus the results in this area should be interpreted with caution, we hope this approach encourages further research to incorporate the scientific aspects of speech-language pathology into their analyses.

In future surveys of this type, it will be important to achieve a more balanced distribution of respondents by age and gender, as well as a more representative sample from different regions. While quantitative data from multiple-choice questions provide useful basic information, they are limited by the potential for respondents to guess answers. Future research should also focus on understanding awareness of SLPs' professional and scientific work among specific groups, such as professionals who frequently collaborate with SLPs.

Conclusions

The results of this study show that the Croatian public has high awareness of some aspects of SLPs' professional and scientific work, but it is important to note that the sample for this study consisted mainly of highly educated women. For SLPs' professional work, there is high awareness of SLPs' area of expertise, as well as most SLPs' workplaces such as schools, preschools, hospitals, rehabilitation centers, and children's homes. The public is also highly aware that SLPs work with children and treat people with disorders, such as articulation disorders, stuttering, language disorders, dyslexia, and dysgraphia. There is also high awareness of some types and forms of work, such as diagnostics and assessment, providing support/therapy, direct work, and educating preschool teachers, schoolteachers, and hospital workers. Additionally, there is high awareness that SLPs collaborate with preschool teachers, schoolteachers, doctors, and psychologists. A high proportion of the public is also aware of SLPs' education. On the other hand, there is low awareness regarding nursing homes as a potential workplace, newborns and older adults as possible clients, screening and providing legal reports as possible types and forms of work, and collaboration with librarians and physiotherapists. For SLPs' scientific work, there is high awareness of some bases for SLPs' work, such as scientific evidence and SLPs' experience. There is also high awareness of schools, preschools, and hospitals as potential research sites. However, there are some aspects of SLPs' scientific work for which the public shows low awareness, such as basing SLPs' work on users' preferences and resources, conducting research in laboratories, and SLPs being a discipline within the social sciences.

Results also show that there are differences in awareness of SLPs' professional and scientific work based on demographic factors, such as age, gender, personal experience, and parenthood. Older adults and men show the lowest levels of awareness, while young adults, women, and people with personal experience show the highest levels of awareness of SLPs' professional work. Also, non-parents exhibit higher levels of awareness of SLPs' scientific work.

This study showed that awareness of some aspects of SLPs' professional and scientific work is relatively high, but there are also issues that require further attention. The goal of conducting survey research on public's awareness of SLPs' professional and scientific work is to uncover potential barriers to the early identification of disorders and the uptake of therapies for communication and swallowing disorders.

Acknowledgements

The authors would like to thank all the participants in this study.

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Assessing sentence comprehension in Slovenian using the new JERA test: Linguistic background and standardization

SUMMARY

This article presents JERA, a new sentence comprehension test for the Slovenian language based on the sentence-picture matching task well-known in the psycholinguistic literature. We analyzed existing theoretical studies and identified ten sentence structures that cover the relevant range of structural complexity and reflect the relevant features of Slovenian morpho-syntax. The test uses one hundred carefully selected sentences of these types. Measuring accuracy and response time, researchers standardized on 506 adult neurotypical speakers of Slovenian. The scientific background, aim, and standardization of the test are presented.

Keywords: *receptive language, Slovenian, language assessment, standardization, language faculty, psycholinguistics*

Introduction

In sentence comprehension, incoming sounds, morphemes, and words are processed quickly, effortlessly, and automatically. Nevertheless, these processes require significant mental work through the coordination of various cognitive functions, both consciously and unconsciously. This is possible because humans possess the capacity for language known as 'competence,' which identifies and constrains the set of possible linguistic expressions, as well as with a set of cognitive resources known as performance, which enable the use of this knowledge in everyday situations (Chomsky, 1965). Understanding some types of sentences requires more mental resources than understanding other types. One obvious criterion is length: compared to shorter utterances, such as a transitive clause in (1a) below, longer utterances, such as two coordinated clauses in (1b), may require more time to access lexical meanings and then integrate them

into a coherent semantic whole.

However, sentence length is not the only determining factor, as shown by examples (1b), (1c), and (1d), which are of comparable length and syntactic complexity; in particular, they all describe two events. It is easier to understand two coordinated clauses in (1b) than two subordinated clauses in (1c) and (1d), where a syntactic dependency is established between the subject of the main clause and the corresponding verb, which is separated from the subject by a relative clause so that during the processing of the relative clause, the subject must be temporarily stored in working memory. Object relative clauses (1d) are more difficult to process than subject relative clauses (1c) due to the greater distance between the dependent elements (see, e.g., Gibson (1998) for discussion).

(1)	a.	Medved		brca	konja.						T1¹
		bear _{M.SG.NOM}		kick _{3.SG}	horse _{M.SG.ACC}						
		<i>'A/the bear kicks a/the horse.'</i>									
	b.	Medved		brca	konja	in žirafa	grize	slona.			T4
		bear _{M.SG.NOM}		kick _{3.SG}	horse _{M.SG.ACC}	& giraffe _{F.SG.NOM}	bite _{3.SG}	elephant _{M.SG.ACC}			
		<i>'A/the bear kicks a/the horse and a/the giraffe bites an/the elephant.'</i>									
	c.	Medved,	ki	brca	konja,		grize	slona.			T5
		bear _{M.SG.NOM}	THAT	kick _{3.SG}	horse _{M.SG.ACC}		bite _{3.SG}	elephant _{M.SG.ACC}			
		<i>'A/the bear that kicks a/the horse, bites a/the elephant.'</i>									
	d.	Medved,	ki ga	brca	konj,		grize	slona.			T6
		bear _{M.SG.NOM}	THAT	kick _{3.SG}	horse _{M.SG.NOM}		bite _{3.SG}	elephant _{M.SG.ACC}			
		<i>'A/the bear that a/the horse kicks, bites a/the elephant.'</i>									

Given the general homogeneity of the anatomical organization of cognitive resources (brain structures) in a given language community (e.g., the adult neurotypical population), it is naturally expected that members of that population will exert a comparably similar cognitive effort for a given sentence structure to understand sentences of that type. This effort can be measured by various behavioral markers that track comprehension globally, specifically at the level of the entire sentence (as opposed to tracking sentence comprehension online). For example, if relative clauses (1c) and (1d) require more cognitive resources than coordinated (1b) and simple (1a) transitives, one might expect the former to be associated with lower accuracy and longer global reading time than the latter. A generalized version of this idea leads to the concept of a standardized sentence comprehension test that can serve as a reference measure of performance on specific sentence types. Standardized tests are generally considered good predictors of an individual's performance because they meet stringent reliability requirements, such as measures of

¹ The codes T1, T2, etc. refer to respective sentence types in JERA (see Section 2).

internal validity, test-retest procedures, normalization of scales, and establishment of thresholds for certain measures. For this reason, such tests are used not only in scientific research but also in applied (multilingual, clinical, and educational) research aimed at specific population groups.

This paper introduces JERA, a new standardized tool for measuring sentence comprehension in Slovenian, and reports on its standardization process. When creating an original Slovenian sentence comprehension test, we considered both syntactic and processing complexity and specifically determined which sentence types should be included so that the test administrator can distinguish between the effects of impaired language competence and the effects of impaired language performance. In developing JERA, we identified several sentence types that we believe adequately represent the range of the syntactic and processing difficulty a Slovenian speaker typically encounters in regular language use. We hypothesized that a test sensitive to syntactic and processing complexity could contribute to a more objective, efficient, and usable tool, as reflected in a high degree of reliability in standardization.

This paper is structured as follows. In Section 2, we discuss the sentence types selected for JERA based on syntactic and processing complexity. In Section 3, we present the psycholinguistic task used to create a sentence comprehension test in Slovenian. In Section 4, we summarize the normalization data and provide reliability measures.

Sentence Types in Relation to Syntactic and Processing Complexity

In this section, we discuss the sentence types included in JERA. The selection was made based on the following:

- **a careful examination of the linguistic literature on Slovene syntax** from descriptive (Toporišič, 2000) and formal (e.g., Ilc, 2008; Marušič & Žaucer 2016, among others) perspectives,
- **our own previous psycholinguistic studies** (Pavlič & Stepanov, 2020; Stepanov & Stateva, 2015; Stateva & Stepanov, 2017), and
- **examination of the sentence types** included in previous sentence comprehension tests, most notably the English Test for Reception of Grammar (TROG; Bishop, 1982, 2003, 2005) and the Italian COMPRENDO (Cecchetto et al., 2012), which can be considered JERA's methodological predecessors.

With respect to the last point, TROG was standardized for English but later developed into TROG-2 and standardized again for English and several other languages, for example, Croatian (Bishop et al., 2014), but not Slovenian, for which only a non-standardized translation exists (Mirt, 2022). The test items are divided into 20 sets of sentences with four items in each set. COMPRENDO was developed and standardized exclusively for Italian. It contains ten sets of sentences with ten items in each set. Considering these tests and the studies mentioned above, as well as our own further research, we have identified ten sentence types for inclusion in JERA, briefly

reviewed below. Further linguistic criteria for selection, including the choice and balancing of lexical items used in the test, are addressed in Section 3.2 and by Stepanov et al. (2023).

Affirmative SVO Sentences with Unmarked Word Order (T1)

Slovenian is a Slavic language that permits a large degree of freedom in the relative ordering of words and constituents within a sentence. The SVO order is unmarked, whereas other orders represent various syntactic and/or information structure-driven constituent displacements that may also carry semantic consequences. Therefore, considerations of (un)markedness of the word order are relevant more generally in choosing the sentence types for JERA. Sentence type T1 is represented by basic SVO sentences with minimal phrasal complexity, whereby both subject and object are single-word items (Slovenian does not make use of definiteness devices such as articles). These sentences are made thematically reversible, meaning the subject and object can, in principle, switch their positions without possibly affecting the sentence's plausibility (e.g., *The bear bites the elephant* is reversible, but *The bear bites the tree* is not). Comprehension of sentences like these requires an understanding and keeping track of the respective thematic roles based on word order and morphological case assignment. An example of this type is in (1a) above.

Subject and Object Center-embedded Relative Clauses (T5 and T6)

These sentence types, exemplified in (1c) and (1d), are particularly useful for assessing working memory performance since they both require storage and manipulation of incomplete syntactic dependencies. Furthermore, numerous previous studies have observed that processing an object relative clause is more costly than processing a subject relative clause (Ford, 1983; Gordon et al., 2001; Grodner & Gibson, 2005; Just & Carpenter, 1992; King & Just, 1991; Levy et al., 2013; Traxler et al., 2002). In JERA, we only used the center-embedded versions of the relative clauses (cf. (1c) and (1d)), where the relative clause is located between the main subject and main verb (see also Pavlič & Stepanov (2020) for discussion). We also considered the inclusion of the right-peripheral relative clauses, an option also utilized in TROG and COMPRENDO (e.g., *The bear bites the elephant that kicks the horse*, cf. (1c)). However, we opted against it as in this format the sentences become ambiguous regarding the point of attachment of the relative clause (subject or object) and therefore are not well suited for a sentence-picture verification task (see Pavlič & Stepanov (2020) for details and relevant literature).

Coordination of Two Simple SVO Clauses with Unmarked Word Order (T4)

Type T4, exemplified in (1b), involves an increase in lexical complexity without significant increases in syntactic complexity. There is no syntactic dependency connecting both clauses at any point: each clause functions as its own proposition, and the complex proposition is a simple juxtaposition of these two clauses. Testing sentences of this type is useful for determining

any complications in comprehending non-trivial sentences without involving complex syntax. Performance on these sentences may potentially be compared with performance on sentence types with similar argument structures that do involve syntactic dependencies, such as relative clauses (see Section 2.2 above).

Negated SVO Sentences with Unmarked (T7) and Marked (T8) Word Order

(2)	Medved	ne	grize	slona.	T7
	bear _{M.SG.NOM}	NOT	bite _{3.SG}	elephant _{M.SG.ACC}	
	<i>'A/the bear does not bite an/the elephant.'</i>				

Fodor and Garrett (1967) and Sherman (1976) were among the first to show that reaction times and error rates are higher when understanding negated sentences than when understanding their affirmative counterparts, suggesting that negation increases processing costs. JERA contains negated transitive sentences with unmarked (2) and marked (4) word order, the latter being object-verb-subject (see Section 2.5 below).

Sentences with Information Focus and Marked Word Order (T2 and T8)

(3)	Slona		grize	medved.	T2
	elephant _{M.SG.ACC}		bite _{3.SG}	bear _{M.SG.NOM}	
	<i>'It is a/the bear that bites an/the elephant.'</i>				
(4)	Slona	ne	grize	medved.	T8
	elephant _{M.SG.ACC}	NOT	bite _{3.SG}	bear _{M.SG.NOM}	
	<i>'It is not a/the bear that bites an/the elephant.'</i>				

As with many other Slavic languages, word order in Slovenian is regulated largely by information-structural considerations. Specifically, topics precede foci, and presupposed 'old' information tends to precede the non-presupposed 'new' one. According to common theories of information structure, information focus serves to adapt the information structure of a sentence to its larger context: one piece of information is emphasized, and everything else fades into the background (see Mathesius (1947) and subsequent work). As a result, a narrow information-focused constituent usually appears postverbally, and if that constituent is the subject, this usually results in a marked OVS word order whereby the object precedes the subject. Sentences like this are typically used as answers to a content question such as Who bites the elephant? This is also the case in Slovenian (Živanović, 2015; Stopar, 2017). The introduction of affirmative and negative sentences with marked word order is therefore dictated by the specifics of Slovenian grammar and has a notable impact on performance. Note that in some languages (e.g., English and Italian), a similar effect can also be achieved by passivization. Due to the similarity

of function and effect, both processes are often used to test processing, both in psycholinguistic experiments and diagnostic tests (although, according to linguistic analyses, they are not related by the nature of their structure).

Comparative Sentences (T3)

- (5) a. Medved nosi več korenčkov kot hrušk. **T3**
 bear_{M.SG.NOM} carry_{3.SG} MORE carrots_{F.PL.GEN} THAN pear_{F.PL.GEN}
'A/the bear carries more carrots than pears.'
- b. Medved nosi več korenčkov kot slon. **T3**
 bear_{M.SG.NOM} carry_{3.SG} MORE carrots_{F.PL.GEN} THAN elephant_{M.SG.NOM}
'A/the bear carries more carrots than an/the elephant.'

According to the standard syntactic analysis presented by Živanović (2010) for Slovenian, the comparative structure contains two events expressed by two verbs, each in a separate clause. Such a structure makes it possible to omit semantically recoverable parts, as the interpretation of the whole is not affected. The speaker must recover the omitted part by linking it to the syntactically/semantically identical source (Kennedy et al., 2013). This process is costly and, at the same time, depends on the distance between the elements. Therefore, we can assume that it is not irrelevant which part of the syntactic structure is omitted: the subject plus verb or the verb plus object. In fact, Grant (2013) reports longer reading times in self-paced reading of English comparative structures with the omission of the subject-verb complex compared to the omission of the verb-object complex. If these results can be transferred to Slovenian in future studies, we would expect the interpretation of (5b) to require more cognitive effort than that of (5a) under the appropriate contextual conditions.

Temporal Subordination with Cataphora and Marked (T9) and Nnmarked (T10) Word Order

- (6) a. Medtem ko tepta rože medved grize slona. **T9**
 while crush_{3.SG} flower_{F.PL.ACC} bear_{M.SG.NOM} bite_{3.ED} elephant_{M.SG.ACC}
'While crushing flowers, a/the bear bites an/the elephant.'
- b. Medtem ko tepta rože slona grize medved **T10**
 while crush_{3.SG} flower_{F.PL.ACC} elephant_{M.SG.ACC} bite_{3.SG} bear_{M.SG.NOM}
'While crushing flowers, a/the bear bites an/the elephant.'

These sentences belong to a relatively complex syntactic type involving cataphora, a type of anaphoric dependency. Furthermore, these sentences utilize another important morphosyntactic feature of Slovenian, namely, *pro*-drop or subject omission. They thus involve two syntactic dependencies: (i) the subject of the verb *crush* is the same as of the verb *bite*, and (ii) the first subject is unpronounced. Specifically, in examples (6a) and (6b), the referent for the

unexpressed subject in the subordinate clause is only made explicit in the main clause. Understanding these sentences involves a dependency resolution whereby the referent for the unpronounced subject only comes later in the sentence. The parser does not find an available antecedent in the preceding syntactic context. Therefore, it expects to find it in the incoming sentence material and considers each subsequent incoming noun phrase as a potential referent. Experimental studies have shown that the parser is 'active' or 'impatient' in the sense that it does not wait until all potential referents are stored in verbal working memory but evaluates them one by one as they are integrated into the structure. More precisely, the parser tries to link the cataphor to the first potential referent. In cases like (6a), this attempt is successful, as the pronominal element is first linked to *medved* 'bear', which is the correct referent. However, Slovene also allows a different type of structure, in which the first potential referent is actually the focalized (in the sense of information focus, see Section 2.5 above) object *slon* 'elephant' (6b). The parser tries to associate this referent with the pronoun but fails because the pronoun requires an association with the subject. The parser then abandons this potential referent and continues the search until it encounters the subject, which can be successfully integrated, and the syntactic dependency is closed. This additional processing, however, comes at a cognitive cost, as can be seen, for example, in the self-paced reading paradigm (Pavlič & Stepanov, 2023). Therefore, (6b) is associated with greater cognitive complexity than (6a). To our knowledge, this is the first time this sentence type has been included in a sentence comprehension test.

Methodology

As noted above, JERA is based on the sentence-picture matching or verification task (Fraser et al., 1963). In this task, the participant typically reads or hears a sentence and is then presented with a choice of four pictures from which they must select the picture that corresponds to the meaning of the sentence. The earlier sentence comprehension tests, TROG and COMPRENDO (see Section 1), also used this task. In terms of sentence type selection, we found COMPRENDO more oriented toward sentence complexity than TROG, making it possible to assess the competence level (syntax) as well as the functioning of linguistic working memory. In creating JERA, we followed this good practice. We also hypothesized that balancing a test in terms of syntactic and processing complexity will be reflected in a high degree of reliability in test standardization. This section presents the process of standardization of the test: participants (3.1), measuring instrument (3.2, and procedure (3.3).

Participants

A total of 599 self-reported Slovenian-speaking adults were recruited to test their performance on the ten sentence types included in JERA using the following predefined demographic criteria:

- 18-75 years old (inclusive)

- Slovenian as only L1
- no confirmed diagnosis of neuropathological disease
- normal or corrected-to-normal vision
- normal or corrected-to-normal hearing

Data from 93 informants were excluded from this pool as they did not fulfil these criteria, leaving 506 participants as the final standardization pool. As is common in neuropsychological testing, we also controlled for the demographic factors of the recruited sample, namely age, gender, and education, as shown in Table 1. To estimate how representative our sample is, the figures are supplemented by a comparison with the age, gender, and education structure of the adult Slovenian population from the SISTAT database (2021). In the standardization pool, the proportions of male/female participants per age group do not deviate by more than 8.4% (M=2.7%, SD=2.1%) from the proportions in the entire population, while the proportions of participants with primary, secondary, and tertiary education per age group do not deviate by more than 6.7% (M=3.6%, SD=2.3%).

Table 1. Demographics broken down by age, gender, and education.

Age	Gender		Education			SUM
	F	M	prim	sec	tert	
18-27	73 (+8.4%)	41 (+1.2%)	07 (-0.9%)	75 (+6.7%)	32 (+3.9%)	114 (+9.7%)
28-37	49 (+1.9%)	45 (+0.0%)	07 (+0.2%)	21 (-4.5%)	66 (+6.3%)	94 (+2.0%)
38-47	54 (+1.4%)	41 (-2.3%)	08 (-0.2%)	32 (-4.4%)	55 (+3.6%)	95 (-0.9%)
48-57	57 (+2.1%)	39 (-1.9%)	17 (+0.4%)	27 (-5.6%)	52 (+5.4%)	96 (+0.2%)
58-67	51 (+1.1%)	28 (-3.4%)	07 (-3.1%)	25 (-5.1%)	47 (+5.9%)	79 (-2.3%)
68-75	19 (-3.7%)	09 (-4.9%)	06 (-3.5%)	10 (-5.3%)	12 (+0.1%)	28 (-8.6%)
SUM	303 (+11.3%)	203 (-11.3%)	52 (-7.0%)	190 (-18.2%)	264 (+25.2%)	506

When the informants are grouped according to individual factors, the test sample still largely reflects the entire Slovene adult population, but the differences become somewhat larger. Regarding age groups (Figure 1), the differences are in the youngest group (18-27 years) with 9.7% more informants and in the oldest group (68-75 years) with 8.6% fewer informants. In terms of gender (Figure 2), female and male participants are disproportionately represented, with 11.3% in favor of women. In terms of education (Figure 3), participants with completed tertiary education are more strongly represented (25.2%), meaning that 7.0% fewer participants with primary education and 18.2% fewer participants with secondary education were tested compared to the entire adult population in 2021.

Figure 1. Age distribution in the JERA recruitment sample (left) compared to the entire adult population (right)

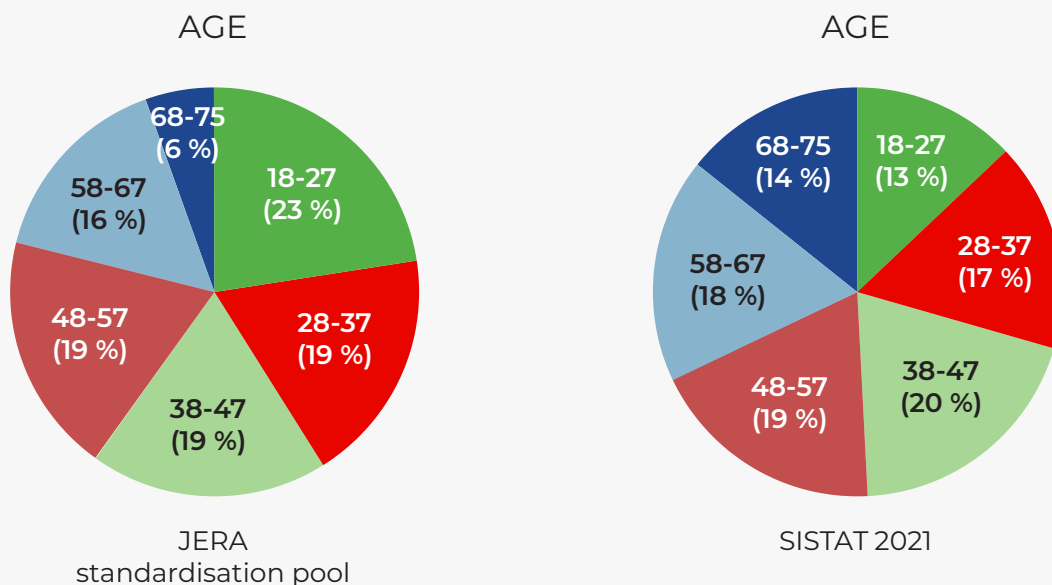


Figure 2. Gender distribution in the JERA recruitment sample (left) compared to the entire adult population (right)

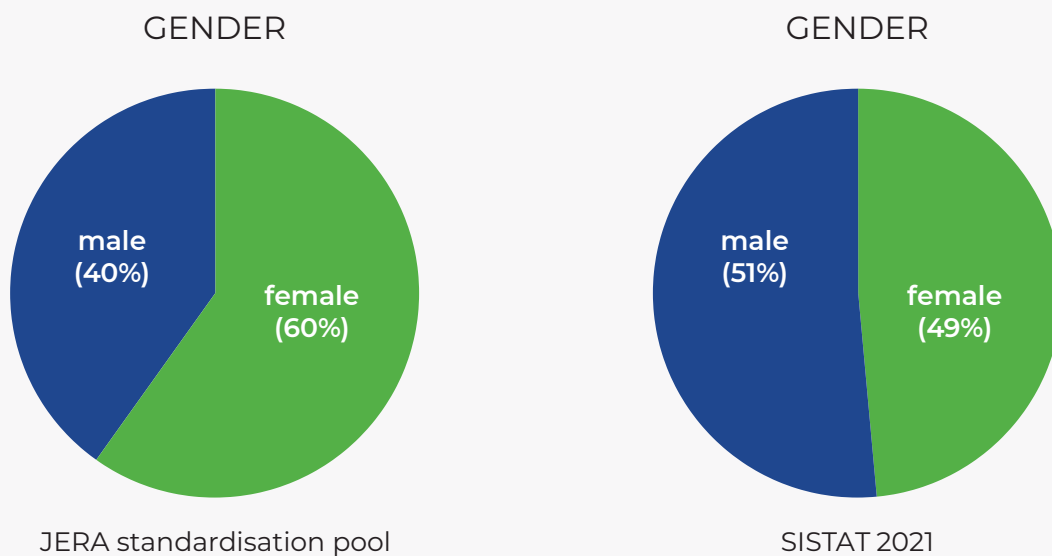
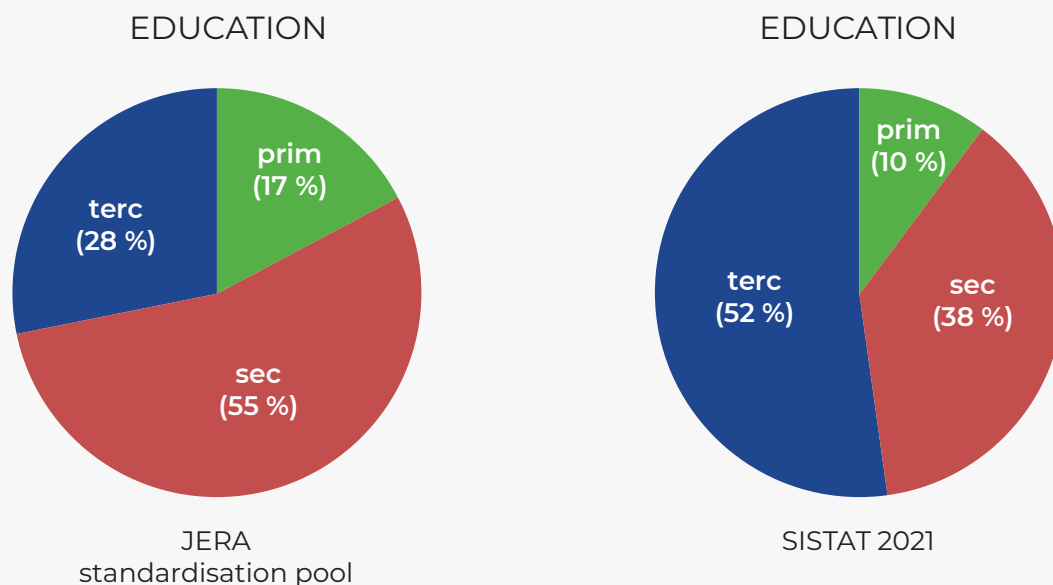


Figure 3. Education distribution in the JERA recruitment sample (left) compared to the entire adult population (right)



Measuring Instrument

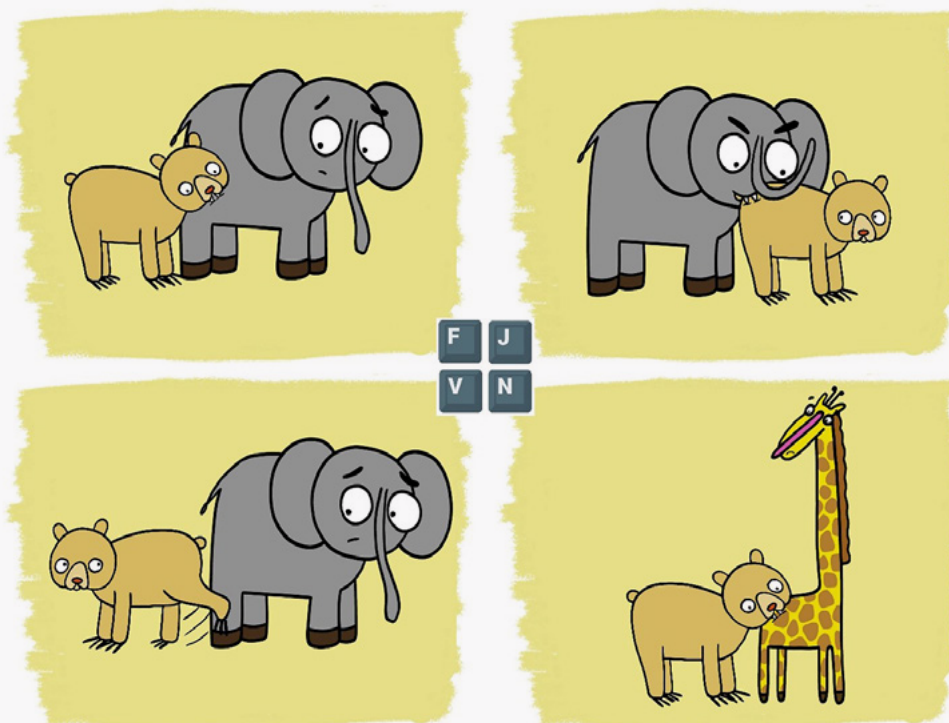
The processing of a sentence is mediated by the retrieval of individual lexemes from the so-called mental dictionary, a part of the long-term memory system. The retrieval of a lexeme, known as 'lexical access', depends on several factors. Frequently used lexemes are accessed faster than rarely used ones, shorter lexemes are accessed faster than longer ones, and lexemes learnt earlier in childhood are accessed faster than those learnt later (Balota & Chumbly, 1984; Nicholas & Brookshire, 1995; Kirshner et al., 1984; Oldfield & Wingfield, 1965; Snodgrass & Vanderwart, 1980; Morrison et al., 1992). There are also other important psycholinguistic features of lexemes, such as prevalence and name agreement, but the feature that often explains most of the variance is their frequency. This is also the only feature for which data is available for Slovenian. In terms of frequency, we accepted nouns that have at least 0.8 concordances per million words in the deduplicated representative corpus of written Slovenian, Gigafida 2.0, and verbs that have at least 0.2 concordances. Although we did not include extremely rare or frequent lexemes, the frequency of the lexemes in JERA is still very different. We attempted to subjectively minimize its effect by including lexemes that are familiar to the widest possible range of Slovenian speakers, regardless of their demographic (age, gender, and educational level) and linguistic (dialect, foreign languages, and multilingualism) background. In practice, this meant that we only used everyday words. We also paid attention to their form, avoiding irregular paradigms as well as those that are often subject to dialectal variations. In addition

to functional items needed in specific sentence types, the vocabulary in JERA comprises 420 lexical items, of which 150 are verbs (36 different lexemes) and 270 are nouns (42 different lexemes). The average number of occurrences is 4.7 for nouns (min=1, max=10, median=3.5) and 3.0 for verbs (min=1, max=9, median=3.0). We paid attention to the length of the lexemes, which had to contain at least two phonemes or one syllable and could not have more than ten phonemes or five syllables.

We recorded each target sentence in a two-channel stereo audio format and associated it with four digitally processed color images with a resolution of 300 dpi (926×654 pixels) so that only one image can be clearly matched to the target sentence, while the other three images serve as distractors, each belonging to a specific type defined by the type of error a participant might make (Figure 4). One type of distractor relates to the reversibility of the argument structure (Section 2.1). For example, if the target sentence is *Medved grize slona* ('The bear bites the elephant'), then the distractor of the first type would represent an elephant biting the bear. This type of distractor is associated with potentially incorrect assignment of thematic roles due to agreement error and, therefore, belongs to the type of error we classify as *grammatical*. The second type of distractor would represent the bear kicking the elephant, and the third is the bear biting a giraffe, for example. The choice of one of the latter distractors would indicate an error in the selection of a predicate or one of the arguments of the sentence. We refer to this type of error as *lexical*. The distinction between these types of errors is informative and may be potentially useful, especially in distinguishing between certain types of language disorders that affect areas of the brain responsible for either the grammatical or lexical components of language.

In addition to the images, the screen contained a field with four buttons. The F button was used to select the image that appeared at the top left, J at the top right, V at the bottom left, and N at the bottom right.

Figure 4. A series of images for the sentence *Medved grize slona* ('The bear bites the elephant') with the target image (bottom left) and three filler images representing either a grammatical or lexical error type



The test was programmed and implemented on Ibex Farm, an online platform for experimental psycholinguistics (Drummond, 2012), supplemented with the PennController module for the presentation of visual stimuli (Zehr & Schwarz, 2018).

Procedure

Prior to the sentence-picture matching task, participants were instructed to set the volume to a comfortable level and to use either speakers or headphones. Three practice trials were conducted before the test, with feedback (correct, incorrect) displayed on the screen. The actual test consisted of a pseudo-random sequential presentation of an auditory target sentence and four visual stimuli on the screen, to which the participants had to respond by pressing a button to select the picture that corresponded to the meaning of the sentence. No feedback was given during the test. The experimental procedure was approved by the Ethics Committee of the University of Nova Gorica (11/2020) and was conducted in accordance with existing national and international regulations on ethics in research. Participants gave informed consent online and provided their demographic data. They were informed that their participation was voluntary and that they could stop at any time. No personal data were collected during the trials.

Results

In this section, we show that the JERA sentence comprehension test is a valid and reliable instrument by virtue of standardization (4.1), achieves a high degree of internal consistency and consistency over time (4.2) and is characterized by relevant test and sample characteristics (4.3).

Standardization

We calculated confidence intervals for accuracy and response times based on the estimated marginal means, which serve as a statistically derived boundary within which the 95% accuracy values and reaction times theoretically lie for the selected sentence type, as well as for the age and education of the participants (but not for gender, which did not exhibit a statistically significant effect on the results), as described in the accompanying manual (Stepanov et al., 2023).

Figure 6 displays the estimated marginal means and 95% confidence intervals for accuracy per sentence type, age group, and education, provided for illustrative purposes only. For the estimated values, see Stepanov et al. (2023). Accuracy exhibits no significant difference between men and women, while it increases with education level. Furthermore, it remains relatively stable across all age groups, hovering around 95%, except for the oldest age group, where it declines to around 90%.

The estimated marginal means and 95% confidence intervals for response times per sentence type, age group, and education level are shown in Figure 7 for illustrative purposes only. For estimated values, again refer to Stepanov et al. (2023). Response times exhibit no significant difference between men and women, yet they increase steadily with each successive age group. Participants with primary education seem to require more time to respond to stimuli compared to those from the other two education groups.

Figure 6. Estimated marginal means and 95% confidence intervals for accuracy per sentence type, age group, and education

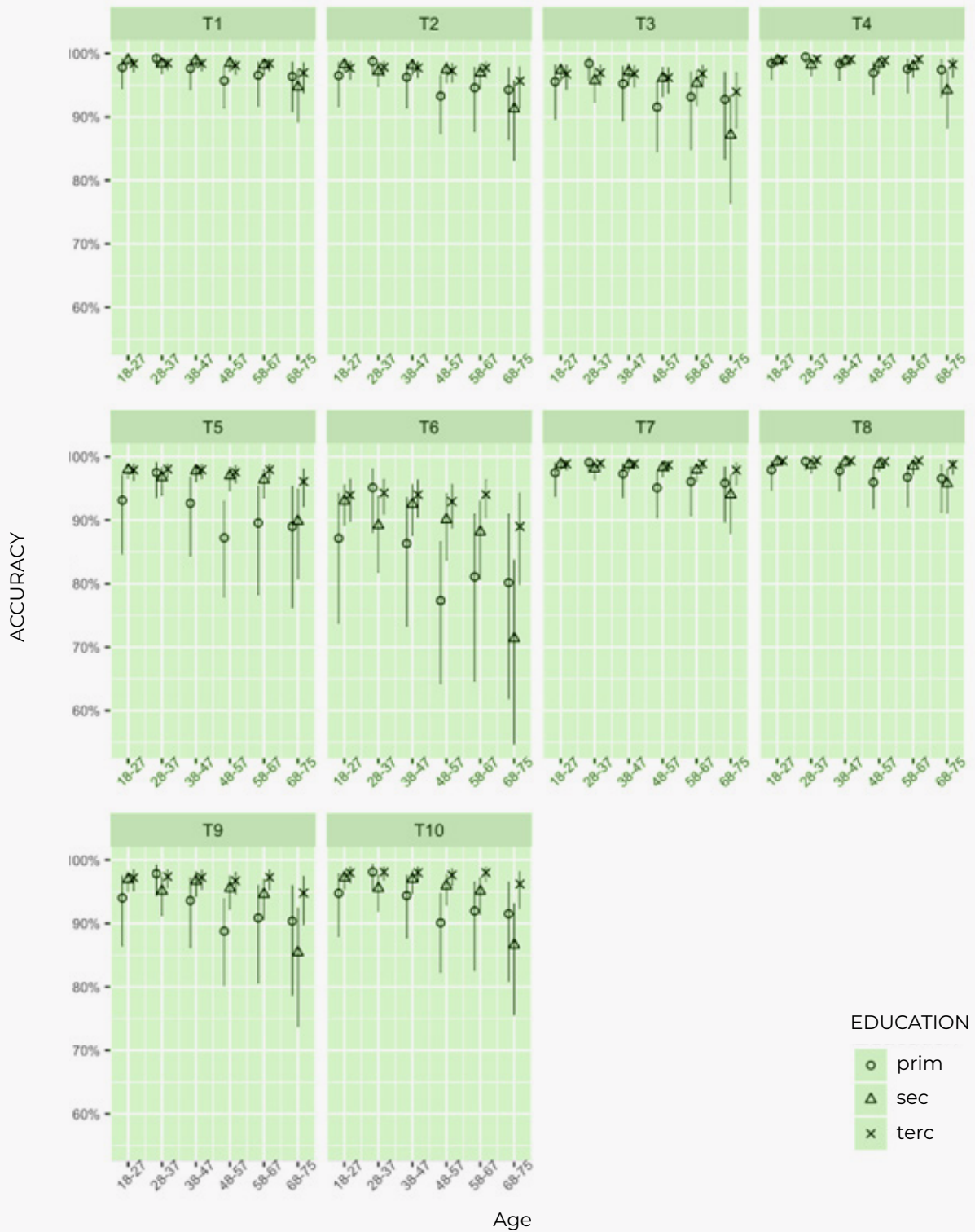


Figure 7. Estimated marginal means and 95% confidence intervals for response times per sentence type, age group, and education



Reliability Measures

Test reliability denotes the extent of consistency in its measurements, usually expressed as a quantitative ratio or coefficient. We provide three options for assessing reliability: Cronbach's alpha and split-half reliability, which, according to Nunnally & Bernstein (1994), evaluate correlations between random subsets, and the test-retest method.

Cronbach's alpha assesses internal consistency by comparing result variances among participants: if performance tends to be similar across informants, the test demonstrates consistency. The calculated Cronbach's alpha for accuracy was 0.99, and for reaction times between sentence types, it was 0.98, both indicating a high degree of consistency.

Split-half reliability serves as an alternative method for assessing the internal consistency of the test. In this method, the results of the participants in two random sub-tests are correlated with each other. The resulting correlation is then adjusted for test length using the Spearman-Brown prophecy formula. In our case, we divided the results for accuracy and reaction time into odd and even test trials within each sentence type. The obtained results were again 0.99 for accuracy and 0.98 for reaction time.

Test-retest reliability, also known as temporal stability, gauges the correlation between the results of the same test administered at two different time points. A test with high test-retest reliability should demonstrate minimal change over time, provided the measured trait remains stable, and there are no differential effects from prior assessments (Strauss et al., 2006). The extent to which the time interval between the two test sessions affects the test-retest coefficient generally depends on the nature of the ability being assessed. For example, if the trait being tested is intrinsically less stable or variable, a longer interval might result in a lower test-retest coefficient compared to a shorter interval. In contrast, if the tested property is generally deemed relatively stable over time, then a longer time interval should not significantly affect the test-retest coefficient. In our case, sentence comprehension in healthy adults represents a stable trait unlikely to undergo significant changes over time (assuming both time periods are within the participants' cognitive prime). Nevertheless, we hypothesize that participants' performance might improve in the second session compared to the first, at least for some sentence types, due to a familiarity effect in both the visual and auditory domains. Therefore, this test may not measure the internal consistency of JERA and two previously reported methods.

Thirty-eight participants (7.5%) underwent retesting seven to nine months (median=8.0 months) following the initial test, conducted under similar conditions, except for the variable order of stimulus presentation for each participant. Given that sentence comprehension is a stable trait in healthy adults, significant changes over time were not anticipated. However, we hypothesized that participants' performance might improve in the second session compared to the first, at least for some sentence types, due to a habituation effect in both the visual and

auditory domains. The test-retest coefficients were 0.75 for accuracy and 0.88 for reaction time. Overall, these markers indicate a relatively high degree of stability.

Test and Sample Characteristics

JERA was faithfully implemented as a stand-alone software application for individual testing. It compares an individual's performance against the standardized normative data encoded within it, relative to the person's age and education—significant predictors of both accuracy and response time. The application is compatible with any Windows-based desktop or laptop featuring a screen size of 13 inches or larger. The application is freely accessible for public use via the web address jera.ung.si.

According to Strauss et al. (2006), the reliability of a test is generally influenced by both the characteristics of the sample (as described in 3.1) and the characteristics of the test (as described in 3.2 and 3.3). On the practical side, the reliability of a test is ensured by the clarity and transparency of its overall organization (Nunnally & Bernstein, 1994), which minimizes subjectivity. This includes:

- digitizing the procedure,
- pre-recording verbal stimuli by a professional speaker,
- preparing graphic stimuli by a professional designer,
- implementing automatic scoring, and
- administering the test through an easy-to-use computer application.

The computer application also alleviates the workload of test administrators during testing, enabling them to more effectively observe test takers. In addition, it facilitates customized selection of sentence types based on diagnostic or research objectives, enhancing the test's cost-effectiveness. The usability of the test is ensured through balanced test terms in terms of length and argument structure, as well as at the lexical level. This ensures that the test not only assesses individual linguistic abilities but also serves research purposes when administered appropriately.

Conclusion

This article introduced the structure and composition of the new sentence comprehension test for the Slovenian language, JERA, emphasizing its standardization properties. JERA is grounded in state-of-the-art research in experimental linguistics and psycholinguistics, considering both the structural (syntactic) and processing complexity associated with specific sentence types. We also discussed the unique features of Slovenian that need to be considered when developing sentence comprehension tests, as opposed to structures whose complexity varies similarly across many languages.

JERA demonstrates its ability to provide valid and reliable measures of language performance in neurotypical and healthy adult Slovenian speakers in their cognitive prime. These measures are applicable for assessing linguistic performance at the sentence level across a broad spectrum of atypical language groups. Specifically, the assessment and comparison of linguistic performance in sentence comprehension are valuable for clinical speech therapists and are likely to become significant in scientific and applied studies involving multilingual and/or heritage Slovenian speakers, Slovenians residing abroad, learners of Slovenian as a second or foreign language, and various teaching and learning contexts.

Acknowledgements

The research was financially supported by the ARIS research project "Acquisition of a minority language in a multilingual context" no. J6-3130 (PI: Arthur Stepanov).

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Pediatric feeding and swallowing disorders: From etiology to solution

SUMMARY

Oral feeding is the most complex task for a newborn baby, requiring coordinated and finely tuned functioning of various organs and organ systems. The complexity of feeding is reflected in the fact that preparation for postnatal oral feeding starts as early as the prenatal age and is based on adaptive and protective reflexes, as well as prenatal learning processes. These jointly constitute the foundation for subsequent complex postnatal learning. This interactive and multidimensional process continues throughout the first two years of the child's life and, in some specific aspects of feeding skills, even beyond that age. Although neonatal feeding might seem like a simple sucking and swallowing reflex, it involves much more. The multifaceted and dynamic nature of this complex sensorimotor activity, which occurs repeatedly throughout the day in the close interaction of the baby, the feeder, and the environment, makes the process of establishing successful feeding prone to dysfunction .

The prevalence of pediatric feeding and swallowing disorders ranges from 25% in healthy children to over 80% in children with development disorders. These disorders are recognized not only as factors that may significantly impact the child's health and development (psycho-physical, cognitive, socio-emotional) but also as major parental stressors. However, feeding disorders in infancy often remain unrecognized or are diagnosed only at an advanced age. If left untreated, feeding and swallowing disorders can interfere with the optimal development of neural circuits for feeding, leading to long-term feeding and swallowing issues that severely burden the infant, the family, and society. Due to the multifactorial nature of feeding and swallowing disorders, a comprehensive understanding of etiology and pathophysiology should form the basis of treatment, with the paramount goal of achieving successful, safe, and pleasurable feeding. This paper suggests implementing a multidimensional model of feeding assessment, aligned with the current concept of Pediatric Feeding Disorder (PFD).

Keywords: *pediatric feeding disorder, swallowing, multidimensional model of feeding assessment*

Introduction

Pediatric feeding disorder (PFD) refers to a complex condition in which a child experiences

significant, acute, or chronic difficulty with feeding. It is a broad term that encompasses various feeding and swallowing difficulties in children, including problems with the development and functionality of eating and drinking skills. These issues range from sucking difficulties at the earliest age to the development of sensorimotor oral skills, swallowing problems, food acceptance and refusal issues, food selectivity, and challenges in developing self-feeding skills. In addition, PFD often involves psychological, emotional, and cognitive components that should always be considered. This paper aims to explore the multifaceted nature of pediatric feeding disorder and propose a comprehensive and multidimensional assessment framework aligned with the current understanding of PFD.

Feeding, swallowing and eating disorders: important distinctions between the terms

It is necessary to distinguish between the terms feeding disorders (Cro. *poremećaji hranjenja*), swallowing disorders or dysphagia (Cro. *poremećaji gutanja ili disfagija*), and eating disorders (Cro. *poremećaji jedenja / poremećaji prehrane*), as each term has a different meaning and implication. Unlike eating disorders such as anorexia nervosa, bulimia, and binge eating, feeding disorder is a developmental disorder of feeding that originates at the developmental age when a child depends on another person for feeding (Eng. *to be fed* / Cro. *biti hranjen*). According to Arvedson (2008), feeding disorders encompass a broad range of eating activities that may or may not be accompanied by difficulty swallowing food and liquid. In contrast, swallowing disorders (dysphagia) refer to problems in one or more phases of swallowing: oral, pharyngeal, and/or esophageal phases.

Historically, swallowing disorders in adults have been the primary area of scientific and clinical study in speech pathology before feeding disorders in children. With the increased survival rate of premature and sick newborns and the resulting long-term consequences, feeding problems in children have become an important focus for medical professionals, especially speech and language pathologists.

Due to the complexity of the nature and expression of the disorder, there was a lack of a universally accepted definition and diagnostic criteria for feeding disorder in children until 2019. After a panel of international experts from various disciplines reached a consensus on the name, definition, and diagnostic criteria at the initiative of the Feeding Matters association (Feeding Matters, 2021), an influential article by Goday et al. was published (Goday et al., 2019). The experts' consensus enabled a decisive change in the conceptualization of feeding disorder in children, allowing scientists and clinicians to communicate "in the same language" and providing the necessary uniform basis for the harmonization of research, education, and clinical practice.

In line with the World Health Organization's International Classification of Functioning, Disability and Health framework (WHO, ICF), this multifaceted disorder has been termed Pediatric Feeding Disorder and defined as "impaired oral intake that is not age-appropriate and is asso-

ciated with medical, nutritional, feeding and/or psychosocial dysfunction” (Goday et al., 2019). The new multidimensional definition thus overcomes the previous simplified categorization into organic and non-organic disorder types. In addition, detailed diagnostic criteria have been defined for each of the four domains of the disorder. As a result, PFD is now regarded as a stand-alone diagnosis, contrary to the previous symptom-type definition. In October 2021, it was approved to be included in the United States ICD-10-CM code as code R63.3 and expanded with additional code extensions (Feeding Matters, 2021; WHO, 2024; see Table 1).

Table 1. (adapted from *Feeding Matters*, 2019)

ICD-10 code	ICD-10 name
R63.30	Feeding difficulties, unspecified
R63.31	Pediatric feeding disorder, acute Pediatric feeding dysfunction, acute
R63.32	Pediatric feeding disorder, chronic Pediatric feeding dysfunction, chronic
R63.39	Other feeding difficulties Feeding problems (elderly) (infant) NOS Picky eater

Prevalence, Etiology, and Consequences of Pediatric Feeding Disorder

The prevalence of pediatric feeding disorders ranges from 25% in healthy children to over 80% in children with developmental disorders (Reiley et al., 1996; Lefton-Greif & Arvedson, 2007; Arvedson 2008; Calis et al., 2008; Nadon et al., 2013).

A recent study by Kovacic et al. (2020) showed that pediatric feeding disorder is highly prevalent and increasing in the U.S., with a prevalence ranging from 1:23 to 1:37. The prevalence was highest in children under 5 years of age but was also common in older children. According to the authors, pediatric feeding disorder surpassed the prevalence of autism spectrum disorders and eating disorders among U.S. children. In the subgroup of children with complex chronic conditions such as respiratory diseases, gastrointestinal diseases, miscellaneous technology-dependent diseases, prematurity, neonatal conditions, and transplants, the rate of pediatric feeding disorder was highest and increased steadily during the study period. Interestingly, Kovacic et al. (2020) also found that PFD was more common in males.

The rising prevalence of PFD can be attributed to several factors: enhanced neonatal survival due to advancements in medical knowledge and technology, which has led to a higher rate of PFD among survivors; increased awareness of PFD; and improved availability and quality of feeding assessment, among others .

Although PFD has been recognized as a factor that may significantly impact the health and development of a child (psychophysical, cognitive, socio-emotional) and as one of the strongest parental stressors (Sharp et al., 2017), feeding disorders in infancy often remain unrecognized or are diagnosed only at an advanced age .

In an editorial commentary in the *Journal of Pediatrics*, Rosen (2020) noted that pediatric feeding disorder is significantly under-researched despite its widespread prevalence. Rosen concluded that hospitals and programs are often under-resourced to care for children with PFD. Consequently, evidence-based treatments for PFD are not widely available, and many children with PFD do not receive the professional help they urgently need. Developmental disorders do not resolve on their own, and if left untreated, pediatric feeding disorder could potentially have serious or even life-threatening consequences .

A wide array of complications may arise from PFD (Fung et al., 2000; Greer et al., 2008; Silverman et al., 2013; Malas et al., 2017). These complications include malnutrition, dehydration, aspiration pneumonia, increased morbidity, gagging and choking events, physiological discomfort and pain, and stressful feeding situations—all of which can lead to feeding refusal and the development of feeding aversion. Furthermore, unpleasant mealtime interactions between the feeder and the child, disruptive mealtime behaviors, and heightened stress for both caregiver and child may result in psychological, social, and emotional consequences. Over the long term, continuous nutritional deficiency, poor hydration, and limited caloric intake may impair immunity, compromise physical growth and development, and hinder cognitive abilities.

Children with PFD may exhibit a range of symptoms and behaviors, such as gagging or choking during meals, difficulty chewing or swallowing, refusal to eat certain textures or types of food, aversion to specific smells or tastes, prolonged mealtimes, poor weight gain or growth, and anxiety or distress related to eating .

PFD can have multiple causes, including medical, developmental, or psychological. In most cases, though not always, feeding disorders have organic causes (Manikam & Perlman, 2000; Romel et al., 2003). However, due to their multifactorial nature, feeding disorders should be conceptualized on a continuum between psychosocial and organic factors (Manikam & Perlman, 2000). Common underlying factors contributing to PFD include prematurity and intra-uterine growth retardation (IUGR), various neurological, gastrointestinal, respiratory or cardiac issues, craniofacial anomalies, chromosome and gene aberrations, developmental disabilities and cognitive delay, chronic illness and/or complex medical conditions, autism spectrum disorder, psychological factors, lack of or delayed introduction of feeding, and previous negative feeding experiences.

Unveiling the Complexity of Oral Feeding: From Prenatal Preparation to Postnatal Learning

Oral feeding is one of the most complex tasks for a newborn, requiring the coordinated and finely tuned functioning of various organs and organ systems. This complexity is evident in the fact preparation for postnatal oral feeding begins as early as the prenatal stage. It relies on adaptive and protective reflexes (Medoff-Cooper et al., 2000) as well as processes of prenatal learning, which together form the foundation for subsequent complex postnatal learning. This interactive and multidimensional process continues throughout the first two years of a child's life and, in some aspects of feeding skills, even beyond that age.

Although neonatal feeding is often viewed merely as a simple sucking and swallowing reflex, it involves much more than that. A healthy newborn is equipped with protective and adaptive reflexes that facilitate a subtle progression in the development of feeding skills from the very beginning (prenatal). However, the dynamic and ever-changing nature of this complex sensorimotor activity—repeatedly occurring throughout the day in the close interaction between the baby, the feeder, and the environment—renders the process of establishing successful feeding susceptible to dysfunction. This dysfunction can arise from any of the numerous factors involved.

Feeding and swallowing are highly intricate processes that necessitate the synergistic interaction of various organs and organ systems, including the central and peripheral nervous systems, gastrointestinal system, cardiopulmonary system, cognitive system, craniofacial structures and the musculoskeletal system. In the act of swallowing, more than 30 pairs of muscles are involved, orchestrated by at least five cranial and one spinal nerve (Matsuo & Palmer, 2008; Miller, A. J. 2008; Ekberg & Nylander, 2019). The upper aerodigestive tract, situated at the intersection of the digestive, respiratory, and phonatory systems, constitutes the most complex neuromuscular unit in the body (Arvedson & Lefton-Greif, 2020). As with any other sensory-motor, goal-directed skill, feeding skills must be learned. Even under typical, well-tuned, and healthy developmental progression, feeding advancement relies on acquiring a set of skills. This learning process occurs within the repeated context of the caregiver-child dyad, where nurturing and support play pivotal roles in fostering successful feeding experiences.

Importance of Comprehensive Evaluation: Interplay Between Physiological Processes, Feeding Skill Acquisition and Altered Feeding and Swallowing Mechanisms

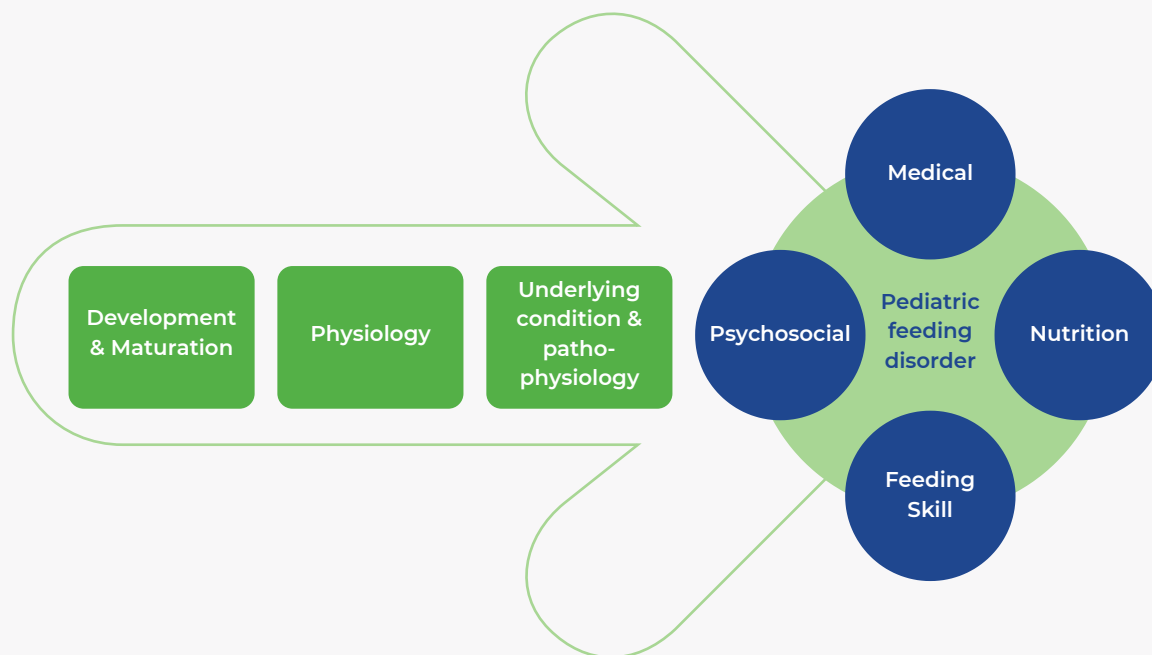
Proper diagnosis and early evidence-based treatment play a crucial role in promoting and guiding the development of a child's feeding skills. This approach not only improves the child's nutritional intake but also enhances their overall well-being and that of their family. For multifaceted disorders such as PFD, the importance of a comprehensive assessment cannot be overemphasized.

To understand the pathophysiology of feeding and swallowing disorders, it is crucial to grasp the interplay between development, physiology, and the underlying causes of the disorder. Knowledge in these areas provides essential context, illuminating the complexities of how these processes can malfunction and the implications for individuals affected by such disorders.

This is why we propose a multidimensional model of feeding assessment, aligned with the current concept of PFD (see Figure 1). This model considers all four potentially affected domains (medical, nutritional, psychosocial, and feeding skills) in relation to development and physiology. It is essential for elucidating the underlying mechanisms of feeding and swallowing disorders. By studying how these processes unfold in typical development and how they are altered in pathological conditions, clinicians can identify potential targets for therapeutic intervention and develop therapeutic strategies tailored to the unique needs of individuals with PFD.

Multidimensional Model Of PFD Assessment

Figure 1. The multidimensional model of feeding assessment proposes examining all four potentially affected domains and their interrelationship with the child's maturational and developmental characteristics, as well as the physiology and pathophysiology of swallowing. The goal is to clarify the complex mechanisms behind feeding and swallowing disorders in each individual case.



The model proposes that the expression of feeding disorder is not due to a single factor but rather a combination of interacting factors, each contributing uniquely. These factors include the individual's maturation and developmental processes, including learning experiences and predetermined physiological processes influenced by underlying causes such as medical conditions and/or psychological factors. As a result of these interactions, different pathophysiol-

ical feeding, swallowing, and behavioral mechanism can emerge, each presenting a unique combination of dysfunction across the four domains. In alignment with the current concept of pediatric feeding disorder, the model emphasizes the importance of considering multiple dimensions when assessing and treating PFD .

In conclusion, a comprehensive understanding of development, physiology, and environmental factors is crucial for unraveling the pathophysiology of pediatric feeding and swallowing disorders. By applying this knowledge, speech and language pathologists can enhance their ability to assess, diagnose, and treat PFD effectively, ultimately improving outcomes and the quality of life for individuals affected by PFD and their families .

The proposed multidimensional model of feeding assessment, aligned with the current PFD concept, offers an integrative approach that could lead to a deeper understanding of contributing factors and, consequently, to more effective diagnosis and treatment .

The use and application of the current definition and diagnostic criteria for PFD, as implemented in WHO ICD-10, in everyday clinical practice in Croatia is essential and should be endorsed for several reasons. First, it facilitates clear communication among healthcare professionals regarding patient diagnoses and treatment plans. Second, it promotes evidence-based practice by aligning diagnoses with internationally recognized standards. Third, it supports research efforts and collaboration across healthcare settings by using a common language and classification system, thereby advancing knowledge and innovation in the field. Most importantly, it accurately identifies and addresses the specific needs of patients with pediatric feeding disorders, ultimately improving their clinical outcomes.

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Vocabulary composition in early lexical development of Croatian children

SUMMARY

Early lexical development involves changes in the size and composition of children's vocabulary. Previous studies have noted cross-linguistic differences in vocabulary composition, possibly stemming from methodological variations (parent reports vs. longitudinal corpora). This study aims to explore the relationship between vocabulary composition and age of acquisition (AoA) in Croatian. The analysis utilized speech samples from two female children aged 1;5 and 2;8, sourced from the Croatian corpus of child language. Proportions of different parts of speech in lemmas were calculated monthly. The findings reveal that nouns dominate during early vocabulary acquisition, followed by verbs, adverbs, adjectives, and function words, which are least prevalent. While the proportion of verbs initially increases during vocabulary acquisition, no significant relationship between verb proportion and AoA was found. The proportion of adjectives, however, increases with age, whereas nouns, adverbs, and function words exhibit individual variations. Although greater variability in vocabulary composition is observed in the early stages of lexical development, i.e., before the age of 1;8, no significant shifts in noun, verb, adjective, adverbs, or function word proportions were noted thereafter. These results differ slightly from previous Croatian and cross-linguistic studies on vocabulary acquisition. This study contributes to broader understanding of cross-linguistic patterns in vocabulary development.

Keywords: *vocabulary composition, early language development, corpus analysis, Croatian*

Introduction

The acquisition of new words is fundamental to lexical development, leading to a continual expansion of vocabulary size. Alongside quantitative changes in the overall vocabulary size, lexical development is also characterized by changes in vocabulary composition. Several studies have examined how children's vocabularies are structured, observing the emergence and varying prevalence of different parts of speech. These parts of speech are acquired at different rates and do not appear in equal proportions in children's vocabularies.

Not all parts of speech have received equal attention regarding their distribution in early vocabulary acquisition. Numerous studies have focused on the ratio of nouns compared to other parts of speech, particularly verbs. Some studies suggest that nouns predominate in the initial stages of lexical development (e.g., Gentner, 1992; Bates et al., 1994). According to these studies, nouns consistently outweigh other parts of speech, with a notable increase occurring after children reach 1;4 years of age and their vocabulary spans from 100 to 200 words. This prevalence of nouns early on is attributed to their concrete meanings, which are easier for children to grasp compared to the more abstract meanings of verbs. Nouns typically refer to specific objects or entities that children encounter in their physical environment, while verbs denote relationships between these entities, requiring contextual understanding (Hoff, 2018).

Psycholinguistic theories that explain vocabulary acquisition based on “internal linguistic constraints” propose that early constraints facilitate noun mapping because children initially interpret words as referring to whole objects rather than parts, properties, movements, states, or other associated features (Markman, 1987). As children age and their vocabulary expands, the proportion of nouns decreases slightly, while verbs show a moderate and continuous increase. Between vocabularies of approximately 100 to 400 words, the increase of verbs and adjectives becomes more pronounced compared to other parts of speech. After acquiring about 400 words, a marked increase in the proportion of function words is observed (Bates et al., 1994). Despite these increases, verbs, adjectives, and function words consistently maintain lower proportions in the vocabulary compared to nouns.

This specific restructuring of vocabulary composition primarily pertains to English acquisition, although similar developmental patterns have been identified in other languages, including Croatian (see Frank et al., 2021). These findings largely derive from parental report checklist, where parents assess their children’s language development.

Studies examining the prevalence of nouns versus verbs across different languages aim to provide a cross-linguistic understanding of vocabulary composition. These studies indicate that characteristics of lexical development are not entirely universal. For instance, corpus-based studies of languages typologically distinct from English reveal a higher frequency of verbs in the early stages of lexical development (see Choi & Copnik, 1995 for Korean; Tardif et al., 1999 for Mandarin).

Furthermore, in certain stages of lexical development, verbs have been observed to predominate over nouns in some Indo-European languages such as Croatian (Kovačević et al., 2007b, Hržica, 2007), French (Bassano et al., 1998), and German (Kauschke & Hofmeister, 2002). This predominance of verbs is also noted in languages including Mandarin, Kiswahili, Swedish, Turkish, Kigiriama, Russian, and Norwegian (Frank et al., 2021). Conversely, nouns generally appear less frequently in German than in English, and they do not dominate the composition of

vocabulary at any point from 1;1 to 3;0 years (Kauschke & Hofmeister, 2002). Although similar developmental patterns of nouns and verbs can be observed across languages—the proportion of nouns initially increases and then slows down, while the proportion of verbs grows continuously and linearly—variations exist in the proportion of these parts of speech in the composition of vocabulary.

In contrast to nouns and verbs, adjectives have received comparatively less attention from researchers, potentially due to significant linguistic differences among languages (Dixon, 1982), suggesting varied developmental patterns. Acquiring adjectives poses challenges compared to nouns and verbs, appearing relatively early in child language (Palmović et al. 2015; Kauschke & Hofmeister, 2002), but showing accelerated acquisition around 1;8 years (Tribushinina et al., 2015). This delay in acquisition has been attributed to their conceptual complexity and lower frequency of adjectives in child-directed speech (Sandhofer et al., 2000).

Previous studies on adjective acquisition have focused on their morphology (e.g. Graziano-King & Cairns, 2005), syntax (e.g. Ninio, 2004), and semantics (e.g. Graziano-King & Cairns, 2005). Research indicates notable individual differences in the onset and rate of adjective acquisition, highlighting that semantic contrast, such as using adjectives in antonymic pairs or semantically related groups, facilitates their emergence across languages (Tribushinina et al., 2014). In Croatian, adjectives typically appear several months later than nouns and verbs, constituting less than 5% of the overall vocabulary. (Palmović et al., 2015).

Adverbs have not received extensive analysis regarding their frequency in child language. Data from other Slavic languages indicate that adverbs appear early (Pačesová, 1968; Kesselová & Slančová, 2014; Chejnová, 2017), but in small numbers and percentages. For instance, in the first 100 lexemes, adverbs constitute approximately 2.1% (Pačesová, 1968), and about 3.5% in the first 1000 lexemes (Chejnová, 2016). However, both the number and percentage of adverbs increase with age as children grasp concepts related to place, time, and manner. Chejnová (2016) notes that the percentage of adverbs increases from around 10% at age 2;8 to about 30% by age 3;7. There are no studies about the acquisition of adverbs in Croatian.

Different languages exhibit slightly varied developmental trajectories for function words as well. In French, for example, determiners, pronouns, prepositions, conjunctions, and auxiliary verbs are acquired early, with significant expansion starting as early as 1;06 (Bassano et al., 1998). Unlike English, these parts of speech play a more dominant role in the lexicon, exceeding the proportions of other parts of speech after the second year of life. However, different function words are acquired at different times and show distinct growth patterns. Bassano et al. (1998) suggest that the grammatical explosion is marked by a shift towards increased emphasis on pronouns and determiners. These findings underscore the importance of studying each part of speech individually rather than within broad lexical categories (as in some previous studies),

especially across different languages.

Among function words in Croatian, only prepositions have been investigated. Hržica et al. (2021) found that prepositions first appear between 1;7 and 1;9 years, accounting for approximately 6% of vocabulary composition. The percentage of prepositions in tokens increases with chronological age. However, data on their developmental pattern and proportion relative to other parts of speech are lacking.

Differences in vocabulary composition during lexical development are generally explained by cross-linguistic differences and the socio-pragmatic features of language input (Kim, 2000). For example, the increase in the proportion of verbs in the early vocabulary of Croatian children after the age of two can be attributed to the growing morphological richness of the verb system at this age (Hržica, 2007). Language-specific features also determine the salience of a particular part of speech in the input. For example, in pro-drop languages, verbs often appear at the end of utterances (Au et al., 1994), making them easier for children to notice and acquire, which explains the greater proportion of verbs compared to other parts of speech in these languages.

Overall, slightly different developmental patterns for various parts of speech have been observed across languages. In Croatian, studies have reported on the acquisition of nouns and verbs (Kovačević et al., 2007a; Kovačević et al., 2007b; Hržica, 2007), adjectives (Kovačević et al., 2007a; Palmović et al., 2015), grammatical words (Kovačević et al., 2007a), and prepositions (Hržica et al., 2021). These studies suggest that the development of different parts of speech follows trends similar to those observed in English, but also reveals some language-specific patterns. However, these individual studies do not provide a comprehensive picture of vocabulary composition, as they compare different data sets and do not encompass prevalence data for all parts of speech.

The results on vocabulary composition may also be influenced by the methods and language measures used in previous studies. The most common methods used in studies of early lexical development are parent-reported questionnaires in the form of checklists and the analysis of child language corpora, namely children's spontaneous speech production. The most widely used and well-known parental checklist is the *MacArthur-Bates Communicative Development Inventories* (CDI; Fenson et al., 2007). In the version for toddlers aged 16 to 30 months, parents tick only those words on the word list that their child uses. The information they provide is therefore referred to as the "theoretical" lexicon, while the data obtained through naturalistic speech production could be considered their "actual" lexicon (Bassano et al., 1998). Children's speech samples are created by recording the child's spontaneous interaction with a parent or other close person during play or daily routines. Subsequently, the entire speech production is transcribed and analyzed in special programs.

Differences in methodology used in previous studies may have influenced the results on lexical development (Pine et al., 1996; Tardif et al., 1999). A study comparing words produced in children's spontaneous speech production with words selected by mothers of these children on parental checklists found an overall greater overlap for nouns than for verbs (Tardif et al., 1999). It seems that mothers are more likely to report nouns, and the proportion of verbs compared to nouns in their reports could be underestimated. Moreover, nouns are the most numerous parts of speech and are therefore represented to a greater extent on checklists, which may also affect the reported proportion of nouns in previous studies. On the other hand, studies based on the analysis of speech samples generally report the proportions of parts of speech in tokens. A token refers to any instance of a particular word form (Crystal, 2008). Therefore, this measure shows how frequently a particular word is used, which may indicate a stronger representation of those parts of speech that are frequently used, such as verbs (Jelaska & Kovačević, 2001).

Apart from the differences in method, previous studies used different measures in the analysis of spontaneous speech samples. The typological characteristics of languages can be reflected in the information provided by a particular measure. This is clearly seen in the measure of the number (or proportion) of types. A type is a unique form of occurrence or a unique string of characters that is different from any other string (Jelaska, 2005). This means that each form of a word is counted as a new type (e.g., in Croatian, *mama*-NOM.SG.F and *mame*-GEN.SG.F are two types in two different cases of the noun *mama*, meaning 'mom'). It is therefore important to consider how the morphological richness of a language can be reflected in this measure. This can present a challenge when comparing languages that differ in their morphological richness, such as Croatian and English (Kovačević et al., 1998).

Moreover, this measure reflects the inflection of particular parts of speech, which is important to consider if we want to compare the proportions of parts of speech that differ in the inflection, such as nouns and prepositions in Croatian. If we consider that verb morphology in Croatian is richer compared to noun morphology (Kovačević et al., 2007b), this could also influence the higher proportion of verb types in relation to noun types. In addition, measuring children's vocabulary composition in types may pose a problem because a child acquires not only new words but also new forms of these words (Anđel et al., 2000; Kovačević et al., 2009). This means that the number of types in studies on vocabulary composition in Croatian (e.g., Kovačević et al., 2007b; Hržica, 2007) also reflects morphological development of Croatian children (Kovačević et al., 2009). Therefore, it is hard to distinguish between lexical development and morphological development when only types are considered.

In addition to tokens and types, vocabulary composition can be analyzed by the number (or proportion) of lemmas or new words. A lemma is a word in its citation form, which means that all words, regardless of their frequency and forms, are reduced to their citation or canonical form

(Jelaska, 2005). This measure has rarely been used in studies on early lexical development. However, if we consider that data on vocabulary composition obtained by analyzing speech samples in lemmas overlap with data obtained by parental checklists (Bornstein & Haynes, 1998), this measure seems to be more appropriate for studying lexical development. This approach may account for inconsistencies in the results of previous studies that used parental checklists (Kovačević et al., 2007a) and speech samples (Kovačević et al., 2007b; Hržica, 2007).

The last methodological difference is related to the various lexical categories or classification systems used in different studies on vocabulary composition (Kauschke & Hofmeister, 2002). These differences make it difficult to compare studies and draw conclusions about the developmental patterns of each part of speech. Some studies focus on only one or two parts of speech, mostly nouns and verbs, while there is a lack of studies that examine different parts of speech simultaneously. Analyzing multiple parts of speech simultaneously would allow for a more comprehensive comparison of developmental patterns in terms of their proportions.

Aim of the Study and Research Questions

Due to the inconsistent results of previous studies on lexical development in early language acquisition and the differences in the methodology used, some questions related to vocabulary composition remain open.

The first question is methodological. Previous studies have used parental checklists (e.g., Bates et al., 1994; Kovačević et al., 2007a), which are ecologically less valid because they do not provide insight into the child's spontaneous speech production. On the other hand, corpus-based studies (e.g., Kovačević et al., 2007b; Hržica, 2007) that have used children's spontaneous speech samples have mostly relied on measures such as the number of tokens and/or types, which have certain limitations when considering the typological features of languages.

Secondly, research on vocabulary composition in Croatian has yielded mixed results (e.g., Kovačević et al., 2007a; Kovačević et al., 2007b; Hržica, 2007), and data on the acquisition of some parts of speech is still lacking. The present study aims to investigate the developmental changes in early lexical development of children acquiring the Croatian language by measuring children's vocabulary composition in lemmas. We addressed the following research questions:

1. What is the distribution of different parts of speech in children's vocabulary composition during early language acquisition?
2. What is the relationship between different parts of speech and the age of acquisition?

Method

Participants

The analysis used speech samples from the *Croatian child language corpus* (Kovačević, 2002), a longitudinal corpus of spontaneous speech production of Croatian children from the onset of speech to about 3 years of age. The corpus provides information about the language development of three Croatian children: two girls (Antonija and Marina) and one boy (Vjeran), in spontaneous interaction with their parents or other family members. Longitudinal corpora are the most common method in language acquisition research, as they provide information about how a child uses language in real situations. In this study, we focused on speech samples from Antonija and Marina, aged 1;5 to 2;8 years.

Antonija was recorded from the age of 1;3 to 2;8 years. Due to family reasons, there are no recordings at the age of 1;8 years. Antonija's corpus mainly contains samples of conversations with her mother, accounting for 90% of utterances in child-directed speech. Marina was recorded from the age of 1;5 to 2;11 years. Data for two months, specifically at the ages of 2;4 and 2;10, are missing. Marina was also primarily recorded in conversation with her mother, with her mother's utterances making up 95% of the child-directed speech. Antonija and Marina were recorded at home, in everyday situations such as playing, preparing food, and singing.

Speech samples of Vjeran were excluded from the analysis because he was rarely recorded in conversation with his mother. Most of Vjeran's recordings were made with the investigator, his nanny, or various other speakers. Therefore, questions arise regarding the extent to which the utterances of the adult speakers reflect Vjeran's speech throughout his language development and how these factors influence child-directed-speech. The parents of all three children belong to the urban middle class and have a high level of education.

Procedure

The *Croatian Child Language Corpus* (Kovačević, 2002) is publicly available in the *Child Language Data Exchange System* (CHILDES; MacWhinney, 2000), a database of language acquisition corpora in more than 20 languages. The corpus includes audio files and corresponding transcripts. All audio recordings were transcribed and coded using the *Codes for Human Analysis of Transcripts* (CHAT) system and the *Computerized Language Analysis of Transcripts* (CLAN) program. This was done by native speakers of Croatian trained in transcription and coding for language research. All speech samples successfully passed the CHECK option in the CLAN program. To compile the *Frequency Dictionary of Croatian Child Language: Lemmas* (Kuvač Kraljević et al., 2022) and the *Frequency Dictionary of Croatian Child Language: Morphological and Developmental Forms* (Hržica et al., 2022), the transcripts from the corpus were lemmatized, meaning all tokens of a given lexeme were combined into lemmas and morphologically tagged.

Data analysis

To unify the data, we limited the analysis to speech samples of Antonija and Marina from the ages 1;05 to 2;08. From the *Croatian Child Language Corpus* (Kovačević, 2002) we extracted lemmas of different parts of speech that occur in the child language, following the general word classification in Croatian (see Barić et al., 2005; Marković, 2012). We distinguished between nouns, verbs, adjectives, pronouns, adverbs, numbers, prepositions, conjunctions, and particles.

Nouns denote entities from the extra-linguistic context. These include proper names (*Antonija*) and common nouns referring to animates, e.g. people (*mama* 'mommy', *beba* 'baby') or animals (*pas* 'dog'), and inanimates, e.g. objects, food, body parts, places, or abstract entities (*lopta* 'ball', *kolač* 'cookie', *hand* 'ruka', *dvorište* 'backyard', *ljeto* 'summer'). Verbs denote actions and states (*pjevati* 'sing', *boljeti* 'hurt'). Adjectives are used to attribute a quality (*zločest* 'bad', *dobar* 'good') or a property of what is denoted by a noun (*mamin* 'mom's'). Pronouns refer to different entities from the extra-linguistic context and usually substitute other words (*mi* 'we', *taj* 'this'). Adverbs are used to complete or specify the meaning of verbs and adjectives (*ovdje* 'here', *čisto* 'clean'). Prepositions express different relations between what nouns and pronouns refer to (*s* 'with', *na* 'on'). Conjunctions connect words, phrases, or utterances (*i* 'and', *ali* 'but'). Numbers are used to express the quantity (*jedan* 'one') or the order of entities (*prvi* 'first'). Particles are used to express the speaker's attitude towards what is being spoken (*da* 'yes', *ne* 'no').

We calculated the proportions of newly acquired words for each month by dividing the total number of words in each part of speech for each month by the number of words acquired in the previous month. The relationship between vocabulary composition and age of acquisition was statistically analyzed using Spearman's rank correlation. Statistical analysis was performed in SPSS version 25.0 (IBM, 2017).

Results

The descriptive statistics detailing the proportions of nouns, verbs, adjectives, adverbs, pronouns, prepositions, conjunctions, numbers, and particles within Antonija's and Marina's corpora are presented in Table 1. Examination of the table reveals that nouns are the most prevalent part of speech in Antonija's corpus, followed by verbs, adverbs, pronouns, particles, conjunctions, prepositions, numbers, and adjectives, respectively. A similar distribution of parts of speech is evident in Marina's corpus, with nouns and verbs being the most prevalent, followed by adverbs, pronouns, adjectives, numbers, prepositions, conjunctions, and particles.

Figure 1. The proportion of all parts of speech in Antonija's and Marina's corpus

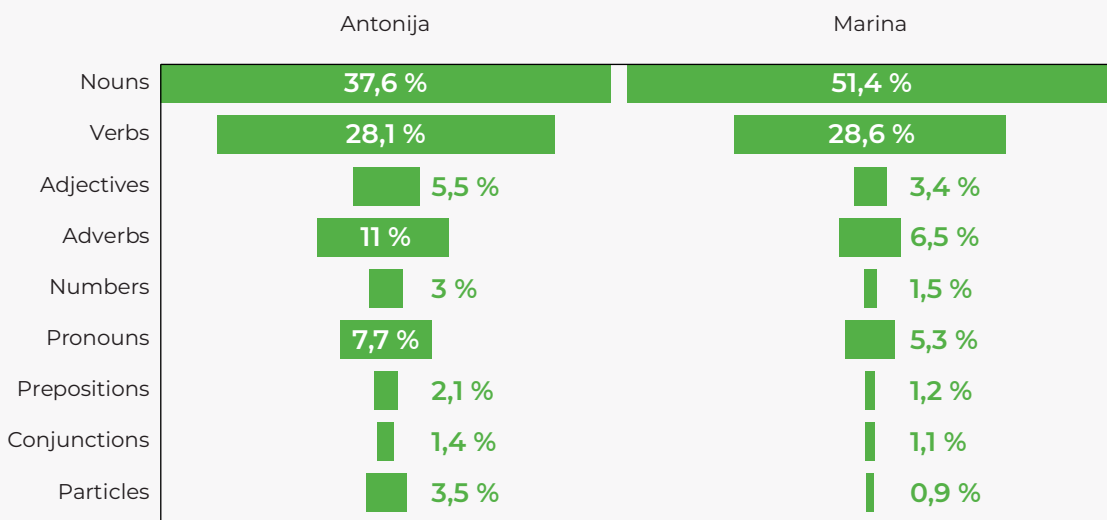


Table 1. Descriptive statistics for the proportions of nouns, verbs, adjectives, adverbs, pronouns, conjunctions, prepositions, particles, and numbers in Antonija's and Marina's corpus

	Antonija's corpus				Marina's corpus			
	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max
Nouns	0.40	0.02	0.37	0.44	0.56	0.02	0.53	0.60
Verbs	0.38	0.03	0.33	0.43	0.51	0.03	0.47	0.56
Adjectives	0.02	0.01	0	0.4	0.01	0	0	0.02
Adverbs	0.28	0.01	0.25	0.29	0.28	0.02	0.26	0.34
Pronouns	0.11	0.01	0.10	0.15	0.06	0.03	0	0.10
Prepositions	0.03	0.01	0	0.06	0.01	0	0.01	0.02
Conjunctions	0.05	0.02	0	0.08	0.03	0.01	0.02	0.05
Numbers	0.03	0.04	0.01	0.15	0.01	0	0	0.1
Particles	0.08	0.03	0.05	0.15	0.05	0	0.04	0.06

The results indicate a consistent increase in the proportions of nouns in Antonija's corpus over time. Specifically, a strong positive correlation was observed between the proportion of nouns and the age of acquisition ($r_{s(14)} = .78, p < .001$). Conversely, no correlation was found between the proportion of verbs and the age of acquisition. For other lexical words, a strong positive correlation was found between adjectives and the age of acquisition ($r_{s(14)} = .94, p < .001$), while the proportions of adverbs and numbers do not correlate with the age of acquisition. Among the function words, a strong positive correlation was found between the proportion of conjunctions and the age of acquisition ($r_{s(14)} = .84, p < .001$), whereas the proportions of pronouns ($r_{s(14)} = -.96, p < .001$) and particles ($r_{s(14)} = -.93, p < .001$) decrease with age, both showing strong

negative correlations with the age of acquisition. No correlation was found between the age of acquisition and the proportion of prepositions.

Figure 1 shows the changes in the proportions of lexical words in Antonija's corpus with increasing age (per month). Figure 2 shows the changes in the proportions of function words with increasing age in Antonija's corpus (per month).

Figure 2. *The proportions of lexical words (nouns, verbs, adjectives, adverbs, and numbers) per month in Antonija's corpus*

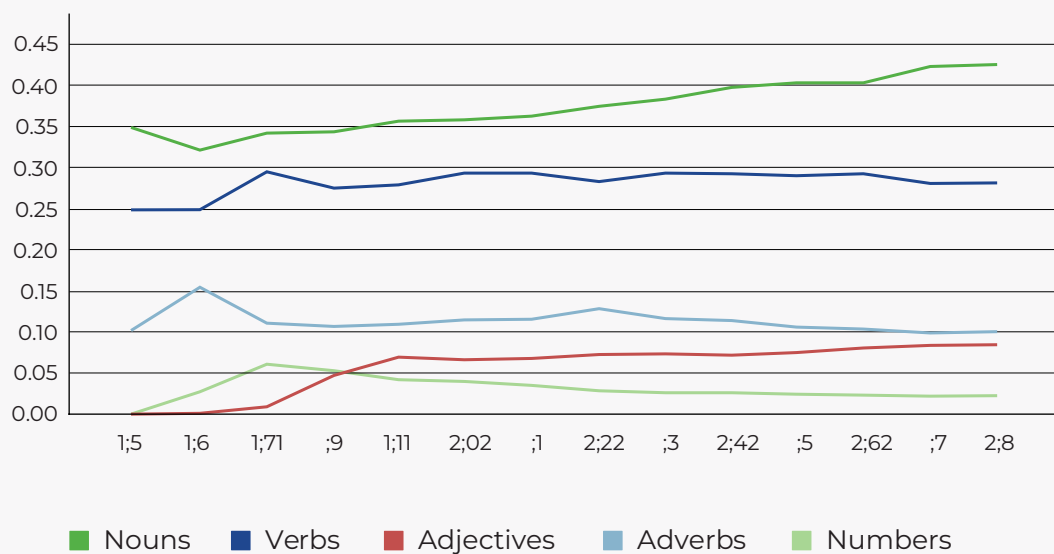
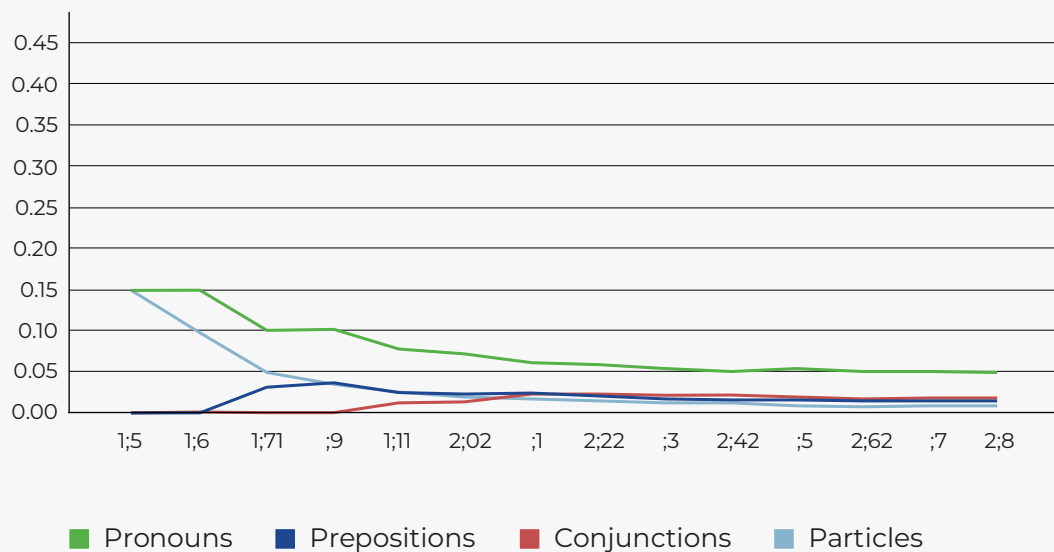


Figure 3. *The proportions of function words (pronouns, prepositions, conjunctions, and particles) per month in Antonija's corpus*



In Marina's corpus, the proportions of nouns initially increase and then gradually decrease over time. A strong negative correlation was found between the proportion of nouns and the age of acquisition ($r(15) = -.70, p < .01$). Conversely, no correlation was found between the proportion of verbs and the age of acquisition. The proportions of adjectives and adverbs increase with age. A moderate correlation was found between the adjectives and the age of acquisition ($r(15) = .59, p < .001$) and a strong positive correlation was found between adverbs and the age of acquisition ($r(15) = .92, p < .001$). Numbers do not correlate with the age of acquisition. For the function words, the proportions of pronouns and conjunctions do not correlate with the age of acquisition, whereas the proportions of prepositions and particles increase significantly with age. A strong positive correlation was found between the proportion of prepositions and the age of acquisition ($r(15) = .875, p < .001$) and a moderate positive correlation was found between the proportion of particles and the age of acquisition ($r(15) = .59, p < .001$).

Figure 3 shows the changes in the proportions of lexical words in Marina's corpus with increasing age (per month). Figure 4 shows the changes in the proportions of function words with increasing age (per month) in Marina's corpus.

Figure 4. *The proportions of lexical words (nouns, verbs, adjectives, adverbs, and numbers) per month in Marina's corpus*

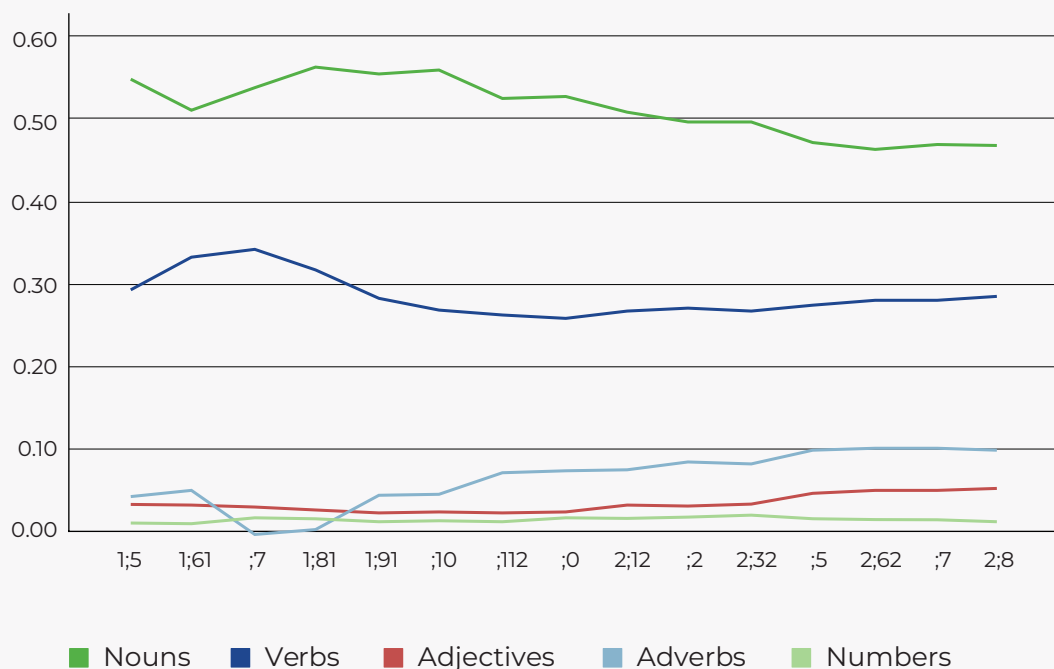
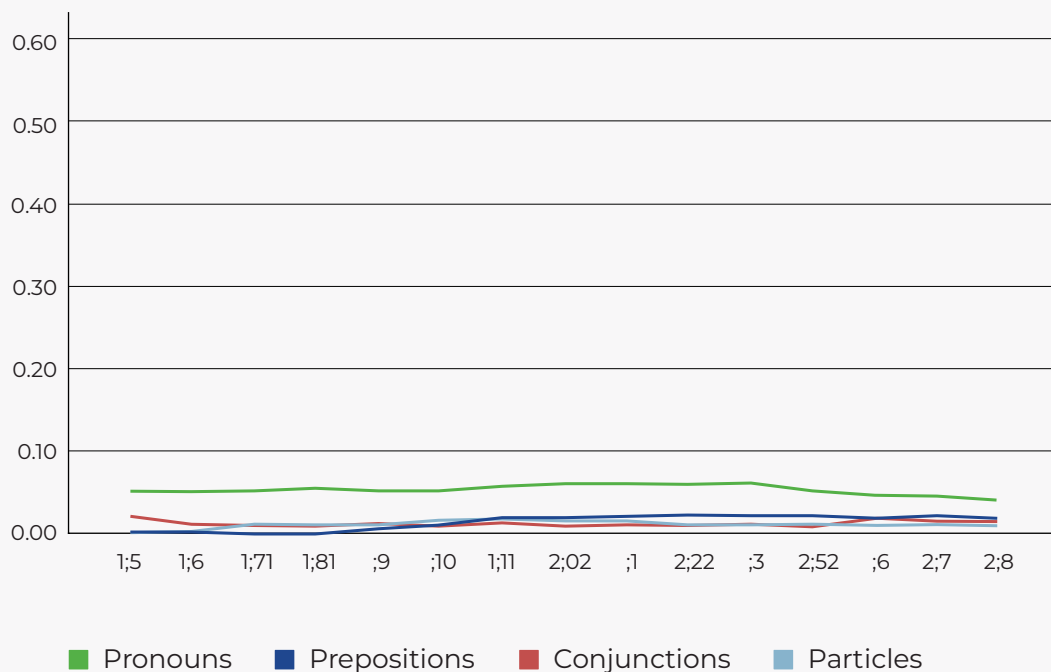


Figure 5. *The proportions of function words (pronouns, prepositions, conjunctions, and particles) per month in Marina's corpus*



Discussion

The present study investigated changes in the vocabulary composition of Croatian children. We focused on examining the changes in the proportions of different parts of speech (nouns, verbs, adjectives, pronouns, conjunctions, adverbs, particles, numbers, and prepositions) by analyzing longitudinal corpus of children's spontaneous speech production and measuring vocabulary composition in lemmas. This approach allowed us to fill the gap in research on lexical development, particularly considering that previous corpus-based studies used different language measures, different divisions of parts of speech, and often did not comprehensively observe all parts of speech. In addition to the methodological aspects, the present study also accounts for language-specific features of lexical development.

First, we aimed to determine the distribution of different parts of speech in children's vocabulary composition during early language acquisition. The analysis of lexical parts of speech partially confirmed previous studies where comparisons were available. Analyzing the vocabulary composition of female children aged 1;05 to 2;8 years acquiring Croatian revealed that nouns are the most prevalent parts of speech throughout early vocabulary acquisition, consistent with results on the proportion of nouns obtained from parental checklists, for example in English and Croatian (Bates et al., 1994; Kovačević et al., 2007a). The obtained results support the assumptions about the predominance of nouns in early lexical development (Gentner, 1982).

Verbs do not predominate over nouns at any stage of lexical development, contrasting with existing data on the acquisition of verbs from corpus-based studies. For example, Kovačević et al. (2007b) found that the proportion of verbs exceeds that of nouns after the second year of life, although they measured vocabulary composition in types. The third most common lexical category for both children comprises adverbs, followed by adjectives. Previous research suggests an expectation of similar percentages for adjectives and adverbs, as studies on adverbs have shown their prevalence to be below 5% (e.g., Chejnová, 2016), while research on Croatian has yielded comparable results for adjectives (Palmović et al., 2015). However, in the case of both children, adverbs are found to be twice as frequent as adjectives. Future studies may benefit from exploring the analyzed semantic functions of adverbs used in Croatian to facilitate additional cross-linguistic comparisons.

Function words are the least prevalent part of speech, consistent with previous studies (Bates et al., 1994; Kovačević et al., 2007a). We conducted separate analyses of function words, focusing on pronouns, prepositions, conjunctions, and particles. Pronouns were the most frequently occurring, followed by particles in Antonija's corpus, and prepositions in Marina's corpus. Conjunctions were found to be the least frequent part of speech in Antonija's corpus, and the same applies to particles in Marina's corpus. It is noteworthy that when combined, function words are less frequent than nouns, which aligns with findings from prior research (e.g., Frank et al., 2021).

Second, we aimed to examine the relationship between different parts of speech and the age of acquisition, starting with lexical words. The developmental trajectory of nouns in Antonija's corpus follows a continuous upward trend, whereas in Marina's corpus, there is a noticeable decrease in the proportion of nouns with age. Overall, nouns maintain a higher proportion compared to other parts of speech.

The proportion of verbs in both Antonija's and Marina's corpora does not exhibit any relationship with age. Notably, the overall proportions of verbs are high. Similar developmental trajectories of verbs have been identified in prior studies employing parental checklists (Bates et al., 1994; Kovačević et al., 2007a). These studies examined verbs and adjectives in predicative function collectively, referring to them as predicates. In contrast, in the present study, verbs were represented in a larger proportion (24–37 %) compared to predicates in studies employing parental checklists (6–21 %). This disparity is evident even at the onset of lexical development, where the proportion of verbs surpasses that observed in previous studies (< 10 %). Additionally, adjectives demonstrate an increase with age in both Antonija's and Marina's corpora, while adverbs show an increase solely in Marina's corpus. Despite differing trajectories regarding nouns across the two corpora, similarities are observed in the trajectories of verbs and adjectives.

154 The inconclusive results on the relationship between the composition of vocabulary (nouns, adjectives, and adverbs) and the age of acquisition in the two girls underscore the individual

nature of early vocabulary development.

The relationship between various types of function words and age highlights significant differences between the two children. Notably, in Antonija's corpus, there is a discernible increase in conjunctions, a trend not observed in Marina's corpus. Conversely, in Marina's corpus, prepositions and particles show an increase in proportion with age, whereas in Antonija's corpus, their proportions decrease. These variations may be attributed to individual differences in language acquisition, potentially reflecting distinct parental input styles (Dale et al., 2015).

Our results suggest that Croatian might be classified among the languages in which verbs play a more prominent role than other parts of speech. Furthermore, our results indicate that at the onset of lexical development, starting from the age of 1;05 years, function words are more prevalent than previously reported in studies using parental report checklists (Bates et al., 1994; Kovačević et al., 2007a). This suggests that parents may be less sensitive to recognizing these words, and their development can be more reliably monitored by analyzing spontaneous speech samples.

On the other hand, the developmental trajectory of function words differs from that reported in previous corpus-based studies (Bates et al., 1994; Kovačević et al., 2007a). In Marina's corpus, the proportion of function words does not significantly increase with age, while in Antonija's corpus, the proportion initially increases steeply and then decreases with age. These divergent patterns between the two girls indicate distinct styles of lexical development. Since previous data on the acquisition of function words in Croatian are based solely on the normative parent report instrument *Communicative Development Inventories* (Kovačević et al., 2007a), the present study is the first to delineate their developmental trajectory using spontaneous speech samples.

In comparison to previous studies based on parental checklists (e.g., Bates et al., 1994; Kovačević et al., 2007a), the developmental trajectories of all parts of speech examined in the current study generally show more similarities. Although greater variability in vocabulary composition is observed in the early stages of lexical development, i.e., before the age of 1;8 years, no significant shifts in the proportions of nouns, verbs, adjectives, adverbs and function words were observed after this period. This suggests that all parts of speech follow a similar developmental path and that the transitions from the reference phase to the predicative and grammatical phases are not so clear-cut.

When interpreting the results of different studies, it is important to consider the methods used to investigate lexical development, namely parental checklists on one hand and children's speech samples on the other, as well as the language measures in which vocabulary composition is represented, such as tokens, types, or lemmas. Data on vocabulary composition obtained from parental checklists are presented in lemmas and depend on the subjective assessments

of parents, who may be biased towards lower proportions of predicates and function words. In contrast, data on vocabulary composition obtained from speech samples provide insight into children's actual vocabulary, as they do not depend on parents' estimates. However, in previous corpus-based studies, proportions of parts of speech were usually presented in tokens or types. When proportions are presented in tokens, they reflect the frequency of word use rather than the vocabulary composition. Proportions in types reflect not only vocabulary composition but also morphological development and the morphological richness of the language.

Therefore, this study was conducted on children's spontaneous speech samples using lemmas as the language measure. This approach allowed us to observe not only vocabulary composition and corresponding developmental changes but also revealed important insights into children's lexical development. For example, verbs were more prevalent in our study compared to studies based on parental reports, yet less prevalent than in speech samples where their proportions were reported in tokens or types. However, opting for an alternative methodological approach may have compromised our ability to directly compare our results with those from previous studies.

The present study is limited by the small number of participants, i.e., our sample consists of only two children. The observed differences between participants make it challenging to draw generalized conclusions about lexical development in Croatian. Since the parents did not provide information about their children in the parental checklist, we could only indirectly compare our data with normative data. In the parental checklist, the developmental trajectories of parts of speech are presented in terms of vocabulary size, whereas in our study, they are presented in terms of age of acquisition, and we lack information about children's vocabulary size. Moreover, the two girls in our study were first recorded at the age of 1;05 years, and we lack information about their lexical development from the beginning of their spoken language production. Therefore, although we can draw conclusions about the proportion of some parts of speech at the beginning of lexical development, it may not represent the actual beginning of their lexical development.

Another limitation in comparing our results with previous corpus-based studies is word classification. For instance, we categorized verbs and adjectives separately, whereas Bates et al. (1994) and Bassano et al. (1998) treated verbs and adjectives collectively as predicates. Bates et al. (1994) considered only common nouns as nouns, while we included both proper nouns and common nouns in our analysis.

Conclusion

156 The analysis of developmental changes in vocabulary composition in longitudinal samples of two female children presented in this paper provides a valuable contribution to the study of

the early development of the productive lexicon. A particular contribution is the description of developmental changes in the distribution of nouns and verbs, an important research topic due to the question of universal and language-specific features of lexical development (Frank et al., 2021). Our results indicate that in Croatian, nouns continuously predominate over other parts of speech, which is consistent with the results of previous studies in other languages (Frank et al., 2021) and points to a universal feature of lexical development. In contrast, verbs have been shown to expand earlier in lexical development and are represented in a higher proportion than in previous studies (Bates et al., 1994; Kovačević et al., 2007a), which may indicate that language-specific features also need to be considered. However, this assumption should be further tested in more detailed cross-linguistic studies. To the best of our knowledge, this study is the first to report on the development of function words based on children's spontaneous speech production.

Understanding typical lexical development, more specifically the developmental trajectories of different parts of speech and their proportions in vocabulary composition, has important clinical implications for speech and language pathology. Supporting lexical development in children with language disorders at an early age lays the foundation for developing language skills. Our study shows that nouns are predominant in the early lexical development of Croatian children and should therefore be the focus of attention when supporting the children's acquisition of new words (Laubscher & Light, 2020). However, clinicians should bear in mind that verbs and adjectives are also acquired from the beginning, and their proportion increases continuously, accounting for about 30% of children's vocabulary. Supporting the acquisition of predicates is even more important when considering the frequency of their use in daily communication and their role in early syntactic development. The proportions of function words increase before the age of two, earlier than reported in previous studies based on parental checklists (Kovačević et al., 2007a). This has important implications for intervention in speech and language pathology, as function words are often neglected as intervention targets. Due to the low concreteness of words that are not nouns, speech and language pathologists may facilitate the acquisition of such words with visual support (Washington & Warr-Leeper, 2013; Shane et al., 2015). This is important for the promotion of spoken language development as well as the development of augmented language in children with complex communication needs who use communication aids.

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Positive youth development as a predictor of romantic activities in adolescence

SUMMARY

Positive youth development can be defined as an adaptive outcome in adolescence and a predictor of healthy behaviour later in life. Indicators of positive youth development as described in the 5C model, i.e., competence, confidence, character, caring, and connection, correlate, for example, with fewer internalising and externalising symptoms and show greater involvement in romantic socialising and dating. Thus, the aim of this paper was to examine whether indicators of positive youth development, as described in the 5C model, can predict the romantic experiences of Croatian youth. A total of 2,870 second-grade high school students (51% female) with a mean age of 16 years (SD = 0.429) from urban areas of Croatia participated in this study. They completed the Short Measure of the Five Cs and answered questions about their romantic experiences, i.e., their experiences with romantic socialising, dating, and relationships. Data were analysed using logistic regression. The results indicate that adolescents with higher scores on the competence scale and lower scores on the character scale were more likely to be involved in romantic socialising and go on dates: only competence proved to be a significant predictor of the likelihood of a romantic relationship. Based on this model, it was possible to accurately predict which participants would not engage in romantic activities. These results help us understand normative romantic behaviour in adolescence, as well as its relationship to positive youth development. In the context of prevention science, they also help us highlight the importance of promoting positive youth development for the socio-emotional development of adolescents.

Keywords: *positive youth development, romantic activities, adolescence*

Introduction

During adolescence, relationships with peers gain increasing significance, becoming crucial for further development (Brown, 2004; Collins, 2003; Laursen & Bukowski, 1997). These relationships may be formal or informal and typically occur at one of three levels: dyadic relationships, cliques, or crowds (Brown, 2004). Particularly significant are romantic relationships, as they

play a pivotal role in shaping identity, sexuality, and career aspirations while also contributing positively to academic success. Moreover, they evoke profound emotions, either pleasant or unpleasant (Furman & Shaffer, 2003; Wilson Shockley, 1995). Therefore, it is not surprising that time spent with peers of the opposite sex increases between ages 10 and 18, whereas time spent with same-sex peers remains the same (Richards et al., 2008).

According to Beckmeyer and Weybright (2020), three types of romantic activities in adolescence can be identified: romantic socializing, dating, and romantic relationships. Romantic socializing involves spending time in a group that includes both same- and opposite-sex peers, providing opportunities to meet potential romantic partners. Although dating may also occur in a group, it differs from romantic socializing as it involves spending time with someone due to an existing, rather than potential, romantic interest (Beckmeyer & Weybright, 2020). A romantic relationship is a dyadic connection between two individuals, characterized by the expression of feelings both verbally and physically (Collins, 2003).

When examining dating, it is important to note that different surveys measure dating inconsistently. Some define it broadly, as mutual romantic interest, while others define it more formally, as a romantic or sexual relationship (Eickmeyer et al., 2020). Beckmeyer (2015) focused on romantic involvement, operationalizing it through romantic socializing, dating, and serious romantic relationships. Romantic socializing examined whether adolescents attended activities with boys or girls present, went dancing with boys or girls, or went out in groups that included boys or girls in the evening. Dating, in contrast, referred to whether adolescents participated in group or single dates. Serious romantic relationships were assessed based on the number of such relationships the adolescents reported (Beckmeyer, 2015). However, defining what constitutes a "serious romantic relationship" varies among individuals. Recognizing this heterogeneity, Carver et al. (2008) asked participants if they had experienced a special romantic relationship in the past 18 months. If they denied being in such a relationship, they were asked whether they had ever held hands, kissed someone, or expressed feelings of liking or love to someone outside their family. Finally, participants were asked if all these actions had occurred with the same person. If all answers were affirmative, that person was considered their romantic partner (Carver et al., 2008).

Older studies indicate that both romantic socializing and dating are normative activities in middle adolescence. Beckmeyer (2015) reported that 98.9% of 838 middle adolescents had engaged in some form of romantic socializing, 69.7% had started dating, and 56% reported at least one serious romantic relationship. Regarding trends in romantic relationships, data show that only a quarter of adolescents had experienced a romantic relationship by the age of 12, increasing to half by the age of 15. By age 18, more than 70% of adolescents had been in a romantic relationship (Carver et al., 2003). However, recent data from the United States suggest

that dating trends have shifted. Specifically, between 1991 and 2017, the percentage of thirteen-year-olds who reported dating declined from 52% to 29%, the percentage of fifteen-year-olds dropped from 72% to 45%, and the percentage of seventeen-year-olds fell from 86% to 51% (Eickmeyer et al., 2020).

The observed decline in romantic activities warrants greater attention from researchers due to their significance for adolescents and their future development. As previously noted, romantic experiences are crucial not only for identity formation but also for supporting adolescents' mental health. For instance, romantic relationships positively influence psychological well-being but may also contribute to increased internalized and externalized symptoms when they deviate from normative patterns (Pinquart & Pfeiffer, 2018). Data from a representative German longitudinal study on relationship experiences between the ages of 10 and 20 identify four groups of young people: continuous singles, frequent changers, late starters, and moderate daters. Frequent changers begin romantic relationships at the youngest age and have the most partners, while late starters start dating later and have the fewest partners. Moderate daters occupy a middle ground between these groups. Continuous singles report feeling lonelier and less satisfied with their lives compared to late starters and moderate daters, both during adolescence and young adulthood (Gonzalez Avilés et al., 2020). Thus, normative romantic experiences can be regarded as positive developmental outcomes.

Positive youth development is a theoretical framework that explains adaptive developmental outcomes as the result of supportive interactions between a child and their environment. In a nurturing developmental context, positive development can occur regardless of socioeconomic status (Benson et al., 2006; Geldhof et al., 2021). The 5C model of positive youth development, which has the strongest empirical foundation to date (Heck & Subramaniam, 2009), identifies five key indicators: competence, confidence, character, caring, and connection (Lerner et al., 2005). Competence encompasses positive perceptions of social, cognitive, academic, and professional abilities, while confidence reflects a general sense of self-worth. Character refers to the acceptance of social norms, morality, and integrity, and caring denotes compassion for others. Lastly, connection involves reciprocal interactions with peers, family, school, and the broader community (Lerner et al., 2005).

Positive youth development is associated with various adaptive outcomes during adolescence. For example, competence, confidence, and connection have been identified as potential protective factors against mental health issues (Geldhof et al., 2014; Gomez-Baya et al., 2022; Kozina et al., 2021; Novak et al., 2023). Additionally, research suggests that positive youth development, particularly confidence, enhances psychological well-being (Abdul Kadir et al., 2021a; Kozina et al., 2021; Novak et al., 2023). It is also strongly linked to increased happiness (Gomez-Baya et al., 2021), mindfulness (Abdul Kadir et al., 2021b), and healthy lifestyle behaviors, such as engaging in

physical activity and consuming fruits and vegetables regularly (Domínguez Espinosa et al., 2021).

Objective

Few studies have explored the role of romantic activities in fostering positive youth development. For instance, romantic socializing has been associated with reduced externalizing behaviors, while both romantic socializing and dating have been linked to higher peer competence and stronger school attachment (Beckmeyer & Malacane, 2018; Beckmeyer & Weybright, 2020). Although positive youth development is known to predict adaptive developmental outcomes—and normative romantic experiences can be classified as such—there appears to be no prior research investigating whether the indicators of positive youth development predict romantic experiences during adolescence. This paper aims to examine whether the indicators of positive youth development, as defined by the 5C model, predict the romantic experiences of Croatian youth.

Research Problems and Hypotheses

The objective of this paper was operationalized through two research questions:

1. What romantic activities (i.e., romantic socializing, dating, and romantic relationships) are normative in mid-adolescence in Croatia?

Based on previous studies (Beckmeyer, 2015; Carver et al., 2003; Eickmeyer et al., 2020), the hypothesis posits that romantic socializing and dating are normative romantic activities.

2. Do the 5C indicators of positive youth development (i.e., competence, confidence, character, caring, and connection) predict engagement in romantic socializing, dating, and romantic relationships in mid-adolescence in Croatia?

Earlier findings support hypotheses regarding the positive association between competence, confidence, caring, and connection, as outlined in the 5C model, and romantic activities in adolescence. Since interpersonal competencies are essential for developing interpersonal relationships (Brown, 2004), it is hypothesized that greater competence is linked to a higher likelihood of engaging in romantic activities during mid-adolescence. Additionally, Johnson and Galambos (2014) found that higher self-esteem during the transition from adolescence to young adulthood correlates with higher-quality intimate relationships, leading to the hypothesis that greater confidence is similarly associated with increased romantic activity.

Empathic adolescents are often considered more desirable romantic partners (Bower et al., 2015), supporting the hypothesis that more expressed caring is positively associated with a higher likelihood of romantic activity. Finally, a friendship network that include both same-sex and opposite-sex friends—more common among girls—are linked to the development of

more intimate and stable romantic relationships in mid- and late adolescence (Connolly et al., 2000; Feiring, 1999). Therefore, the hypothesis posits that greater connection is associated with a higher likelihood of romantic activity.

Methods

This study was conducted as part of a project *Testing the 5C framework of positive youth development: traditional and digital mobile assessment – P.R.O.T.E.C.T.* funded by the Croatian Science Foundation (UIP-2020-02-2852). A total of 2,870 second-year high school students, with an average age of 16 years (SD = 0.429), participated in the research. Among the respondents, 51% identified as female, 47% as male, and 3% preferred not to disclose their gender. Nearly half of the participants resided in Zagreb (47%), while the remainder lived in Varaždin (22%), Rijeka (14%), Osijek (8%), Split (6%), Vinkovci (3%), and Dubrovnik (1%), indicating that the study predominantly involved youth from urban areas in Croatia. Regarding education, 52% of the respondents attended a four- or five-year vocational school, 32% were enrolled in grammar schools, and 16% attended three-year vocational schools.

The Ethical Committee of the Faculty of Education and Rehabilitation Sciences of the University of Zagreb, the National Agency for Education, and the Ministry of Science and Education approved this study. Both parents and adolescents provided active consent for participation. The respondents completed an online questionnaire via SurveyMonkey during regular school hours in a group setting.

The survey included demographic questions and various self-assessment questionnaires. For this study, specific questions on romantic activities and the *Short Measure of the Five Cs* (Geldhof et al., 2014) were utilized. Respondents answered "yes" or "no" to the following questions, developed based on the definitions by Beckmeyer (2015) and Beckmeyer and Weybright (2020):

1. *In my free time, I choose activities where I could meet people for whom I might develop a romantic interest* (romantic socializing).
2. *In the evening, I go out with a group of people for whom I could develop a romantic interest* (romantic socializing).
3. *I go out with the person I like* (dating).
4. *I am in a relationship* (romantic relationship).

These questions were not mutually exclusive, allowing adolescents to provide the same answer for multiple questions. As a result, participants were not divided into groups based on their romantic involvement, nor were the groups compared. Instead, each question was treated as a separate criterion variable in a logistic multiple regression analysis.

The *Short Measure of the Five Cs* (Geldhof et al., 2014) consists of 34 items rated on a scale from

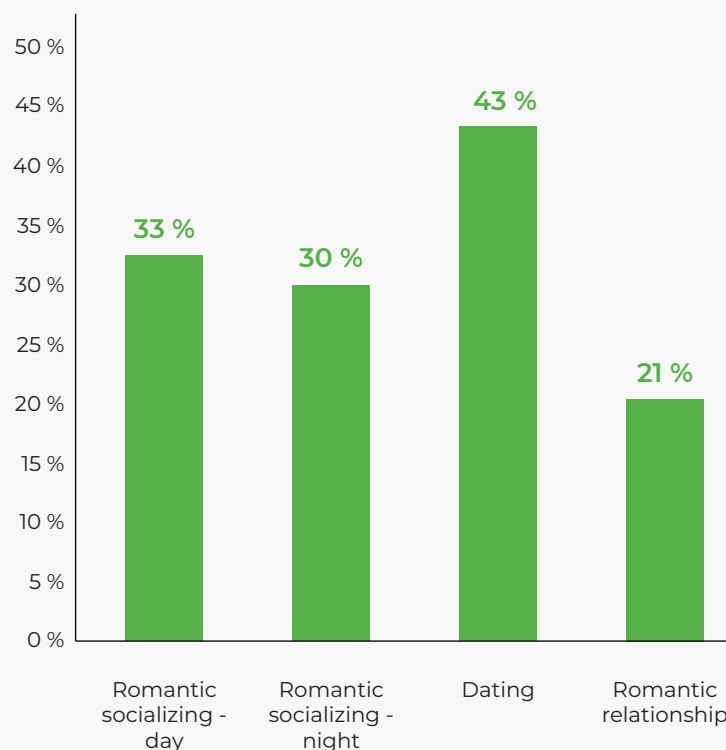
1 ("not at all like me") to 5 ("just like me"). Both the five-factor structure (CFI = .956; TLI = .938; RMSEA = .041; SRMR = .022) and the bi-factor structure (CFI = .944; TLI = .917; RMSEA = .064; SRMR = .037) on parcels demonstrated excellent model fit in the Croatian sample. For further details on the construct and criterion validity of this scale, see Novak et al. (2023).

In this study, five subscales measuring the five indicators of positive youth development proved to be reliably consistent: Competence ($\alpha = .71$), Confidence ($\alpha = .89$), Character ($\alpha = .73$), Caring ($\alpha = .90$), and Connection ($\alpha = .79$). The total score for each subscale was calculated as the average of all item assessments within that category.

Results and Discussion

To address the first research question, the frequency of participation in various romantic activities was analyzed. As illustrated in Figure 1, dating emerged as the most common romantic activity among mid-adolescents in Croatia, with 43% of respondents reporting engagement in this activity. Approximately one-third of the participants engaged in romantic socializing, either during the day (33%) or at night (30%). In contrast, only 21% of respondents reported being in a romantic relationship.

Figure 1. *Frequency of Romantic Activities in Mid-adolescence (N = 2,870)*

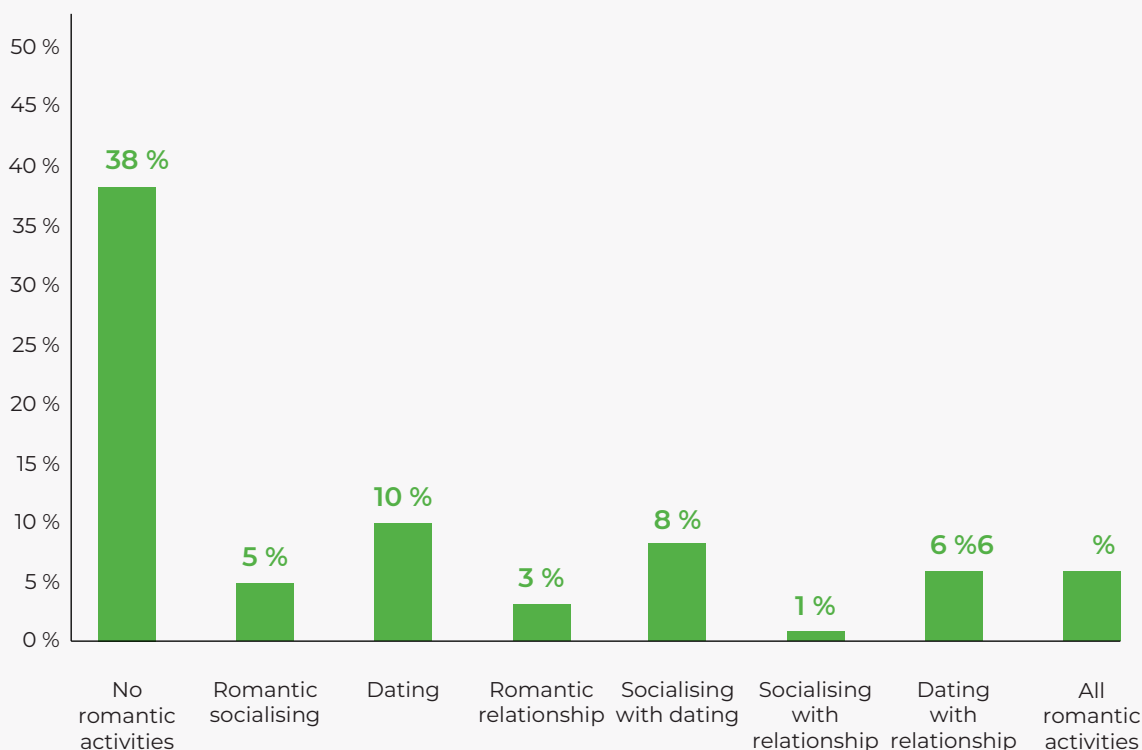


Since the questions on participation in romantic activities were not mutually exclusive, a more detailed frequency analysis was conducted. Following the procedure outlined by Beckmeyer and Malacane (2018), participants were categorized based on their involvement in romantic socializing (daytime and nighttime romantic socializing combined), dating, and romantic relationships. This classification resulted in eight groups:

1. Adolescents not involved in romantic activities.
2. Adolescents who engage in romantic socializing.
3. Adolescents who date.
4. Adolescents who are in a romantic relationship.
5. Adolescents who both socialize and date.
6. Adolescents who socialize and are in a romantic relationship.
7. Adolescents who date and are in a romantic relationship.
8. Adolescents involved in all three romantic activities.

The data indicate that most participants (38%) do not engage in romantic activities. Among those who do, dating (10%) and a combination of socializing and dating (8%) were the most common forms. Only 3% of participants reported being in a romantic relationship without engaging in other forms of romantic activity.

Figure 2. Frequency of Combined Romantic Activities in Mid-adolescence (N = 2,870)



These findings align with previous studies suggesting that romantic socializing and dating are normative behaviors at this age (Beckmeyer, 2015; Carver et al., 2003; Eickmeyer et al., 2020). However, the percentage of adolescents in romantic relationships observed in this study is lower than reported in earlier research (e.g., Eickmeyer et al., 2020). One possible explanation is that the COVID-19 pandemic has generally limited opportunities for social interaction, thereby reducing chances for romantic activities of any kind.

It is also important to note that previous studies typically reported the percentage of adolescents who had ever experienced a romantic relationship, rather than the percentage of those currently in one. Furthermore, in the present study, a romantic relationship was broadly defined as a "romantic relationship," leaving participants' responses dependent on their personal interpretations of the term. Indeed, earlier qualitative research suggests that late adolescents and emerging adults conceptualize different types of romantic and sexual relationships in varying ways (Šutić et al., 2022).

To address the second research question, four binomial logistic regressions were conducted using the Bootstrap method to calculate confidence intervals. The criteria included romantic socializing during the day, romantic socializing at night, dating, and being in a romantic relationship, while the predictors were the five Cs of positive youth development. Respondents reported the following levels for the predictors: competence ($M = 3.41$, $SD = 0.688$), confidence ($M = 3.63$, $SD = 0.843$), character ($M = 3.67$, $SD = 0.598$), caring ($M = 3.86$, $SD = 0.833$), and connection ($M = 3.44$, $SD = 0.682$). These values were slightly above the theoretically expected average.

The results of the binomial logistic regression analyses are presented in Table 1. The indicators of positive youth development statistically significantly differentiate between adolescents who engage in romantic socializing and those who do not ($\chi^2 (5) = 67.7$, $p < .001$; Nagelkerke $R^2 = 0.03$), with a classification accuracy of 0.67. Similarly, these indicators distinguish adolescents who engage in romantic socializing at night from those who do not ($\chi^2 (7) = 121$, $p < .001$; Nagelkerke $R^2 = 0.06$), with a similar classification accuracy of 0.69. Adolescents with higher levels of competence and caring, combined with lower levels of character, are more likely to engage in romantic socializing.

Regarding dating, the indicators of positive youth development statistically significantly differentiate between adolescents who date and those who do not ($\chi^2 (7) = 151$, $p < .001$; Nagelkerke $R^2 = 0.07$), with a classification accuracy of 0.61. Adolescents with higher levels of competence and lower levels of character are more likely to go on dates.

Finally, the 5Cs also statistically significantly differentiate between adolescents who are in romantic relationships and those who are not ($\chi^2 (5) = 21.3$, $p < .001$; Nagelkerke $R^2 = 0.01$), achieving the highest classification accuracy of 0.79. Adolescents with higher levels of competence and lower levels of connection are more likely to be in a romantic relationship.

Table 1. Predictors of Romantic Activities Calculated Using Logistic Regression Analysis (N = 2,870)

Romantic socializing during day				Romantic socializing at night		
Predictor	B	SE	95% CI	B	SE	95% CI
Competence	.50**	.079	1.419 – 1.931	.64**	.083	1.608 – 2.224
Character	-.37**	.094	0.574 – 0.830	-.62**	.099	0.443 – 0.652
Confidence	.02	.066	0.900 – 1.165	-.06	.069	0.819 – 1.073
Caring	.19*	.064	1.067 – 1.374	.18*	.068	1.046 – 1.364
Connection	-.12	.082	0.754 – 1.041	.06	.086	0.898 – 1.257
Dating				Romantic relationship		
Predictor	B	SE	95% CI	B	SE	95% CI
Competence	.71**	.078	1.748 – 2.364	.27*	.088	1.105 – 1.559
Character	-.43**	.092	0.544 – 0.779	-.09	.105	0.745 – 1.126
Confidence	.10	.064	0.970 – 1.246	.08	.074	0.938 – 1.256
Caring	.08	.063	0.957 – 1.225	.10	.072	0.959 – 1.273
Connection	-.11	.079	0.764 – 1.043	-.35**	.093	0.589 – 0.846

Note. B = unstandardized estimate. SE = standard error. 95% CI = Bayesian Credible Intervals. Criteria: 0 = no, 1 = yes.

* p < .01, ** p < .001

As hypothesized, competence emerged as a significant predictor of all romantic activities. A positive perception of social skills appears to be crucial for forming and maintaining any kind of social relationships. For instance, time spent with a group of close friends predicts time spent in larger groups of same- and opposite-sex peers during early adolescence, which subsequently fosters the development of more intimate and stable romantic relationships in late adolescence (Connolly et al., 2000; Feiring, 1999). Consequently, prevention programs aimed at enhancing adolescents' social skills could benefit not only their peer relationships but also their overall psychological well-being.

Interestingly, confidence, understood as a broader sense of self-worth, does not appear to play a major role in romantic activities. This finding suggests that specific domains of self-esteem may hold greater significance during adolescence.

It was hypothesized that caring predicts romantic activity, as empathic adolescents are often considered more desirable romantic partners (Bower et al., 2015). However, this hypothesis was only supported for romantic socializing. It is important to differentiate between romantic interest and romantic activity: while someone may be desirable as a romantic partner, this does not necessarily mean they will engage in romantic activities.

Barrio et al. (2004) found that empathy during adolescence is strongly and positively associated with friendliness. Consequently, it is plausible that respondents reporting higher levels of caring are generally more open to social interactions, thereby creating more opportunities for romantic socializing.

Connection was found to predict involvement only in romantic relationships. Although it was hypothesized that higher levels of connection would correlate with an increased likelihood of engaging in romantic activities, the results of this study suggest that adolescents with higher levels of connection are less likely to be in a romantic relationship. Broader friendship networks are known to facilitate the development of more intimate and stable romantic relationships (Connolly et al., 2000; Feiring, 1999).

Conversely, research on long-term singleness indicates that some individuals choose to remain single because they find fulfillment in non-romantic relationships (Pepping et al., 2018). Since connection, as defined by the 5C model, reflects positive interactions with peers, families, teachers, and the broader community, it is plausible that adolescents with higher levels of connection have fulfilling non-romantic relationships, which may reduce their interest in pursuing romantic relationships.

The most intriguing findings suggest that a less developed character increases the likelihood of romantic socializing and dating. Character, as an indicator of positive youth development, reflects the internalization of social norms. This raises the question of what social norms regarding romance exist for youth. Does Croatian society primarily promote stable romantic relationships?

Romantic relationship experiences during adolescence are critical for psychosocial adjustment in both adolescence and young adulthood. Continuous singles report lower life satisfaction and higher loneliness compared to moderate daters and late starters (Gonzalez Avilés et al., 2020). On the other hand, Beckmeyer and Malacane (2018) identified four clusters of adolescents based on their romantic activities: abstaining from any kind of romantic involvement, socializing, socializing with dating, and socializing with relationships. While adolescents in the "socializing" and "socializing with dating" clusters exhibited less externalizing behavior, those in the "abstaining" cluster also reported greater social dissatisfaction (Beckmeyer & Malacane, 2018).

These mixed findings suggest that romantic experiences are important, but caution is needed to avoid entering romantic relationships without a clear understanding of expectations and behaviors. Studies on positive youth development (e.g., Novak et al., 2023) highlight that character—particularly obedience and adherence to rules—is emphasized in Croatian society. Therefore, future research should explore not only the social norms surrounding romantic relationships but also the long-term effects of various romantic activities on adolescents' psychosocial adjustment.

The primary limitation of the present study lies in the operationalization of romantic activities. Specifically, romantic experiences were categorized as romantic socializing, dating, and romantic relationships, following the work of Beckmeyer (e.g., Beckmeyer, 2015; Beckmeyer & Malacane, 2018; Beckmeyer & Weybright, 2020). These categories were not mutually exclusive, meaning that individuals could report participation in all three activities. In addition, the definition of a romantic relationship was left open to the adolescents' interpretation, rather than including specific criteria such as whether they had held hands or kissed someone outside their family, as in Carver et al.'s (2008) study.

This study focused on romantic activities rather than categorizing adolescents into clusters based on their involvement in different types of romantic activities. However, prior research (e.g., Beckmeyer & Malacane, 2018; Gonzalez Avilés et al., 2020) suggests that examining differences between clusters, particularly focusing on adolescents who abstain from all romantic activities (i.e., the "abstaining" cluster), could provide valuable insights.

Conclusions

Although there is a growing body of evidence supporting positive youth development as a determinant of adaptive developmental outcomes and highlighting the adaptiveness of normative romantic experiences in adolescence, a gap exists in the literature regarding the association between positive youth development and romantic experiences. The present study explored this association using a sample of more than 2,800 mid-adolescents from urban areas in Croatia.

The main findings suggest that dating—spending time with individuals for whom one has a romantic interest—is a normative romantic activity. Adolescents with higher levels of competence are more likely to engage in dating, romantic socializing, and romantic relationships. Competence, as defined by the 5C model of positive youth development, reflects a positive perception of one's professional and, more significantly, social skills. Enhancing social skills among youth could therefore foster adaptive outcomes.

Additionally, romantic socializing and dating are more common among adolescents with lower levels of character, i.e., those with fewer internalized social norms. This raises important questions for both experts and parents regarding what they consider appropriate romantic activities for adolescents. It would also be valuable for researchers to employ qualitative methodologies to investigate the messages adolescents receive from adults regarding romantic activities.

Ultimately, a deeper understanding of these social messages could help in encouraging adolescents to engage not only in romantic relationships but also in other normative romantic activities that support their overall development.

Acknowledgments

The author would like to thank the team members of the *Testing the 5C framework of positive youth development: traditional and digital mobile assessment – P.R.O.T.E.C.T.* research project for their invaluable support in planning this study and assisting with data collection..

Study funding: This paper is part of the project “Testing the 5C framework of positive youth development: traditional and digital mobile assessment - P.R.O.T.E.C.T.” funded by Croatian Science Foundation (UIP-2020-02-2852).

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The impact of Covid-19 on cybercrime: Trends, assessment and prevention strategies

SUMMARY

The pandemic of COVID-19 and the enforced lockdown has led to more people to be restricted at home with more hours to spend online each day and progressively relying on the Internet to access services, they usually acquire offline. The perils of cyber-crime have been known many years before, but the surge in the proportion of the population linked to the Internet and the time spent online, have provided more opportunities for cybercriminals to take advantage of the situation and make more money or create disruption. Using available published materials, in this paper we identify the most common cyber-attacks during the Covid-19 pandemic in order to assess the damage and possible changes in the forms of cyber-attacks during the Covid-19 pandemic. After the assessment, we identify the risks and possible prevention steps in order to successfully combat the future cyber-attacks.

Keywords: *cybercrime, covid-19, prevention*

Introduction

With the increasing use of computers and the development of computer networks, cyberspace became a place where various crimes are committed, leading to the new term "cybercrime," which broadly describes crimes committed in this space and symbolizes the insecurity and risk on the Internet (Wall, 2007, p. 10). The proliferation of digital technology, computers, and communication tools has transformed human transactions, communication, and life in general. Crime seizes the opportunity, which is why almost every advance is followed by the possibility of misuse for criminal purposes (Chawki et al., 2015). Some authors believe that cybercrime is composed of traditional types of crimes with new strategies, such as Grabosky (2001; after Payne, 2020), who asks the question: Is cybercrime "old wine in new wineskins" or "a completely new type of wine"? The growing reliance on computers made technology a tempting target: the ease with which digital media is shared led to an explosion in copyright infringement and

the distribution of child pornography. Furthermore, the ability to bank and store over the Internet is fertile ground for fraud, while electrical communication tools such as email and text messaging enable cyber-stalking and harassment (Chawki et. al., 2015). The aim of this paper is to present the phenomenon of cybercrime, focusing on its conceptual determinants such as definition and typology, phenomenology and changes that occurred during the corona virus pandemic caused by cybercrime, and possible problems and solutions. The complexity of cybercrime and the specificity of the situation in which humanity finds itself in 2020 make this type of crime a relevant research topic. We asked ourselves: does humanity's increasing dependence on technology have an impact on cybercrime, and if so, in what way?

Defining cybercrime

Although the term "cybercrime" is now widely used to refer to criminal acts in so-called cyberspace, there are still differences regarding an acceptable, universal definition of this phenomenon (Vojković and Štambuk-Sunjić, 2006; Holt and Bossler, 2016; Choi, Lee, and Louderback, 2020; Payne, 2020; Viano, 2017; Paoli, 2018; Sarre, 2018; Donalds and Osei- Bryson, 2019; after Phillips et al, 2022). According to Chawki, Darwish, Khan, and Tyagi (2015, p. 3), cybercrime is any criminal activity that uses a computer as an instrument, target, or means to commit a crime, which leads to the conclusion that a general definition of cybercrime can be illegal activities that use a computer as an instrument, target, or both. On the other hand, Dragičević (2004; adapted from Protrka, 2018) defines cybercrime as "totality of crimes committed during a certain period of time in or using a cybernetic space by using or abusing the resources or services of the cybernetic space or other services using information technologies that constitute its infrastructure." Since there is no unified definition of the term to date, it is necessary to emphasize that the term cyber, as the first element of the word in most dictionaries, refers to something associated with the world of virtual reality that appears when using a computer.

Typology of cyber crime

The most commonly used categorization system that is consistently accepted by scholars and policymakers is the one that distinguishes between two types of cybercrime: "cyber-enabled," i.e., cyber-assisted, and "cyber-dependent," i.e., computer-centric (McGuire and Dowling, 2013; Paoli, 2018; Sarre, 2018; after Phillips et al., 2022). This dual categorization is based on a definition originally proposed by Brenner (2007; after Phillips et al., 2022), which distinguished specific cyber offenses from so-called real-world crime that had migrated into cyberspace. "Cyber-enabled" crimes (alternatively, computer-based crimes, computer-related crimes, or crimes against persons) are traditional crimes that existed before the advent of computer technology and are now facilitated or sustained using information and communication technology. In contrast, "cyber-dependent" crimes (alternatively, computer-related crimes, computer crimes, and

'technological crimes') are crimes that cannot exist without computer technology and outside the digital world.

As cybercrime has evolved over the years, other classification systems have emerged to capture the ever-evolving types of cybercrime. The best known is the two-factor spectrum approach proposed by Gordon and Ford (2006; adapted from Phillips et al., 2022), which divides cybercrime into two types, such as the cyber-enabled and cyber-dependent cybercrimes, which represent opposite ends of the spectrum. Another, more recent typology by Sarre, Lau, and Chang (2018; adapted from Phillips et al., 2022) extends this approach by adding a new dimension to cybercrime by referring to crimes perpetrated by artificial intelligence, robots/bots, or self-learning technology.

In addition to the two-factor classification, there is also a three-factor classification, most notable by Wall (2007), who distinguishes between "crimes against the machine," "crimes using the machine," and "crimes within the machine." Another categorization is provided by the European Commission (2013; adapted from Phillips et al., 2022), which identifies "crimes related to computers and information systems," "traditional crimes" (fraud, identity theft), and "content-related crimes" (e.g., incitement to hatred).

An alternative to these classifications is Chandra and Snowe's (2020) classification, which focuses on the victim and aims to achieve stability, clarity, integrity, and mutual exclusivity of categories, which requires careful determination and narrow definition of a victim type. They divide cybercrime into "pure technology crime" and "advanced cybercrime". Pure technology cybercrime refers to a crime that targets or victimizes the computer technology ecosystem and disrupts some or all of its confidentiality, integrity, or availability, while advanced cybercrime uses computer technology to harm individuals, governments, businesses, or property other than the computer technology ecosystem, resulting in denial, disruption, or damage to a facility or property.

The focus on the victim ensures comparability with traditional crime, where measures such as detection, prevention, and prosecution are taken according to the nature and severity of the harm suffered. In identifying and defining the direct victim, the initial, direct, and immediate impact of any cybercrime is critical. Implicit, or indirect, victim is temporally and spatially removed from the initial, direct, or immediate impact and refers to extended and subsequent impacts of a crime. Chandra and Snowe (2020) consider this taxonomy a contribution to theory and knowledge enhancement that is relevant to practice and a starting point for future criminological research.

Common forms of cybercrime

One of the most common forms of cybercrime is known as hacking, which derives from the term hacker, which originally meant an innovative use of technology that resulted in benefits and had a positive connotation, describing a person who was able to create effective solutions to computer problems. Hackers were considered the brave new pioneers of the computer revolution (Levy, 1984; after Yar, 2006). Over time, hacking became synonymous with committing crimes, so in 1985 hackers introduced the term "cracker" for a malicious person who "cracks" the security settings of a computer system. Nevertheless, the terms "hacker" and "hacking" came to refer to illegal activities in the field of cybercrime, so the classification of hackers and crackers has more of a criminological meaning than anything else (Yar, 2006). The same author sees hacking as a general term for a range of activities related to computer crashing, manipulation, and disruption. The basic form of hacking is gaining access to and control over other people's computer systems.

Another common form of cybercrime is fraud, which is defined in the context of cybercrime as "a broad range of activities whose common characteristic is a misrepresentation by the perpetrator to gain an advantage or cause harm to others" (Button and Cross, 2017; adapted from Tomić, 2019). According to Yar (2006), computer fraudsters separate their victims from their money or property through disinformation and deception. The most common form of computer fraud occurs in online shopping, where the victim is usually deceived by the person with whom they are interacting, while that person falsely claims to be part of a legitimate organization or professional role holder. Whitty (2020) cites fake lotteries and sweepstakes, identity theft, charity fraud, and investment fraud as the most common types of fraud associated with cybercrime. Investment fraud most commonly includes stock trading and seeking investments in non-existent companies (Yar, 2006).

Although it is a type of malware, the role of ransomware is to extort money, which makes it a category of computer fraud. Victims are asked to pay a fee to gain access to their own system databases and data (Ferguson, 2013; adapted from Holt and Bossler, 2016). These software programs, of which CryptoLocker is the best known, are distributed via attachments in emails or as malicious software that can be downloaded from the Internet. The popularity of this type of malware increased in late 2013, which coincided with the emergence of cryptocurrency, which facilitated the payment of the ransom or, in other words, made it more difficult to track the hackers (Vuković, 2018).

An interesting phenomenon is love or romance scams, where perpetrators use the perception of a legitimate relationship to take advantage of the victim, usually resulting in financial losses. The perpetrator uses trust and builds a relationship to manipulate the victim and take advantage of them both financially and emotionally. A romance scam can destroy lives through ob-

vious financial losses combined with severe emotional losses (e.g., development of depression or suicidal thoughts), impaired health, and severance of relationships with family and friends (Button et al. 2009, 2014; Cross et al. 2016; after Cross, 2020).

Phishing usually involves sending an email in which an attacker poses as a reputable company to trick the user into revealing private information that will be used for identity theft. In these cases, the content of the e-mail message includes a link that directs the user to a fake website to change a password, update personal information that the legitimate company already has, or take some other action that supposedly needs to be done urgently (Gandhi, 2012). Phishing messages rely on social engineering, which uses social masks, cultural tricks, and psychological gimmicks to trick computer users (i.e., the targets) into helping the hackers (i.e. the perpetrators) in their illegal attack or use of computer systems and networks (Bullé and Junger, 2020), or on spoofing reliable website services that the target uses (e.g., banks), asking the user to directly reveal credentials such as passwords or credit card information (Kigerl, 2020).

Spam is ubiquitous in today's world and is usually perceived as nothing more than a nuisance. It is the mass sending of unsolicited electronic messages, usually with the aim of making money, which accounted for more than half of all email messages in 2017 (Gudkova et al., 2017; after Kigerl, 2020), not including spam sent via other electronic communication media. Almost 90% of spam messages are sent by botnets, as spam makes a lot of money, i.e., thousands of hosts are needed to send unwanted emails in the largest possible quantities. Spam consumes system resources, affects bandwidth, fills server capacity, uses network infrastructure, and provides an entry point for the spread of viruses and phishing attacks on access codes and confidential information (Kokot, 2014).

Digital piracy is often simply defined as "the unauthorized and illegal digital reproduction of intellectual property" (Gunter 2008; adapted from Jennings and Bossler, 2020). Lee et al. (2018; after Jennings and Bossler, 2020) define digital piracy as "the reproduction, use, or distribution of information products in digital formats and/or the use of digital technologies without the permission of their rightful owners," leading to the conclusion that digital piracy is more than just illegal downloading. In its most basic form, intellectual property consists of so-called "intangibles" such as ideas, inventions, and information. While property laws create rights in tangible goods, intellectual property laws create property rights in original forms of intellectual products (WIPO, 2001; after Yar, 2006). It is important to keep in mind that "digital piracy" is an umbrella term that encompasses several types of unauthorized conduct and forms (Jennings and Bossler, 2020).

Cybercrime during the Covid pandemic

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In December 2019, the Chinese city of Wuhan reported a disease caused by the novel Corona

virus, and the World Health Organization (hereafter WHO) officially confirmed that it was the SARS-CoV-2 virus, and the disease caused by it was named COVID -19. After the WHO declared the pandemic in mid-March 2020, various countries around the world initiated global shut-downs, or "lockdowns," through which governments restricted people's movement, ordered them to stay indoors, and closed national borders to protect human health (Onyeaka, Anumudu, Al-Sharify, Egele-Godswill, and Mbaegbu, 2021). Humanity began to depend on information and communication technology, which in some ways became a pillar for the continued functioning of society. Businesses moved to remote work, students to online classes, and interpersonal relationships took place virtually. The logical question is whether the increase in human activity in cyberspace caused by the coronavirus pandemic had an impact on cybercrime and opened new opportunities for it.

Based on a comprehensive data analysis of Member States and private partners, Interpol (2020a) identified ransomware, malicious domains, phishing, fraud, malware, and fake news as the main threats associated with the COVID -19 pandemic. In 2020, the National Cyber Security Center (hereafter NCSC) in the United Kingdom processed three times as many ransomware incidents as in 2019 (NCSC, 2021). The African continent also saw a steady increase in cyberattacks. Attacks on online banking platforms increased by 238% in 2020 (Interpol, 2021), while more than 61% of African businesses were reportedly affected by ransomware (some of the attacks targeted critical health and maritime infrastructure). During the pandemic, most reports to Europol (2020c) were related to already known forms of ransomware, suggesting the involvement of already known criminals who continued or intensified their activities during the lockdown.

In March 2020, it was reported that phishing attacks increased by 600% (Shi, 2020; after Ventrella, 2020). According to information provided to Interpol (2020a) by Member States and private partners, the main forms of phishing attacks related to COVID -19 emails from national or global health authorities, government orders and financial assistance initiatives, fraudulent requests for payment and monetary refunds, offers of vaccines and medical supplies, mobile apps for tracking COVID -19, and requests for charitable donations. Phishing emails purportedly sent by national health ministries or the WHO included attachments with malware such as Emotet, Trickbot, and Cerberus (specifically designed to steal information) and were recorded by Interpol member states and private partners as being widely used in phishing emails (Interpol, 2020a). In addition, organizations such as Google, WHO, and the U.S. Johns Hopkins College created online mapping applications that included data and statistics on infection and death rates, as well as visual representations of virus spread, allowing people to track the spread of the virus. Cyberattackers saw this as an opportunity and created their own realistic maps similar to the apps mentioned above to spread malware or track users (Saleous et al., 2022; Ventrella, 2020). A similar app called CovidLock was developed as a ransomware program

to lock the victim's phone, who then has 48 hours to pay \$100 in Bitcoin for recovery (Khan, Brohi, and Zaman, 2020).

At the beginning of the pandemic, there was an increase in domains with the keywords "COVID" and "corona". Many domains were created with malicious intent by cybercriminals looking to take advantage of the increasing number of people searching for information about the virus. From February to March 2020, Palo Alto Networks, one of Interpol's private partners, noted a 569% increase in malicious registrations, including malware and phishing (Interpol, 2020a). At the end of March 2020, 2,022 newly registered domains were classified as malicious and 40,261 were classified as high-risk (Interpol, 2020b). Known disruptive software that had been relatively dormant was rediscovered in new forms or using Covid-19 to enhance social engineering tactics when the Covid-19 crisis erupted (Interpol, 2020c).

Cyber criminals took advantage of people's emotional vulnerability caused by uncertainty and difficulty during the pandemic. It is estimated that more than 80% of the exploitation was successfully channeled through social engineering techniques (Naidoo, 2020). In his analysis of cybercrime, the same author concludes that perpetrators during the pandemic COVID -19 tended to follow a dynamic four-step process: Gathering intelligence on situational factors, identifying targets, selecting attack methods, and using social engineering techniques. Naidoo (2020) believes that perpetrators used more subtle techniques by incorporating more situational factors into their fraud schemes. In addition, they often resorted to methods of formulating fake messages to create the impression that the victim would be rewarded for acting quickly or punished for delaying action; for example, a perpetrator posing as a bank may use punishment as a scare tactic to get the victim to act quickly (Naidoo, 2020).

In March 2020, there were numerous cyberattacks worldwide, often targeting hospitals and universities. Brno College Hospital, one of the largest COVID -19 testing laboratories in the Czech Republic, was affected by a ransomware attack (Pranggono and Arabo, 2020). The incident forced the hospital to postpone emergency surgeries, redirect new acute patients to a nearby alternative hospital, and shut down its entire IT network. This type of attack during a public health crisis such as the COVID -19 pandemic is particularly threatening and poses very real risks to human life (Europol, 2020b). A London-based medical research company was the victim of ransomware-personal and medical data of thousands of former patients was released or accessed online. The systems of a group of hospitals in Paris were the target of a DDoS attack that disrupted access to servers and emails. In early May, the NCSC reported several attempted cyberattacks in the United Kingdom on college institutions involved in coronavirus and vaccine research, with the goal of stealing information and disrupting services. Attempts were made to steal passwords, deploy ransomware, and conduct espionage, and the attacks are believed to have originated from malicious parties overseas (Saleous et al., 2022). In June 2020, the College

of California San Francisco (UCSF), which was working on a vaccine for COVID -19, was the target of a ransomware attack and was forced to pay \$1.14 million to a cybercriminal group called Netwalker (Pranggono and Arabo, 2020).

The hacking attacks on healthcare organizations have highlighted the problems associated with cybersecurity in the healthcare sector. One of the main reasons for poor cybersecurity in such organizations is the limited budget, as they are funded by cities or countries that are usually subject to very strict budgetary controls (Pranggono and Arabo, 2020). Despite numerous ransomware attacks on healthcare facilities, Europol (2020b) notes that these occurred before the crisis had a significant impact in Europe and the United States, suggesting that the pandemic was not a trigger for these types of attacks. Since companies typically suffer business disruption when they cannot access their files, the perpetrators have a relatively high chance of receiving a payout. For this reason, they target their ransomware attacks at high-value data or assets within organizations that are particularly vulnerable to delays, so the motivation to pay the ransom is high. Hospitals are the best example, as disrupting a hospital's information system can potentially lead to loss of life. Other attractive targets for attackers include government agencies, universities, and organizations in the manufacturing sector (Europol, 2020c). Cybercriminals target hospitals because their records allow them to quickly collect a large amount of personal information that can later be sold, such as personal data or credit card information (Chigada and Madzinga, 2021).

The presence of disinformation became a critical feature during the crisis COVID -19. Many Europol member states reported problems related to the spread of disinformation. These threats are referred to as hybrid, but despite their potential to support criminal activity, law enforcement agencies and state legislatures are generally not tasked with sanctioning cases of disinformation or fake news (Europol, 2020b). Another strategy to financially benefit from the COVID -19 crisis was the spread of Fake News about possible cures for the virus or effective prevention measures. Such news also made it easier for perpetrators to sell items that purported to help prevent or cure COVID -19 (Europol, 2020b). One sensational case was the website "coronavirusmedicalkit.com," which purported to provide access to World Health Organization vaccine kits (WHO) for a \$4.95 shipping fee. The website included a link that directed customers to a FedEx page with a logo where they were asked to enter their credit card information and confirm payment. The perpetrator also posted a photo of Dr. Anthony Fauci, the director of the U.S. National Institute of Allergy and Infectious Diseases, on the website to give the impression of credibility, and several individuals suffered identity theft and financial losses due to the defendant's actions (Eboibi, 2020).

The sale of counterfeit or substandard goods also experienced a surge in the pandemic economy. Demand for certain types of health and hygiene products (masks, gloves, disinfectant gels,

pharmaceutical products) was particularly high, creating a significant market for counterfeiters and fraudsters (Europol, 2020c). Tactics used by counterfeit websites included copying a legitimate website, selling unlicensed items or counterfeit goods, or taking payment for the items without delivering them (Interpol, 2020a). Companies purchasing the aforementioned goods were targeted. In one Europol member state, there was a case involving the purchase of €6.6 million worth of gels and masks that were never delivered, and in another case reported by a member state, a company attempted to purchase 3.85 million masks and lost € 300,000 (Europol, 2020c).

Cybercriminals also took advantage of situational factors such as the transition to home-based work and online courses, as well as the critical dependence of organizations and individuals on virtual environments (Naidoo, 2020). Organizations needed to quickly adapt their systems, networks, and apps to work remotely, while perpetrators took advantage of the resulting increased security vulnerabilities to steal data, gain profits, and cause disruption (Interpol, 2020a). Home-based work increased exposure to cyber risks as individuals accessed corporate networks with personal devices via less reliable and unsecured Internet connections (Simonovich 2020; adapted from Chigada and Madzinga, 2021). The pandemic and the resulting shift to telecommuting can be seen as a catalyst for an increase in business email compromise (hereafter BEC) and phishing attacks aimed at stealing data to gain access to corporate systems (Venkatesha, Reddy, and Chandavarkar, 2021). BEC is a type of fraud that targets businesses for financial gain or to steal data. In this context, cybercriminals typically use key-logging and phishing methods or forge a legitimate email account to send fake emails requesting the transfer of funds or sensitive data by posing as the legitimate account holder, usually impersonating high-level financial executives (Interpol, 2021). There is also the possibility of impersonating technology company employees who contact the company to provide video telephony or other similar services (Naidoo, 2020). The frequency of attacks on BEC has increased dramatically and caused very high financial losses for companies during the remote work period (Al-Musib, Al-Serhani, Humayun, and Jhanjhi, 2021). In addition, BEC has become more sophisticated, and attackers have started to be more targeted (Europol, 2006). According to Trend Micro (Interpol, 2021), most BEC attempts occurred in English-speaking countries such as the United States, Australia, and the United Kingdom. The Internet Crime Report 2020 published by FBI Internet Crime Complaint Center shows that BEC resulted in 19,369 reported complaints/crimes with a total damage of 1.8 billion USD (FBI, 2020).

Online school and college education has become the primary method of teaching, leading to increased use of online teleconferencing platforms. Zoom's inventor, Eric Yuan, reported a surge in users from 10 million worldwide to about 200 million in March 2020 (Saleous et al., 2022). A recent analysis of the privacy policies of apps like Google Meet, Microsoft Team and Zoom found that they collect more data than people realize. The most widely used online con-

ferencing tool, Zoom, is now facing a massive backlash from cybersecurity experts who have warned that it is not sufficiently secure. A new phenomenon called Zoom bombing has also emerged; it refers to unwanted intrusion into video calls (regardless of the name of the teleconferencing platform on which they take place). Security vulnerabilities in platform software allow hackers to intercept authentication credentials and insert objectionable content such as pornographic material and violent images into seemingly secure online conferences (Weil and Murugesan, 2020; Upadhyay and Rathee, 2022).

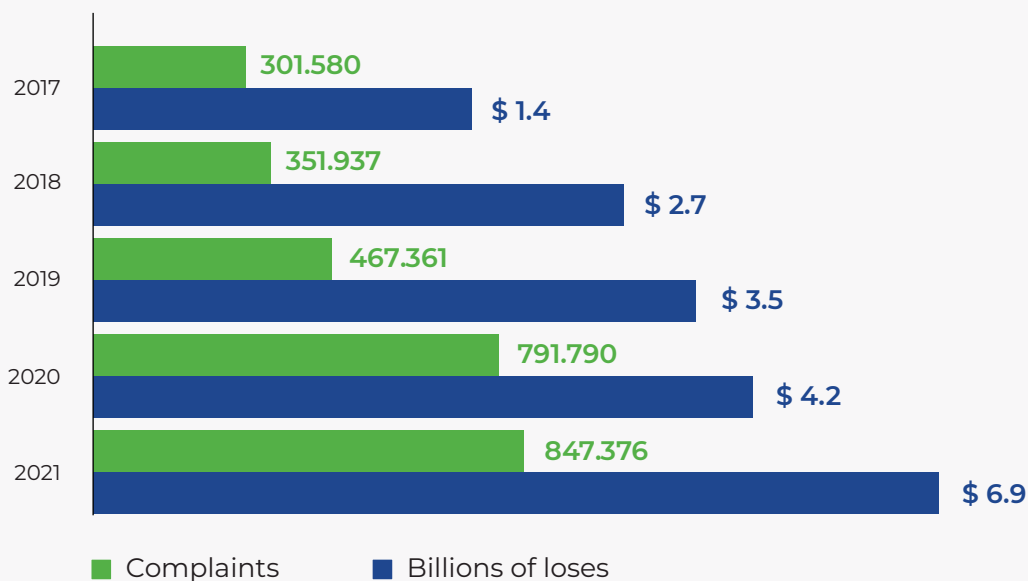
There have been several media reports that child pornography and sexual abuse are another potential risk associated with the COVID -19 pandemic. The Boston Division of FBI reported that video teleconferences were hijacked in Massachusetts to sexually exploit children. There were also reports of video calls interrupted by pornographic images (Olofinbiyi and Singh, 2020). According to Europol (2020a), Member States reported an increase in attempts to access illegal websites containing child sexual exploitation material (hereafter CSEM) that were blocked by their filters. In Spain, the number of complaints about CSEM has increased significantly since the beginning of March 2020, while Denmark reported a threefold increase in attempts to access such illegal websites. CSEM also continues to be distributed via darkweb platforms, where there is evidence of increased activity in this criminal area during the pandemic (Europol, 2020a). One of the drivers of the steady increase in CSEM on the Internet is child-produced material, which has been greatly encouraged by the coronavirus-related quarantine. Because of the quarantine, children spent more time on the Internet sharing images and videos that later ended up with perpetrators (Europol, 2020b).

According to one of Interpol's private sector partners, between January and the end of April 2020, 907,000 spam messages, 737 malware-related incidents, and 48,000 malicious URLs were detected, all associated with COVID -19 (Interpol, 2020a). The U.S. Federal Trade Commission estimated that between January and April 14, 2020, \$ 12 million was lost to COVID -19 related to fraudulent activity, with a total of 18,235 reports received (Hakak, Khan, Imran, Choo, and Shoaib, 2020). Scamwatch, a fraud detection and prevention organization operated by the Australian Competition and Consumer Commission, has received more than 6,415 reports of COVID -19 related scams since the start of the pandemic (most related to phishing, identity theft, and scams related to online purchases and annuities) with losses exceeding \$9,800,000 (Scamwatch, 2021).

In April, the FBI Internet Crime Complaint Center (hereafter IC3) received between 3,000 and 4,000 cybersecurity complaints per day, up from an average of about a thousand complaints per day before the pandemic (Naidoo, 2020). IC3 is a hub for alerting the public and operates a portal where victims report cybercrimes. In addition, IC3 conducts analysis, handles asset recovery, and works with the private sector and local, state, national, and international authorities.

According to IC3, over the past five years, it has received an average of 552,000 complaints per year about a wide variety of Internet scams affecting victims around the world. In addition to the U.S., most complaints in 2020 came from the United Kingdom, India, Canada, Greece, and Australia (FBI, 2020). It is interesting to note that most complaints in 2020 and 2021 were filed by individuals over the age of 60, who also suffered the greatest financial losses (FBI, 2020, 2021). The total number of complaints from 2017 to 2021 is 2.76 million, while losses total \$18.7 billion. There is a clear upward trend in the number of complaints, with the largest jump from 2019 to 2020. Financial losses are growing along with the number of complaints, with the largest jump from 2020 to 2021, where the most drastic losses have occurred in the last five years.

Figure 1. The number of complaints in the period from 2017 to 2021 (FBI, 2021).



IC3 data continuously show that from 2017 to 2021, the most prevalent complaints were those that analysts categorized by type into phishing, non-payment/non-delivery, extortion, personal data breach, and identity theft.

Table 1. Number of complaints about the 5 most common cybercrimes over the past 5 years

Form of criminal offence	2017	2018	2019	2020	2021
Phishing/Smishing/Vishing	25344	26379	114702	241342	323972
Non-payment/non-delivery	84079	65116	61832	108869	82478
Extortion	14938	51146	43101	76741	39360

Personal Data Breach	30904	50642	38218	45330	51829
Identity Theft	17636	16128	16053	43330	51629

Source: 2021 Internet Crime Report (FBI, 2021).

From the IC3 data, 3 of the top 5 complaint categories showed an increasing trend over the last 5 years from 2020 to 2021 (Phishing, Personal Breach Data, and Identity Theft); the same is seen from 2019 to 2020 in all 5 categories. The biggest increase in complaints was recorded in the Phishing category, which relentlessly reaches higher and higher numbers, maintaining a growing trend since 2018. This is not the case for other categories, which have seen a decrease at least once in a five-year period. Although the number of non-payment/non-delivery complaints has generally not shown an increasing trend in the aforementioned period, the jump from 2019 to 2020 is interesting, considering that there is an increase of a whopping 47,037 complaints. Similarly, identity theft has a stable trend through 2020; this year there was an increase of 27,277 complaints compared to 2019, and this trend continues in 2021. When interpreting the above data, it should be noted that the number of complaints does not reflect the number of people who filed a complaint. Also, there is a possibility that some of the complainants filed more than one complaint for the same offence.

Changes in the forms of cybercrime

Cybercriminals have managed to adapt quickly, exploiting people's fears and anxieties, and using various criminal methods to exploit the crisis for their own interests. The types of criminals who took advantage of the pandemic were already active beforehand, but it is believed that they intensified their activities during the pandemic and actively recruited fellow criminals to maximize their impact (Europol, 2020b). The COVID -19 pandemic has shown that cybercrime remains largely the same at its core. However, social engineering methods are changing the specifics of criminal access to better fit the social context, ultimately increasing attack success rates. Cyber criminals show improved levels of operational security and are very aware of how to hide their identities and criminal activities from law enforcement or private sector companies (Europol, 2020b).

A key trend in 2020 is the increasing sophistication of phishing, which is becoming harder to detect. Identity theft websites are now almost identical to those being mimicked. Phishing campaigns are becoming more automated, forcing respondents to act faster than in the past, as in some cases it takes 24 hours for a credential leak to lead to an attack. In addition, cybercriminals are taking a more holistic approach to phishing, demonstrating a high level of expertise in the tools, systems, and vulnerabilities they exploit under false identities. In some cases, the entire criminal infrastructure is gone by the time a phishing attempt is investigated

(Europol, 2020b). In addition, attacks have become more targeted. Cybercriminals are increasingly specializing in intelligence gathering and victim profiling, focusing more on select victims than a random group to optimize their financial gains (Europol, 2020b). At the time of the COVID -19 pandemic, the elderly population (often less aware of online risks) was targeted to download and forward infected spam links and spread misinformation among friends and relatives (UNODC, 2020). Various websites on the darkweb helped criminals significantly improve the technical sophistication of their attacks when they lacked the knowledge to carry out the attacks on their own by offering the so-called cybercrime-as-a-service. For a fee, they offered to help facilitate a criminal act or perform it themselves for a fee.

Ransomware attacks became more sophisticated and the time between initial infection and activation became shorter. In addition, the use of cryptocurrencies has degraded law enforcement's ability to trace payments related to criminal activity (Europol, 2020b). While the total investment cost of ransomware is increasing, the damage caused by business downtime has also increased. At the same time, the potential profits of attackers are also increasing. In 2020, there was an increase in Business Email Compromise (BEC) in most EU member states, which was accompanied by an increase in the sophistication of methods and a more targeted approach by criminals. The sophistication of BEC is reflected in the establishment of complex criminal networks used to launder the proceeds of fraud. More advanced methods include the use of artificial intelligence to mimic the voice of a company's CEO (Europol, 2020).

Conclusion

The pandemic period was challenging and demanding, bringing several changes to which society had to adapt. Cybercriminals have shown exceptional adaptability and have proven to be true opportunists, ruthlessly exploiting people's fear for their own health and lives. Considering all the facts mentioned, it can be concluded that the era of COVID -19 pandemic was suitable for cybercriminals who skilfully exploited the great interest of mankind in information about COVID -19, in supporting countries/people at risk of the disease, and in obtaining essential hygiene items. Looking at the collected international, an upward trend in the number of cyber-crime crimes can be observed. According to the international data, there is a global increase from 2019 to 2021. It can be concluded that the pandemic has opened additional opportunities for criminals. Since cybercrime is one of the biggest and most widespread problem at the moment, especially on a global scale, it is impossible not to point out phishing, where criminals can make good profits with just a few clicks. During the pandemic, there were a lot of ransomware attacks on various entities around the world, which are generally attractive to criminals due to the high probability of a successful and financially lucrative attack, regardless of the situation. It can be concluded that cybercriminals are willing to do almost anything to capture as much money as possible, often using social engineering methods whose sophistication is

increasingly difficult to see through.

The pandemic and the measures taken to keep COVID -19 under control have forced people to make numerous adjustments and changes that illustrate the new, increased reliance on information and communications technology: remote work, online courses, and virtual maintenance of interpersonal relationships. A common feature of remote work and distance learning is that companies, universities, and schools, along with their employees and students, find themselves in a new situation for which they were probably not adequately computer trained, nor were they aware of cyber threats. It is possible that employees in businesses, schools, and universities had difficulty navigating the new working conditions, which cybercriminals tried to exploit. In addition, due to the global shutdowns, children spent more time at home and on the Internet than they would under normal circumstances, making them potentially more vulnerable and undoubtedly more accessible. This circumstance contributed to an increase in the number of child sexual abuse materials produced by children themselves. The pandemic itself led to an increase in demand for such material, as well as an increase in activity in this area on the so-called dark web. According to the international data, the elderly population is another target group of cybercriminals, relying on their naivety and lower awareness of cyber risks. According to Bača and Ćosić (2013), the most common reasons why citizens and businesses become victims of cybercrime are security deficiencies and lack of education in information and communication technology.

Situational crime prevention strategies that can be directly applied to cybercrime primarily refer to attempts to make it more difficult to commit crimes, i.e., to strengthen the security of users' computers, systems, and personal information (Newman and Clarke, 2003; adapted from Holt and Bossler, 2016). This prevention approach seems to be the most widespread. It manifests itself in the fight against malicious programs, which often support and create various forms of hacking, phishing, and malicious domains (which was also the case during the pandemic period, when an increase in malicious domains, phishing, and malicious programs was recorded).

The systems of the other group have a greater computer monitoring function and belong to the field of intrusion detection systems. Their disadvantage is that they cannot always detect whether a program is a real threat, and sometimes they mark legitimate programs as threats. Often the threat is reported to the user, who then decides how to proceed. The problem arises when the user does not have sufficient technical knowledge to understand what the data offered by the system means (Vuković, 2018). There are IDS forms that work proactively - the system automatically responds to threats (thus avoiding the problem of uninformed users). Despite its shortcomings, IDS is extremely valuable because it offers different and more advanced features than antivirus tools or firewalls (Scarfone and Mell, 2010; after Holt and Bossler, 2016).

Antivirus fingerprinting techniques do not provide information about the general traffic patterns of a particular network and only stop attacks on a single system. Firewalls restrict access to various network resources coming from outside the network perimeter, but do not provide information about internal threats or warn of detected threats (Scarfone and Mell, 2010; adapted from Holt and Bossler, 2016). Organizations can use various tools to detect attacks, such as IDS, and in this way allocate resources to reduce the likelihood of infections and phishing campaigns. However, if employees are careless with cybersecurity strategies, they will not be of much use (Holt and Bossler, 2016). Once the perpetrator successfully accesses the system of a particular organization, it is very likely that he will target confidential information that can lead to material gain. For this reason, organizations have developed mechanisms to hide or mask data, which is also one of the situational prevention strategies and helps with deception and theft crimes (Fujinkoki, 2015; Newman and Clarke, 2003; Oracle, 2013; after Holt and Bossler, 2016).

According to Fischer (2016), cyberattack risk management typically involves the following: (1) eliminating the source of the threat (e.g., by shutting down botnets or reducing opportunities for criminals), (2) addressing vulnerabilities by strengthening ICT resources (e.g., by patching software and training employees), and (3) reducing the impact by mitigating damage and restoring functions (e.g., by providing backup resources to ensure continuity of operations in response to an attack). As for strengthening ICT resources and network security, it is necessary to regularly update new patches, i.e. upgrades of the operating system and applications that handle the found vulnerabilities (Vuković, 2018).

It can be concluded that most prevention methods are aimed at strengthening computer systems and data to make various cyberattacks and unauthorized access to the computer system more difficult. Cybercrime prevention is a necessary and useful tool to mitigate it, but, as with any other type of crime, it has its limitations and challenges. It appears that the above prevention methods focus on crimes that involve a computer (cyber-dependent crimes), while cyber-enabled crimes, i.e., those that are supported by computers, are more challenging and complex in terms of prevention. Criminal acts such as fraud, identity theft, business e-mail compromise, and phishing are based on human error and cannot be that easily prevented. It should be kept in mind that people using the Internet through home and/or business systems, sometimes intentionally ignore policies to maintain cybersecurity, make unintentional mistakes or are unaware of the dangers of the Internet. A multidisciplinary approach that combines the knowledge and skills of information technology professionals and criminologists is essential. It is likely that a situational prevention approach will be used for this purpose.

190 What businesses, their employees, educational institutions, their students, and the older population have in common is the need for education and awareness about the dangers of the In-

ternet. There is a need to educate the younger generations by developing computer skills from elementary school on, as children start using the Internet and social networks at an early age without thinking about phishing and other forms of cybercrime. It is likely that these crimes will be even more advanced and dangerous in the future. Considering the increase of BEC and the general vulnerability to ransomware attacks, companies and public institutions should pay more attention to cybersecurity and training of non-technical personnel, which requires additional funding and resources.

According to the data presented, which suggest a significant increase in phishing trend, preventing it is not a simple task. As the most common attack vector uses a type of social engineering, users should be extremely suspicious of messages containing questionable content. They should always verify the authenticity of the message before acting on the instructions received, giving away their own password, succumbing to fraud, or installing a potentially malicious software. In addition, they should not be deceived by offers of free content, programs, and media (Vuković, 2018). The same principle applies to Non-payment/non-delivery scam, which, according to international data, recorded a large increase during the COVID-19 crisis. Caution and careful site inspection is required; this can be challenging as spoofs have become extremely successful at imitating the legitimate sites. Prevention must be based on education and sensitization to the problem. The first step should be to bring the IT vocabulary closer to the public, having in mind that most people using the Internet would probably not know what phishing or a spoof is.

Since there is a tendency today to digitize almost everything there is, therefore, unlikely that cybercrime will be less prevalent in the future. A relatively low risk of detection and low levels of investment are most likely going to stay attractive factors for perpetrating such crimes. Based on the data presented, a further upward trend of criminal offenses in this area can be expected. Taking into account the constant technological advances and new developments, it is safe to assume that cybercriminals will always look for ways to use useful inventions for anti-social purposes. In the future, technological advances and new social situations will undoubtedly bring along some new challenges in the field of cybercrime that humanity will have to deal with. People will most likely remain to be the weakest link in protecting digital information. It is therefore important to invest preventive efforts into education and make the entire population aware of the risks preying in cyber space. Maintaining people's security in cyber space is a huge and transnational task that requires the strengthening of international cooperation and dialogue between governments, the UN, Europol, Interpol, and a number of other organizations.

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Evaluation of the implementation process of the *Imam stav* school-based prevention program

SUMMARY

Imam stav (Eng. Unplugged) is a school-based prevention program aimed at preventing or delaying the initiation of experimental alcohol, tobacco, and cannabis use and preventing progression from occasional use to dependence. This study evaluated the implementation process of the *Imam stav* program in primary schools in Zagreb County, Croatia. In 2021/2022, *Imam stav* was implemented in 12 primary schools in Zagreb County, Croatia. Study participants included 58 program implementers (classroom teachers and school counsellors) and students from 46 classes in these schools who participated in the *Imam stav* (Grade 6) prevention program. To monitor the implementation process, teachers reported data on fidelity. Additionally, teachers and students completed an anonymous questionnaire at the program's conclusion to evaluate satisfaction. The implementation of the *Imam stav* program in these 12 primary schools was highly reliable. Most teachers reported improvements in their relationship with students (79.2%) and classroom climate (72.3%), with 86.2% finding the teacher's manual highly useful. From the students' point of view, 49.5% found the program helpful in rethinking their choices, 35% reported improved self-perception, 71.3% noted increased knowledge of the consequences of substance use, 39.7% experienced better relationships with classmates, and 38.2% reported improved relationships with teachers. The implementation of *Imam stav* achieved excellent results in terms of fidelity and satisfaction among both teachers and students. The evaluation of this school-based prevention program will serve as a foundation for future implementation opportunities in Croatia and provide insights into the program's effectiveness.

Keywords: *substance use, prevention program, Unplugged, process evaluation*

Introduction

Children's development occurs within the context of their families, schools, and communities. Schools, given their extensive access to children, serve as a crucial setting for implementing preventive interventions (Humphrey & Wigelsworth, 2016; Sonesson et al., 2020; Streimann, 2021). They provide an ideal environment for evidence-based prevention interventions at a uni-

versal level. From a practical standpoint, schools can reach large numbers of students from early childhood to late adolescence, offering the opportunity to track and monitor their progress over time (Farrell et al., 2001; Sullivan et al., 2015).

By fostering an environment that supports the development of meaningful relationships with peers and adults, schools promote the cultivation of values as well as social, emotional, and cognitive skills (EMCDDA, 2020; Paulus et al., 2016; Streimann, 2021; Theimann, 2016). Primary schools play a vital role in laying the foundation for future developmental success, particularly for students from marginalized families and communities. These schools provide invaluable opportunities for children to develop essential social and emotional skills while cultivating relationships that emphasize care and safety (Schonfeld et al., 2015; Streimann, 2021; Weare & Nind, 2011). Prevention interventions targeting primary school-aged children may prove more effective than those aimed at at-risk youth, as the former have fewer established habits and smaller social networks (Streimann, 2021; Wilson et al., 2014).

Schools are often a key setting for initiatives designed to reduce problem behaviors such as aggression, substance abuse, and truancy (Botvin et al., 2006; Espelage et al., 2013; Sullivan et al., 2015; Vo et al., 2012). They are an ideal environment for preventing risky behaviors and fostering positive youth development.

First, schools can systematically and efficiently reach a large number of students annually. Second, school-based prevention efforts can focus on younger students who have not yet developed fixed attitudes toward risky behaviors such as alcohol consumption or smoking. Third, regular school programs can be integrated into preventive strategies. For instance, a positive school environment itself acts as a protective factor against substance use.

Imam stav (Eng. Unplugged) is a school-based prevention program designed to prevent or delay the initiation of experimental alcohol, tobacco, and cannabis use and to halt progression from occasional use to dependence. The *Imam stav* program is grounded in the theoretical model of social influence (Tobler, 1992), promoting life skills, providing drug-related information, and fostering critical thinking about social and normative beliefs (Sussman et al., 2014).

Notably, *Unplugged* has been included in the Xchange Prevention Registry¹, an online database of thoroughly evaluated prevention interventions. It is rated as beneficial in the registry, demonstrating convincing, consistent, and sustained effects on relevant intervention outcomes. Moreover, previous studies validate the effectiveness of this intervention (Caria et al., 2010; Faggiano et al., 2008; Faggiano et al., 2010; Giannotta et al., 2014; Jandáč et al., 2021; Miovsky et al., 2012; Orosová et al., 2020; Paschall et al., 2022; Vigna-Taglianti et al., 2021).

Research and evaluation literature consistently demonstrates that evidence-based prevention programs help young people avoid numerous risky behaviors (Nation et al., 2009). However, challenges in replicating costly evidence-based models have resulted in the development of many prevention programs with limited impact. It is essential to raise awareness that effective programs do not arise spontaneously but are the result of rigorous scientific processes (EMCDDA, 2020).

Science provides guidelines for designing evidence-based prevention interventions, enabling society to prevent risky behaviors and promote positive youth development. Building on this, Nation et al. (2003) identified nine principles of effective prevention programs through their analysis of four areas of preventive interventions, including substance use. These principles include comprehensiveness, a variety of learning methods, sufficient dosage, theoretical grounding, positive relationships, appropriate timing, sociocultural relevance, outcome evaluation, and the use of trained professionals.

The *Imam stav* prevention program integrates the maximum number of these effective components, making it a robust example of evidence-based prevention.

- **Comprehensive:** Comprehensive prevention programs are interventions with multiple components addressing critical areas (e.g., family, peers, community) that influence the development and persistence of behaviors targeted for prevention (Nation et al., 2003). The *Imam stav* program is implemented in schools with Grade 6 students and includes an educational component for their parents to complement and support the school's prevention efforts.

- **Variety of Learning Methods:** Effective prevention programs recognize that change takes time and focus on "teaching"—imparting new ideas, information, or skills that can enhance the lives of participants (Borkowski et al., 2007). A variety of teaching methods are used to raise awareness and understanding of problematic behaviors while fostering skill acquisition and improvement (Nation et al., 2003). The *Imam stav* program employs an interactive approach, incorporating lectures, role plays, group work, quizzes, small and large group discussions, and various games to engage participants effectively.

- **Sufficient Dosage:** Prevention programs must have sufficient duration to achieve the desired outcomes and include follow-up to sustain those effects (Nation et al., 2003). The *Imam stav* program comprises 12 lessons delivered during regular classes, ensuring an adequate dosage to support its preventive goals.

- **Theory-Based:** According to Nation et al. (2003), effective prevention programs must be scientifically grounded, based on sound theory, accurate information, and supported by empirical research. The *Imam stav* program integrates two theoretical models: the knowledge and information model of substance use and the social influence model, ensuring a strong foundation for its preventive strategies.

- **Positive Relationships:** Effective prevention programs emphasize fostering strong, stable, and positive relationships (Nation et al., 2003). Positive change through an intervention often relies on the quality of the relationship between the professional and the participant (Borkowski et al., 2007). The *Imam stav* program aims to enhance relationships both among students and between teachers and students, contributing to a supportive and connected school environment.
- **Appropriate Timing:** Effective prevention programs are appropriately timed, targeting risk factors before behavioral problems emerge and addressing participants' developmental needs. Interventions that focus on risk factors often have a greater impact than those attempting to redirect an established path away from problems towards positive behaviors (NIDA, 2003). The *Imam stav* program targets Grade 6 students (11–12 years old), a critical period when young people often begin experimenting with addictive substances such as smoking, alcohol, or cannabis.
- **Socio-culturally Relevant:** Socio-culturally relevant programs are tailored to align with the community and cultural norms of the participants, involving the target group in the planning and implementation process (Nation et al., 2003). The *Imam stav* program focuses on tobacco, alcohol, cannabis, and other addictive substances. European and Croatian data indicate that alcohol is the most commonly used addictive substance among young people, while cannabis is the most frequently used illegal addictive substance (Capak, 2020; ESPAD Group, 2020).
- **Evaluation of Outcomes:** The core of scientific practice is gathering data that clearly and convincingly demonstrates the achievement of significant outcomes. The ultimate goal of research is to provide robust evidence that an intervention is truly effective (Borkowski et al., 2007). During program development, it is essential to include an evaluation component, ensuring that this aspect is not overlooked. Evaluation should be integrated into the implementation process, encompassing both process and impact evaluation (Nation et al., 2003). The *Imam stav* program has already been evaluated in Europe and recognized as effective in the Xchange Prevention Registry². Both process and impact evaluations are integral components of the program, ensuring its ongoing effectiveness and reliability.
- **Trained Professionals:** The successful implementation of all principles largely depends on the skills of the professionals delivering the program. Well-trained staff possess the necessary expertise to apply the program consistently and maintain its integrity, while also demonstrating flexibility to address challenges and overcome obstacles during implementation (Borkowski et al., 2007). Before implementing the *Imam stav* program, all facilitators undergo training. This teacher training component is crucial to ensuring the quality and fidelity of the methods and content of the program.

It is crucial to recognize that even if a program is developed according to the principles of effective prevention, its ineffectiveness may still result from inconsistent or careless implementation that deviates from the original design (Raudenbush, 2008). Two key areas in implementation research are implementation fidelity—the degree to which interventions are carried out as intended—and the interaction of barriers and facilitators to implementation (Lendrum & Humphrey, 2012).

Numerous authors highlight various factors that can contribute to effective program implementation, including:

- **Organizational characteristics:** Leadership, decision-making processes, funding, and staff structure.
- **Community-level characteristics:** Availability of funding and the political climate.
- **Program-level characteristics:** Alignment between the culture of the community for which the program was designed and the culture of the community where it is implemented, as well as the context of implementation.
- **Implementer characteristics:** Training, experience, and motivation of those delivering the program (Berkel et al., 2011; Dane & Schneider, 1998; Durlak & DuPre, 2008; Fixsen et al., 2005; Gagnon et al., 2015; Little et al., 2013).

Implementers' prior experience and motivation can significantly impact the quality of implementation (Gagnon et al., 2015). Moreover, Durlak and DuPre (2008) identified eight common aspects of implementation for evaluating interventions, with five of these accepted as key measures of program fidelity (Dane & Schneider, 1998; Domitrovich & Greenberg, 2000; Dusenbury et al., 2003; Ennett et al., 2011): loyalty, dosage, quality, participant responsiveness, and program differentiation.

Findings from evaluations of implementation and its impact on program outcomes highlight that evidence-based programs must be implemented with high-quality fidelity to achieve expected results. Continuous monitoring of implementation quality is essential for ensuring successful outcomes.

Research Problems and Hypotheses

The purpose of this study was to evaluate the implementation process of the *Imam stav* program in primary schools in Zagreb County, Croatia. The aim of this paper is to identify the key features of the implementation process of the school-based prevention program *Imam stav* to enhance the program and foster a supportive context for its continued implementation. Specifically, the objectives of this paper are: (1) to assess the extent to which the program has been implemented according to its theoretical and practical components, and (2) to evaluate the satisfaction of program implementers (classroom teachers and school counsellors) and

students with the implementation of the *Imam stav* program, and to determine whether students perceive benefits from their participation in the program.

Methods

Intervention

As previously mentioned, *Imam stav* is an interactive school-based prevention program based on a combination of two models: the knowledge and information model of substance use and the social influence model. The program integrates life skills training and normative content in weekly 45-minute lessons delivered by the school's current teachers or school counsellors (e.g., social pedagogues, pedagogues, or psychologists) over a 12-week period.

The design of the *Imam stav* prevention program (Eng. Unplugged) was detailed by Kreeft et al. (2009) and can be accessed on the EU-Dap website³ (Faggiano et al., 2008). Supporting resources for the program include:

- A **teacher's manual**, which outlines procedures, objectives, required materials, tips, and planned activities.
- A **student workbook**, containing activities to be implemented by teachers in each class.
- A **teacher's manual for parents' meetings**, providing guidelines for engaging parents in the prevention program.

Participants and Procedure

The content and structure of the *Imam stav* program were previously evaluated and officially endorsed by the Croatian Institute of Public Health (CIPH), the Service for Combating Drug Abuse (SCDA), the Croatian Ministry of Science and Education, and the Croatian Agency for Education and Teacher Training. The program also received ethical approval from the Croatian Ministry of Science and Education.

To facilitate its implementation, meetings were held with school principals and school counsellors to secure their approval and establish partnerships. Collaboration was successfully achieved with each school, and the support of school principals was obtained. Additionally, school counsellors introduced *Imam stav* as part of their school-based prevention program.

The inclusion criteria for schools implementing the *Imam stav* prevention program required that schools be in Zagreb County, Croatia, provide primary education from 1st to 8th grade, and have school counsellors such as social pedagogues, pedagogues, or psychologists. These criteria ensured the presence of qualified professionals to support successful program implementation. The inclusion criterion for participants was that they be 6th-grade students, aligning with the target age group for the program.

³ www.eudap.net

The sample of participants for this study was drawn from those involved in the *Imam stav* program. The implementation phase included two subgroups: program implementers (classroom teachers and school counsellors who conducted the program with students and parents/guardians) and program participants (students) (Table 1). The implementation process was evaluated using an online questionnaire (Survey Monkey Tool) in collaboration with primary school counsellors.

Teachers and school counsellors completed a program fidelity monitoring form after each lesson with students and parents/guardians. In addition, students and teachers anonymously completed satisfaction forms at the end of the *Imam stav* prevention program's implementation. A total of 58 implementers (teachers/classroom teachers) facilitated the program, which involved 999 Grade 6 students across participating schools. Only those students and teachers present in the school on the day of the survey completed the questionnaires, resulting in a participation rate of 100% for teachers and 77% for students.

All procedures conducted in the study adhered to the ethical standards of the institutional ethics committee and the Ethical Codex for Research with Children (Ajduković & Kolesarić, 2003). Since a subgroup of the sample included Grade 6 students under the age of 14, they were personally informed about the program and invited to participate in its evaluation, with informed consent obtained. Parents were also thoroughly informed about the program, its objectives, and the evaluation process, and were asked to provide consent for their children's participation. There were no objections from parents, and all invited students agreed to take part in the study.

Measures

Quantitative methods (questionnaires) were used to collect data for this study. The instruments for the quantitative analysis were the Croatian versions of those employed by the EU-Dap team during the process evaluation of the Unplugged program in Europe (van der Kreeft et al., 2014). These tools are available on the EU-Dap website⁴. For further details on the techniques, instruments, variables, and participants, refer to Table 1.

Statistical Data Analyses

Data were analyzed using IBM SPSS predictive analytics software (version 26.0). Three datasets were examined using descriptive statistics: the student satisfaction questionnaire, the teacher satisfaction questionnaire, and the lesson fidelity monitoring form (monitoring of individual lessons). Quantitative variables were summarized using frequencies, percentages, means, standard deviations, and minimum and maximum values. The distribution of students' and teachers' perceptions of the immediate outcomes of the Unplugged program was assessed using the chi-square test.

⁴ www.eudap.net

Table 1. Data collection techniques for the process evaluation of the *Imam stav prevention program, Zagreb County, Croatia, school year 2020/2021*

Methods	Technique	Participants	Timing	Instruments	Variables
Quantitative	Fidelity Monitoring Form (monitoring of individual lessons in the implementation of the <i>Imam stav</i> program)	Implementers of the program (classroom teachers and school counsellors) (N = 58)	Ongoing, after each lesson with students and each parent meeting (September – December 2021)	Reports for each lesson implemented with students (12 reports) and with parents/guardians (3 reports)	School and class code; date of lesson implemented; number of students present; duration of lesson; implemented activities; assessment of students' response to lesson; subjective evaluation of work of lesson implementer; additional comments and/or suggestions for improvement
Quantitative	Questionnaire – satisfaction with the implementation of the <i>Imam stav</i> program	Implementers of the program (classroom teachers and school counsellors) (N = 58)	At the end of the implementation of the <i>Imam stav</i> program (December 2021)	Questionnaire to assess teacher/school counsellors' satisfaction with <i>Imam stav</i> program	Overall satisfaction with program implementation; identification of the most important components of the program for implementers; improvement of program implementers' knowledge and skills in substance use prevention, teaching skills, relationship with students and classroom climate; satisfaction and usefulness of implementation materials; suggestions for improving program implementation.
Quantitative	Questionnaire - satisfaction with participation in the <i>Imam stav</i> program	6th grade students in experimental schools (N = 771)	At the end of the implementation of the <i>Imam stav</i> program (December 2021)	Questionnaire to assess students' satisfaction with participation in the <i>Imam stav</i> program	Workshops that students liked least; students' satisfaction with participation in the <i>Imam stav</i> prevention program; contribution of the program to addressing questions students have about themselves and their choices; contribution of the program to changing students' self-concept; contribution of the program to improving students' knowledge of the consequences of substance use; improvement of peer relationships; contribution of the program to improving relationships with teachers; continuation of implementation of prevention programs in school.

Results and Discussion

The school-based prevention program *Imam stav* was implemented during the first half of the 2021/2022 school year in Zagreb County, spanning 12 schools and 46 classes. A total of 999 students participated in the program (Table 2).

Table 2. Number of students and classes in schools where the *Imam stav* program was implemented, Zagreb County, Croatia, school year 2020/2021

Schools	Number of Students	Number of Classrooms
OŠ Luka	14	1
OŠ Posavski Bregi	31	2
OŠ Jurja Habdelića	86	4
OŠ Vladimir Deščak	83	4
OŠ Milana Langa	73	3
OŠ Ivane Brlić Mažuranić	42	2
OŠ "Ivan Benković"	94	4
OŠ Velika Mlaka	78	3
OŠ Antuna Augustinčića	113	5
OŠ Nikole Hribara	162	7
OŠ Vukovina	75	4
OŠ Ljubo Babić	148	7
Total	999	46

Table 3 presents the number of classes in each school that participated in each lesson of the *Imam stav* program. The data indicates a high percentage of classes successfully implemented the lessons, with Lessons 3 and 10 being implemented the least frequently. Notably, 73.9% of the classes completed all the program lessons, while more than 50% of the lessons were implemented in 26.1% of the classes. No class implemented less than 50% of the lessons.

It is worth noting that the program was only partially implemented in some schools, either in selected classes or in the majority of classes within certain schools. Numerous studies underline the importance of evaluating the implementation of prevention interventions in schools (Medeiros et al., 2016; Orwin, 2000; Rohrbach et al., 2007). Measuring fidelity of implementation determines the extent to which the intended content was delivered accurately and whether the program was executed with precision (McDavid et al., 2013; Medeiros et al., 2016).

Furthermore, research on program fidelity (Horner et al., 2017; Melo et al., 2022; Throuvala et al., 2019) emphasizes the significance of fostering a cohesive school culture aligned with the program's core principles. This alignment is critical for the successful implementation of the program according to its foundational elements.

Table 3. Implementation of the lessons of the *Imam stav* program by individual schools, Zagreb County, Croatia, school year 2020/2021

School	Nr of Classes	L 1	L 2	L 3	L 4	L 5	L 6	L 7	L 8	L 9	L 10	L 11	L 12
OŠ Luka	1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
OŠ Posavski Bregi	2	2/2	2/2	1/2	2/2	2/2	2/2	2/2	2/2	2/2	1/1	2/2	2/2
OŠ Jurja Habelića	4	4/4	4/4	4/4	3/4	4/4	4/4	4/4	4/4	4/4	3/4	4/4	4/4
OŠ Vladimir Deščak	4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	3/4	4/4	4/4
OŠ Milana Langa	3	3/3	3/3	1/3	2/3	2/3	2/3	2/3	3/3	3/3	2/3	3/3	2/3
OŠ Ivane Brlić Mažuranić	2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2
OŠ "Ivan Benković"	4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
OŠ Velika Mlaka	3	3/3	3/3	3/3	3/3	3/3	3/3	2/3	3/3	3/3	3/3	2/3	3/3
OŠ Antuna Augustinčića	5	5/5	5/5	5/5	4/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
OŠ Nikole Hribara	7	6/7	6/7	6/7	7/7	5/7	6/7	4/7	7/7	7/7	6/7	7/7	7/7
OŠ Vukovina	4	4/4	4/4	4/4	4/4	4/4	4/4	3/4	4/4	4/4	4/4	4/4	4/4
OŠ Ljubo Babić	7	7/7	7/7	7/7	7/7	7/7	7/7	6/7	7/7	6/7	6/7	7/7	7/7
Total	46	45/46	45/46	42/46	43/46	43/46	44/46	39/46	46/46	45/46	41/46	45/46	45/46

Additionally, Table 4 outlines the planned activities for the lessons of the *Imam stav* program, while Table 5 presents the implementation of each activity by lesson across all participating schools. From Table 5, it can be observed that the lowest percentage of classes implemented activities from Lessons 7 and 10. However, the data indicate that nearly all activities from the *Imam stav* program were implemented in schools and individual classes with high fidelity.

Notably, all key activities integral to the intervention—such as role play, discussion, and central lesson activities—were implemented in over 80% of cases, with many reaching a 90% implementation rate. In contrast, concluding activities (e.g., reflection, discussions, workbook tasks, and independent work) were implemented less frequently, ranging from 55% to 85% of cases (Table 5).

Program implementers (classroom teachers and school counsellors) were asked to provide additional comments on each lesson of the *Imam stav* program. Analysis of their feedback re-

vealed the primary reasons for skipping certain concluding activities: general lack of time, time spent addressing non-programme tasks (e.g., class activities), time required for group formation, time spent providing additional explanations of specific concepts, and student absences due to COVID-19 self-isolation protocols.

In some cases, concluding activities were modified, with students being instructed to complete them at home or during the next lesson. Despite these challenges, relatively high implementation fidelity was achieved for the *Imam stav* program in Zagreb County, Croatia. High implementation fidelity is widely acknowledged as a critical factor in enhancing the effectiveness of interventions (Agbadjé et al., 2022; Chen, 1998; Clark et al., 2010; Raudenbush, 2008).

Research consistently supports the notion that ensuring fidelity in program implementation not only prevents misrepresentation but also enhances overall program effectiveness (Meireiros et al., 2016; Sloboda & Bukoski, 2006).

Table 4. Planned activities for the lessons of the Imam stav program

Activity code	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12
A	OPENING <i>Imam stav</i>	OPENING	OPENING	OPENING	OPENING	OPENING	OPENING	OPENING	OPENING	OPENING	OPENING	OPENING
B	BRAINSTORM	ROLE PLAY 1	COLLAGE	HOW MANY TIMES	ARGUMENTS ON CIGARETTES	EMOTION EXPRESSION	DISCUSSION	ROLE PLAY	DRUG QUESTION	COPING	ADVENTURE IN AMAZON	PERSONAL GOAL
C	WORK IN SMALL GROUP	ROLE PLAY 2	A CHARACTER	ESTIMATED FIGURES	THE COURT	TELEPHONE BOOK	AMI ASSERTIVE	COMPLI-MENTS	SCORES	COPING DIFFICULTIES	FAMILY PROBLEM	SHORT TERM OBJECTIVES
D	CLASS CON-TRACT	SITUATION PLAYS		ACTUAL FIGURES	CLOSURE		REFUSAL STATEMENTS		FEELINGS	STORY OF JACOB	PROBLEM SOLVING	REPORT IN CLASS
E	PERSONAL REFLECTION	STUDENT WORKBOOK		CRITICAL THINKING			INDIVIDUAL PROCESSING		CLOSURE		GROUP WORK	INDIVIDUAL EVALUA-TION
F							HOMEWORK				HOMEWORK	

Table 5. Implementation of activities by lesson (%), Zagreb County, Croatia, school year 2020/2021

Activity code	L1		L2		L3		L4		L5		L6		L7		L8		L9		L10		L11		L12	
	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%	Cl. n.	%
A	43/46	93.4	44/46	95.6	41/46	89.1	42/46	91.3	43/46	93.4	43/46	93.4	37/46	80.4	45/46	97.8	42/46	91.3	39/46	84.7	42/46	91.3	42/46	91.3
B	43/46	93.4	44/46	95.6	41/46	89.1	42/46	91.3	43/46	93.4	43/46	93.4	38/46	82.6	45/46	97.8	44/46	95.6	39/46	84.7	30/46	65.2	44/46	95.6
C	40/46	86.9	43/46	93.4	33/46	71.7	42/46	91.3	40/46	86.9	27/46	58.6	38/46	82.6	40/46	86.9	44/46	95.6	39/46	84.7	44/46	95.6	44/46	95.6
D	41/46	89.1	44/46	95.6	-	-	42/46	91.3	32/46	69.5	-	-	38/46	82.6	-	-	39/46	84.7	40/46	86.9	44/46	95.6	43/46	93.4
E	36/46	78.2	26/46	56.5	-	-	40/46	86.9	-	-	-	-	33/46	71.7	-	-	-	-	28/46	60.8	33/46	71.7	35/46	76.1
F	-	-	-	-	-	-	-	-	-	-	-	-	25/46	54.3	-	-	-	-	-	-	-	-	-	-

*Cl. n. = Class number

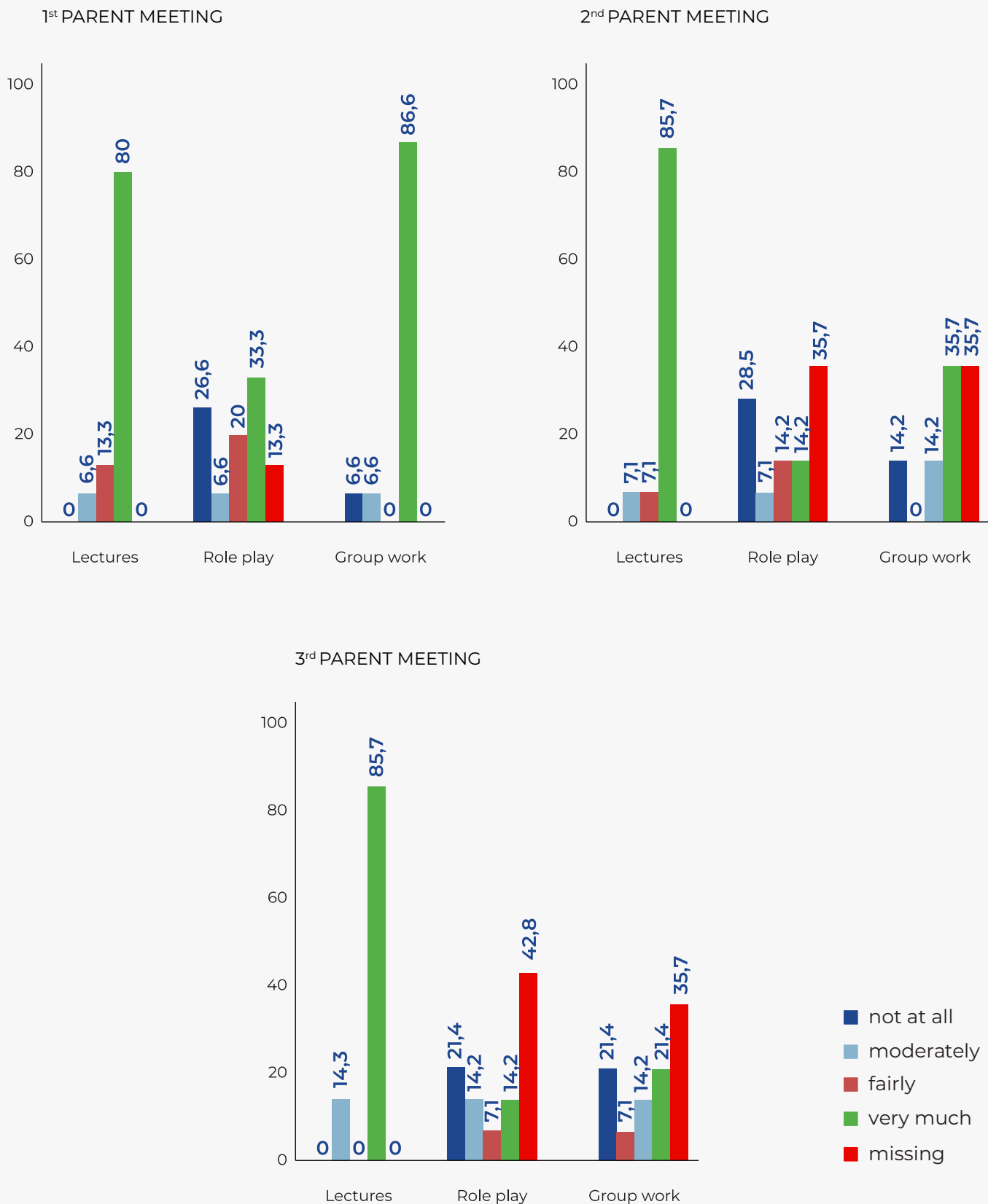
The *Imam stav* school-based prevention program includes a component specifically designed for parents. As part of this component, the program implementers (teachers and school counsellors) are expected to conduct three workshops with the parents of students participating in the program, amounting to three parent meetings. In all 12 schools where the *Imam stav* program was implemented, all three parent meetings were conducted as planned. The meetings lasted, on average, between 61 and 83 minutes, aligning with the recommended duration for such sessions. The program implementers also evaluated the success of the individual components of the parent meetings from their perspective (see Chart 1). Based on the data, the implementers rated the lectures at all three parent meetings as very good. Additionally, 86% of implementers at the first parent meeting felt that group work was very good, compared to 35% at the second parent meeting and 21% at the third. Among all components, the role play was consistently rated the least successful at all three parent meetings.

In fact, due to the COVID-19 pandemic, most parent meetings—particularly the second and third—were conducted online. This likely contributed to the decreased perceived success of group work in those meetings.

Recent research emphasizes the importance of understanding the practical implementation of programs to evaluate their effectiveness and examine how they function in real-world settings (Mihalic et al., 2008; Melo et al., 2022; Morrison et al., 2021). In implementation science, the faithful execution of school-based programs is a critical concern. Interventions not only need to be effective but must also be practical and feasible within the specific school environment (Forman et al., 2013; Melo et al., 2022).

Moreover, numerous studies underscore the positive outcomes of parent engagement, including strengthened school-community relationships, significant improvements in academic performance, enhanced emotional well-being, and the promotion of positive behaviors (Baker et al., 2016; Lawson & Alameda-Lawson, 2012).

Figure 1. Evaluation of the success of the implemented components of the parents' meetings, Zagreb County, Croatia, school year 2020/2021



After completing all the lessons of the program, 6th-grade students from the experimental schools filled out a questionnaire to assess their satisfaction with the *Imam stav* program. A total of 771 students participated in this survey. The chi-square test revealed statistically significant differences in students' assessments across all examined variables related to their satisfaction with the program's implementation and the perceived benefits of participation in the *Imam stav* prevention program.

The results indicate the following:

- 49.5% of students (n = 326) believe that participating in the program positively contributed to addressing personal questions and choices.
- 35% of students (n = 235) feel that the program positively impacted their self-concept.
- 71.3% of students (n = 508) report that the program improved their knowledge about the consequences of substance use.
- 39.7% of students (n = 260) believe it improved their relationships with peers.
- 38.2% of students (n = 241) believe it enhanced their relationships with teachers (see Table 6).

Table 6. *Perception of satisfaction with participation in the Imam stav program among participants, Zagreb County, Croatia, school year 2020/2021*

		Opinion							
		Positive		Neutral		Negative		Missing*	
Participants	Variables	n	%	n	%	n	%	n	p**
Students (N = 771)	The program's contribution to answering questions students have about themselves and their choices	326	49.5	181	27.5	152	23.1	112	<0.001
Students (N = 771)	The program's contribution to changing students' concept of themselves	235	35.0	156	23.2	281	41.8	99	<0.001
Students (N = 771)	The program's contribution to improving knowledge about the consequences of substance use	503	71.3	102	14.5	100	14.2	66	<0.001
Students (N = 771)	The program's contribution to improving relations with peers	260	39.7	171	26.1	224	34.2	116	<0.001
Students (N = 771)	The program's contribution to improving relations with teachers	241	38.2	175	27.7	215	34.1	140	<0.005

*Missing includes participants who skipped the question or answered I don't know

210 ** Chi-square: comparison of the % of positive, neutral and negative answers

Students were also asked about their overall satisfaction with participating in the *Imam stav* prevention program. A total of 743 students responded to this question, while 28 students chose to skip it.

The analysis revealed that 60.17% of students expressed a positive attitude toward participating in the program (20.9%, n = 155 – "I liked it a lot"; 39.0%, n = 290 – "I liked it"). A neutral stance was held by 24.9% of students (n = 185), while 15.2% indicated they did not enjoy participating (8.6%, n = 64 – "I did not like it"; 6.6%, n = 49 – "I did not like it at all").

The success of any program is strongly influenced by its social acceptance, which is closely tied to user satisfaction (Medeiros et al., 2016).

At the end of the implementation of the *Imam stav* program, the implementers (teachers and school counsellors) completed a questionnaire to evaluate their satisfaction with the program's implementation. A total of 58 implementers participated in the questionnaire.

The results indicate that 86.2% (n = 50) of the implementers found the manual useful for implementing the program. Additionally, the chi-square test revealed statistically significant differences in implementers' assessments across all examined variables related to their satisfaction with the program. Specifically:

- 82.4% (n = 42) reported that they improved their knowledge and skills in prevention of substance use.
- 77.1% (n = 37) felt they enhanced their teaching skills.
- 79.2% (n = 38) stated that their relationships with students improved.
- 72.3% (n = 34) noted that implementing the *Imam stav* program improved the classroom climate (see Table 7).

Teacher-student relationships significantly impact classroom climate and influence students' learning progress (Coombes et al., 2016; Klem & Connell, 2004; Szejnberg et al., 2004). Strong teacher-student relationships are especially important for fostering adjustment to the school environment, enhancing academic achievement, and encouraging positive interactions with peers (Coombes et al., 2016; Entwisle & Hayduk, 1988; Klem & Connell, 2004; Szejnberg et al., 2004).

Table 7. Perception of satisfaction with the implementation of the Imam stav program by implementers (classroom teachers and school counsellors), Zagreb County, Croatia, school year 2020/2021

		Opinion							
		Positive		Neutral		Negative		Missing*	
Participants	Variables	n	%	n	%	n	%	n	p**
Implementers of the program (classroom teachers and school counsellors) (N = 58)	Evaluation of the usefulness of the manual for the implementation of the <i>Imam stav</i> program	50	86.2	0	0	0	0	8	/
Implementers of the program (classroom teachers and school counsellors) (N = 58)	Proportion of implementers perceiving improvement of substance use prevention skills through <i>Imam stav</i> program	42	82.4	7	13.7	2	3.9	7	<0.001
Implementers of the program (classroom teachers and school counsellors) (N = 58)	Proportion of implementers perceiving improvement of teaching skills	37	77.1	11	22.9	0	0	10	<0.001
Implementers of the program (classroom teachers and school counsellors) (N = 58)	Proportion of implementers perceiving better relationship with students	38	79.2	9	18.8	1	2.1	10	<0.001
Implementers of the program (classroom teachers and school counsellors) (N = 58)	Proportion of implementers perceiving improvement of classroom climate	34	72.3	12	25.5	1	2.1	11	<0.001

*Missing includes participants who skipped the question or answered *I don't know*

** Chi-square: comparison of the % of positive, neutral, and negative answers

Program implementers, including teachers and school counsellors, were also asked about their overall satisfaction with the implementation of the *Imam stav* prevention program. A total of 51 implementers responded to this question, while seven chose to skip it.

The results revealed that 98% (n = 50) of the implementers were satisfied with the program's implementation (29.4%, n = 15 – "very satisfied"; 68.6%, n=35 – "satisfied"), while 2% (n=1) reported dissatisfaction.

The implementation of a program often begins when school personnel recognize its potential benefits, acknowledge its feasibility, and express confidence in its value (Melo et al., 2022; Mercer et al., 2017). Implementers' belief in the program's components and expected outcomes is critical for maintaining fidelity during implementation and contributes to greater satisfaction with the overall process.

Conclusions

The aim of this paper was to identify the key features of *Imam stav* program implementation to enhance the program and create a supportive context for its continued application. While the results indicate a relatively high level of implementation fidelity, there remains room for improvement.

An analysis of lesson implementation rates reveals that some schools only partially implemented the program, completing only a few lessons. Several factors may contribute to this, including a lack of time, the implementers' commitment and organizational skills, their understanding of the importance of implementation fidelity, and potentially the level of support from school management. Conversely, some schools maintained a high level of fidelity in implementation, suggesting the presence of favorable conditions and practices.

The findings suggest that *Imam stav* training sessions for implementers could place greater emphasis on fostering internal motivation for program implementation, discussing strategies to overcome obstacles such as time constraints, and reinforcing the importance of maintaining fidelity. Furthermore, greater attention should be given to whole-school preparation for implementation. This includes reaching agreements at the school level regarding necessary timetable adjustments to ensure the conditions for achieving high implementation fidelity.

The results of satisfaction with the *Imam stav* program, both among students and implementers (teachers and school counsellors), indicate positive outcomes. Among students, the improvement in relationships with classmates and teachers stands out as particularly noteworthy. A similar finding emerged from the responses of program implementers, who reported that the program contributed to their relationships with students and improved the overall classroom climate.

Similarly, the methods used by implementers during the *Imam stav* program led to self-reported improvements in their teaching skills. These positive outcomes can serve as a motivating factor for continued program implementation in schools, reinforcing its value. The program's anticipated impact on preventing substance use is promising, and its effectiveness evaluation is currently underway.

The *Imam stav* prevention program is an evidence-based, effective intervention that has been successfully implemented in numerous European countries, yielding positive results. It signifi-

cantly impacts key aspects of the school environment, such as improving classroom climate and enhancing relationships between students and teachers (Caria et al., 2010; Faggiano et al., 2008; Faggiano et al., 2010; Giannotta et al., 2014; Jandáč et al., 2021; Mioovsky et al., 2012; Orosová et al., 2020; Paschall et al., 2022; Vigna-Taglianti et al., 2021).

To achieve the program's intended outcomes, maintaining a high level of implementation fidelity is essential. This study highlights the importance of investing in the skills of implementers and in whole-school preparation for program implementation. Such investments support high fidelity in program delivery, which is critical for achieving the desired effectiveness outcomes.

Acknowledgments

This research was supported by the Croatian Institute of Public Health (CIPH) and the Service for Combating Drug Abuse (SCDA). The implementation of the *Imam stav* prevention program is additionally supported by the Croatian Institute of Public Health (CIPH), the Service for Combating Drug Abuse (SCDA), the Croatian Ministry of Science and Education, and the Croatian Agency for Education and Teacher Training.

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Determinants of peer pressure toward risk-taking behavior among high school students

SUMMARY

The phenomenon of peer pressure has been shown to play a significant role in adolescent risk-taking behavior. Peer pressure refers to the direct or indirect encouragement from peers to engage in certain behaviors (Clasen & Brown, 1985). Refusal to conform to such peer encouragement is often met with undesirable consequences, whereas participation in expected behaviors is typically reinforced (Berndt, 1989). Motivated by a fear of social sanctions and a strong desire for acceptance, adolescents are particularly inclined to conform to peer expectations.

The aim of this study was to examine the extent to which individual factors, openness to peer influence, and relationship dynamics significantly predict adolescents' susceptibility to peer pressure. The study was conducted on a sample of 477 second-year high school students in Zagreb (41% male; Mage = 16; SD = 0.34). The study employed Susceptibility to Peer Pressure Questionnaire, the Cooperation Subscale from the International Personality Item Pool, the Self-Concept Questionnaire, and a modified version of the Experiences in Close Relationship Inventory.

The results showed that the predictors accounted for 17.1% of the variance in susceptibility to peer pressure toward risk-taking behavior. Students who exhibited higher compliance, higher levels of anxiety, and lower levels of avoidance in peer relationships, as well as male students, demonstrated greater susceptibility to peer pressure toward risk-taking behavior. These findings underscore the importance of empowering children from an early age to reduce their need for compliance during adolescence and to foster secure attachments with their peers.

Keywords: *susceptibility to peer pressure, risk-taking behaviour, anxiety, avoidance, compliance*

Introduction

220 During adolescence, young people spend increased time with their peers, making peer acceptance and approval critically important (Crone & Dahl, 2012). Therefore, it is not surprising that

peer influence plays a significant role in shaping adolescent behavior. One manifestation of this influence is peer pressure, which can affect an individual's behavior in various ways.

The concept of peer pressure has been defined in various ways within the research literature, reflecting the complexity of this construct and the different aspects emphasized by various authors. Some authors distinguish between direct and indirect peer influence (Dodge & Gonzales, 2009; McIntosh et al., 2003; Meehan et al., 2022; Urberg et al., 2003), describing peer pressure as direct encouragement, persuasion, or threat from peers. Similarly, Santor et al. (2000) view peer pressure as the active urging or prompting of an individual to engage in group activities.

Brown (2004) defines peer pressure as the direct efforts of group members to impose specific attitudes and behaviors on individuals while discouraging those that deviate from group norms. However, this perspective is somewhat restrictive and narrows the construct, particularly given how uncommon it is for a group of friends to enforce behavior explicitly through threats.

Other authors adopt a less extreme perspective, emphasizing that peer pressure can manifest in more subtle forms, such as encouraging a person to behave in a specific way (Brown et al., 2008). Peers may influence an individual by subtly expressing their desires regarding that person's behavior (Fischhoff et al., 1999). These definitions align with Kiran-Esen's (2003) statement that peer pressure is dual in nature, encompassing both direct and indirect forms. In this context, adolescents may be unaware of the presence of indirect peer pressure (Ryan, 2000).

Berndt (1989) also recognizes the distinction between direct and indirect peer pressure, noting that direct pressure occurs far less frequently (Savin-Williams & Berndt, 1990). Unlike previously mentioned definitions, Berndt's (1989) conceptualization emphasizes the consequences of (non)conformity for the individual. Peer pressure, as defined by Clasen and Brown (1985), involves the explicit or implicit influence peers exert to shape an individual's behavior. Resisting this influence often results in adverse consequences, while conforming to expected behaviors is typically rewarded (Berndt, 1989). Adolescents are strongly motivated to conform to peer expectations, driven by a combination of fear of potential repercussions and the desire for acceptance.

The significance of peer pressure in the context of adolescent risk-taking cannot be overstated. Previous research consistently demonstrates that adolescents are more likely to engage in risky behaviors simply in the presence of their peers (Andrews et al., 2020; Albert et al., 2013; Defoe et al., 2015). For instance, a study by van Hoorn et al. (2016) revealed that adolescents exhibit heightened antisocial behavior when influenced by peers to engage in such actions. Likewise, Cohen and Prinstein (2006) documented a direct impact of peer influence on both antisocial and risk-taking behaviors in adolescents.

Peer group associations and friendships significantly affect adolescent alcohol and drug use (Allen et al., 2022; Hiatt et al., 2017; Burk et al., 2012; Osgood et al., 2013). Albert and Steinberg (2011) propose a theoretical framework suggesting that adolescents have a distinct vulnerability to peer influence, attributable to the developmental phase of their brains. This phase enhances their susceptibility to motivational states that are particularly responsive to rewards (Cauffman et al., 2010). In the presence of peers, adolescents are more likely to prioritize immediate gratification over long-term benefits. The mere presence of peers amplifies their focus on immediate rewards, often leading to decisions that favor short-term gains.

In examining the dynamics of peer pressure, Brown et al. (2008) propose a conceptual model of peer influence and basic principles based on a sequence of events: activation of peer influence – response – outcome. A particular event triggers peer action, which may involve exerting pressure on an individual within a group or dyad. In this context, peer behavior that exerts pressure may or may not directly follow the triggering event. Instead, the pressure may stem from the young person's expectations of peer behavior, shaped by their prior experiences with peers.

Peer pressure may also vary in intensity, depending on how strong, persuasive, or persistent peers are in exerting pressure, whether on a single behavior or multiple behaviors. When peer pressure is present, several factors determine whether a young person will conform or resist. In their conceptual model of peer influence, Brown et al. (2008) outline several basic principles. This study focuses on three of these principles, proposing that susceptibility to peer influence is determined by: (1) the youth's openness to influence, (2) the dynamics of the relationship in which the influence occurs, and (3) various individual factors.

Brown et al. (2008) emphasize that peer influence relies on the influenced adolescent perceiving and acknowledging peer behavior as a source of influence, indicating an openness to influence. This openness can also be understood as a dispositional trait. Previous research has primarily focused on the disposition to conform, often defining it as susceptibility to peer pressure and exploring its relationship with individual factors such as age or gender (Brown et al., 1986; Lebedina-Manzoni et al., 2008; Sim & Koh, 2003; Steinberg & Silverberg, 1986).

However, the instruments used in these studies typically examine adolescents' intentions in specific peer-pressure scenarios, with limited research addressing dispositional vulnerability to peer pressure as a broader construct. A person's tendency to succumb to peer pressure is likely influenced by personality traits, which reflect consistent patterns of feelings, thoughts, and behaviors across various situations. Therefore, it can be assumed that individuals with a strong inclination to please others experience a pronounced need to maintain positive relationships and avoid conflicts with friends, peers, parents, or teachers. Such adolescents may exhibit greater susceptibility to peer pressure as part of their desire to gain peer approval. As a result, compliance—one of the facets of agreeableness—was included in this study as a dispo-

sitional predictor of susceptibility to peer pressure.

The second basic principle of peer influence considered in this study is the assumption that *relationship dynamics* affect the extent to which peers influence one another. Brown et al. (2008) highlight that understanding susceptibility to peer pressure requires an examination of the nature of adolescents' relationships with their peers. Previous research on this principle has mostly focused on relationship characteristics, such as whether the relationship involves acquaintances or close friends (e.g., MacLeod, 1995) or the power imbalance between those exerting pressure and those experiencing it (e.g., Crosnoe & Needman, 2004).

Brown et al. (2008) further suggest that an adolescent who is subordinate in a relationship is more likely to yield to peer pressure to preserve the relationship. This assumption also extends to adolescents with heightened anxiety in peer relationships, supporting the inclusion of attachment to friends as a dynamic in peer relationships. A study conducted with Croatian adolescents found that anxiety and avoidance in friendships are positively associated with susceptibility to peer pressure and the perception of being pressured, with the association being stronger for anxiety (Lotar, 2011). Additionally, Allen et al. (2007) demonstrated that adolescents with a secure attachment style are less susceptible to peer pressure, likely due to their reduced susceptibility to peer pressure.

The third basic principle of peer influence considered in this study pertains to the notion that *individual differences* among adolescents influence their susceptibility to peer pressure (Brown et al., 2008). These differences, which affect both exposure to peer influence and responses to it, include factors such as gender, age, family relationships, social and cognitive abilities, and aspects of psychological well-being. Research on peer pressure has primarily focused on differences in susceptibility as a function of gender and age (Brown et al., 1986; Lease et al., 2020; Lebedina-Manzoni et al., 2008; McCoy et al., 2019; Sim & Koh, 2003; Steinberg & Silverberg, 1986; Widman et al., 2016).

Less frequently, studies have explored the effects of adolescents' psychosocial functioning, such as social anxiety (e.g., Cohen & Prinstein, 2006) and self-esteem (e.g., Prinstein, 2007), or examined the link between susceptibility to peer pressure and parental behavior (e.g., Lebedina-Manzoni & Lotar, 2010; Ricijaš, 2011; Steinberg, 1986).

To better understand individual factors that may help explain susceptibility to peer pressure, it is important to consider Deviance Regulation Theory (Blanton et al., 2001). This theory highlights the role of identity concerns, particularly public and private self-images, in shaping an individual's decision-making and behavior. According to this theory, characteristics that are rare within a population are perceived as central and important aspects of a person's self-image or identity (Nelson & Miller, 1995; Turnbull et al., 1990). Consequently, deviant behaviors take on greater personal significance.

In the context of this theory, deviant behavior refers to actions that deviate from the social norms of society or a reference group. Such behavior may involve either desirable or undesirable deviations. When individuals act in ways that do not align with their group norms, they are perceived as more conspicuous and attract attention from others, who then judge them based on these actions.

Every individual strives to cultivate a positive identity, or a self-image that positively influences and guides their behavior (Blanton & Burkley, 2008). A positive or desirable identity is characterized by the presence of positive traits that foster acceptance and a sense of belonging within a group, as well as the absence of negative traits that could hinder acceptance or belonging (Blanton & Christie, 2003).

The foundation of Deviance Regulation Theory is the assumption that individuals strive to maintain a positive public and private self-image by adopting behaviors that represent desirable deviations from social norms while avoiding behaviors that deviate from norms in undesirable ways. For example, when deciding whether to smoke in the presence of peers, an adolescent compares two potential self-images: "me as a smoker" and "me as a non-smoker."

According to Deviance Regulation Theory, the adolescent evaluates only one of these self-images based on the normative context. If smoking is common within their social group, their focus shifts to "me as a non-smoker," and they consider only the consequences of choosing not to smoke (Blanton & Sanchez-Burks, 2001, cited in Blanton & Burkley, 2008). In this scenario, the adolescent does not stand out among peers for smoking, avoids negative consequences, and thus has no reason to evaluate themselves as smokers. However, if the adolescent perceives that not smoking might lead to disapproval, ridicule, or even social exclusion from peers, they may choose to smoke to avoid these adverse outcomes (Blanton & Burkley, 2008; Blanton & Christie, 2003).

Peer groups provide meaning to an individual's behavior by clearly defining the expectations for their members. Individuals who value their membership and wish to remain part of the group tend to conform to group norms. However, this conformity is often driven by a desire to avoid negative evaluation rather than to construct a positive identity (Blanton & Burkley, 2008; Blanton & Christie, 2003). Consequently, adolescents are particularly susceptible to peer pressure because they seek to avoid negative peer evaluations, rather than to attain higher status or recognition within the group.

However, this theory does not entirely rule out the possibility that individuals may alter their behavior to receive positive reinforcement from members of an affinity group. For instance, if certain behaviors are essential for belonging to a particular group (e.g., attending football matches and wearing team merchandise), the group establishes these behaviors as expected norms, which members internalize as part of their "ought selves" (see Higgins et al., 1997; Shah

et al., 1998). These obligatory behaviors, required by all group members, are primarily motivated by the desire to avoid negative reactions from other group members.

On the other hand, some behaviors are desirable but not obligatory for group members (e.g., engaging in physical confrontations with members of a rival football fan group). These behaviors represent ideal norms, and when the group functions as a reference group, adolescents internalize these norms as part of their "ideal self" (see Higgins et al., 1997; Shah et al., 1998). Adolescents are likely to engage in such behaviors to gain admiration and acceptance from group members.

Research Objective and Hypothesis

The aim of this study was to examine the predictors of high school students' susceptibility to peer pressure toward risk-taking behavior. Consistent with the basic principles of peer influence outlined by Brown et al. (2008), susceptibility to peer pressure, as a form of peer influence, depends on individual factors, openness to peer influence, and relationship dynamics. In this study, individual factors included gender as well as actual-ideal and actual-ought self-discrepancies. Openness to influence was assessed as a disposition to yield to pressure, with compliance—one of the facets of agreeableness—serving as a key measure. Variables related to relationship dynamics included anxiety and avoidance in friendship relationships.

Based on prior research, we hypothesized that males would exhibit greater susceptibility to peer pressure related to risky behavior (*Hypothesis 1*). Additionally, we posited that actual-ideal and actual-ought self-discrepancies would significantly contribute to explaining susceptibility to peer pressure in relation to risky behavior, with adolescents exhibiting higher self-discrepancies showing greater susceptibility (*Hypothesis 2*). Consistent with the principle that peer influence is linked to openness to influence, we expected that adolescents with higher compliance levels would also demonstrate greater susceptibility to peer influence (*Hypothesis 3*). Finally, in line with the assumption that relationship dynamics influence susceptibility, we hypothesized that higher anxiety and lower avoidance in friendships would be associated with greater susceptibility to peer pressure (*Hypothesis 4*).

Method

Sample

The study included 477 second-year high school students from Zagreb (41% boys), aged between 15 and 17 years ($M = 16$; $SD = 0.34$). The high schools were randomly selected, and in selected schools all second-grade students were invited to participate in the study.

Instruments

Susceptibility to Peer Pressure Questionnaire (SPPQ; Lotar, 2012)

The questionnaire consists of seven hypothetical scenarios. Participants were asked to imagine themselves in each described situation and select the response that best reflects their likely reaction. These scenarios depict peer pressure related to various risk-taking behaviors, such as drinking alcohol, smoking cigarettes, using marijuana, shoplifting, breaking agreements with parents, truancy, and risky sexual activity.

Responses are scored on a scale from 0 to 3, where 0 indicates complete refusal of peer pressure and 3 indicates full compliance with peer pressure in the described situation. The total score is calculated as the average of responses across all seven scenarios, with higher scores reflecting greater susceptibility to peer pressure. The possible total score ranges from 0 to 3.

The internal consistency of the questionnaire is $\alpha = .59$. While this value is modest, it is expected given the instrument's brevity and its inclusion of diverse risk-taking behaviors, which may not be highly correlated.

Self-Concept Questionnaire - Conventional Construct Version (SCQ-CC; Watson, 2004)

The Self-Concept Questionnaire consists of three parts, each containing the same set of 28 adjectives. Participants were asked to rate, on a seven-point scale, how well each adjective describes their actual self, ideal self, and ought self (with 1 meaning "never or almost never true" and 7 meaning "always or almost always true"). The instructions emphasized that participants should rate their ought self in relation to their peers, specifically considering how they believe their peers expect them to be.

The total score is calculated as the average of the absolute differences between ratings of the actual self and the ideal self, as well as between the actual self and the ought self. The internal consistency of the scale for the discrepancy between the actual self and the ideal self is $\alpha = .80$, and for the discrepancy between the actual self and the ought self is $\alpha = .82$.

Cooperation Scale (International Personality Item Pool, IPIP)

To measure compliance, a facet of agreeableness, the Cooperation Scale from the International Personality Item Pool (IPIP) was used. This scale consists of ten items that evaluate a person's willingness to engage in conflict or disagree with others. Examples of items include: "Can't stand confrontations" and "Contradict others."

Participants rated the extent to which each statement applied to them on a 5-point scale, where 1 indicated "does not apply to me at all" and 5 indicated "applies to me completely." The total score was calculated by summing the responses, with higher scores indicating a greater tendency to cooperate. The internal consistency of the scale was $\alpha = .81$.

Modified Experiences in Close Relationships Inventory (Kamenov & Jelić, 2003)

The Modified Experiences in Close Relationships Inventory is a shortened version of the ECRI (Brennan et al., 1998), designed to measure anxiety and avoidance behaviors in close relationships. For this study, the focus was specifically on adolescents' relationships with friends.

The scale comprises 18 items, with 9 items measuring anxiety and 9 items measuring avoidance behavior. Participants rated their level of agreement with each statement on a seven-point scale, where 1 indicated "strongly disagree" and 7 indicated "strongly agree." In this study, the Cronbach's alpha for the anxiety scale was $\alpha = .75$, and for the avoidance scale, it was $\alpha = .83$.

Procedure

Prior to conducting the study, approval was obtained from the Ethics Committee for Research on Human Subjects at the Department of Psychology, Faculty of Humanities and Social Sciences, University of Zagreb. The principals of the selected high schools were also asked for their consent to conduct the study within their institutions. After obtaining these consents and before administering the instruments, participants were briefly informed about the purpose of the study and invited to participate. It was emphasized that participation was anonymous, all data would be analyzed at the group level, and participants could withdraw from the study at any time.

Participants completed the instruments in a paper-and-pencil format. To minimize potential effects of fatigue, boredom, or influence from completing previous questionnaires, the order of the instruments was rotated. The entire measurement process took approximately 30 minutes.

Data analysis

The data were analyzed using SPSS 23 software. The Pearson correlation coefficient was used to assess correlations between variables. Differences in variables between boys and girls were tested using a t-test.

To identify factors associated with susceptibility to peer pressure, a hierarchical multiple regression was conducted in three steps:

1. Gender and compliance were included.
2. Self-discrepancies were introduced.
3. Dimensions of attachment to friends were added.

The significance level was set at $p < .05$.

Results and discussion

Descriptive statistics and the results of the t-test for gender differences are presented in Ta-

ble 1. The findings indicate that girls exhibited higher compliance compared to boys, as well as greater discrepancies between their actual and ought self and their actual and ideal self. Regarding attachment to friends, girls reported higher levels of anxiety, whereas boys showed higher levels of avoidance.

Table 1. *Descriptive Statistics and Gender Differences in Susceptibility to Peer Pressure and Its Predictors (N = 475).*

Variable	M (SD)	Min	Max	Boys	Girls	t	d
				M (SD)	M (SD)		
1. Susceptibility to peer pressure	0.84 (0.56)	0	2.86	1.02 (0.62)	0.72 (0.48)	5.49**	.52
2. Actual-ideal self-discrepancy	1.42 (0.50)	0	3.12	1.35 (0.55)	1.46 (0.46)	-2.32*	.22
3. Actual-ought self-discrepancy	1.51 (0.56)	0	3.57	1.43 (0.60)	1.57 (0.53)	-2.64**	.25
4. Compliance	31.77 (7.46)	10.0	50.00	30.05 (7.55)	32.96 (7.18)	-4.25**	.39
5. Anxiety	25.02 (8.92)	7.61	54.34	23.69 (7.81)	25.93 (9.51)	-2.81**	.26
6. Avoidance	21.67 (9.27)	9.00	59.00	23.37 (8.70)	20.50 (9.48)	3.36**	.32

* $p < .05$; ** $p < .01$

Abbreviations: M = mean; SD = standard deviation; Min = the lowest observation; Max = the highest observation; t – t-test; d – Cohen’s d

In line with the first hypothesis, it was expected that boys would exhibit higher susceptibility to peer pressure toward risk-taking behavior. Table 1 confirms this expectation, showing that boys are indeed more susceptible to peer pressure, supporting the first hypothesis. This finding reflects a moderate size effect (Cohen’s $d = .52$) and aligns with previous research in this field (Berndt & Savin-Williams, 1993).

Although researchers generally agree that boys are more susceptible to peer pressure in relation to risk-taking behavior, the underlying mechanism driving these differences remains unclear. One possibility is that boys may be more likely to yield to peer pressure because participating in such activities serves as a way to prove themselves among their peers. If this assumption holds true, it can be expected that boys find it significantly more challenging to resist peer pressure and avoid conforming to group norms, as refusing to engage in risk-taking behaviors might be perceived as a sign of weakness.

Previous research has shown that girls experience less pressure from their female peers com-

pared to boys in relation to risk-taking behavior (Lotar, 2011). This lower perceived peer pressure among girls suggests that female peers do not place as strong an expectation on risk-taking behaviors. Consequently, these behaviors appear to hold less significance in achieving higher status within groups of girls.

Table 2. *Pearson's Correlations Among Susceptibility to Peer Pressure and Its Predictors (N = 475).*

Variable	1	2	3	4	5	6
1. Susceptibility to peer pressure	-					
2. Actual-ideal self-discrepancy	.05	-				
3. Actual-ought self-discrepancy	-.03	.71**	-			
4. Compliance	-.33**	-.11*	-.10*	-		
5. Anxiety	.06	-.04	.21**	.20**	-	
6. Avoidance	-.08	-.08	.13**	.21**	.16**	-

* $p < .05$; ** $p < .01$

To test the remaining hypotheses, correlations between the study variables were calculated (Table 2), followed by a hierarchical regression analysis. Variables from each group of predictors (individual factors, disposition to yield to pressure, and relationship dynamics) were introduced stepwise to explain susceptibility to peer pressure.

In the first step, gender, actual-ideal self-discrepancy, and actual-ought self-discrepancy were entered as predictors. Compliance was added in the second step, and anxiety and avoidance, representing two dimensions of attachment to friends, were included in the third step. The results revealed that all three blocks of predictors were significant, with the model explaining 17.1% of the variance in susceptibility to peer pressure toward risk-taking behavior (Table 3).

From the standardized regression coefficients in the first step, gender and actual-ideal self-discrepancy emerged as significant predictors. Boys and participants with a greater actual-ideal self-discrepancy reported higher susceptibility to peer pressure, with these predictors accounting for 7.7% of the variance in susceptibility to peer pressure.

In the second step, including compliance explained an additional 8% of the variance. Interestingly, higher compliance was associated with lower susceptibility to peer pressure.

In the third step, introducing the two dimensions of attachment to friends led to a further significant increase in the coefficient of multiple determination, accounting for an additional 2.5% of the variance in susceptibility to peer pressure. Both anxiety and avoidance in friendships were significant predictors of susceptibility to peer pressure in this model. As hypothesized,

higher anxiety and lower avoidance in friendships were associated with greater susceptibility to peer pressure.

Notably, when the attachment dimensions were included in the model, actual-ideal self-discrepancy was no longer a significant predictor of susceptibility to peer pressure.

Table 3. Hierarchical Multiple Regression in Predicting Susceptibility to Peer Pressure (N = 475).

Predictors		Step 1	Step 2	Step 3
		β	β	β
Gender		-.259**	-.198**	-.234**
Self-discrepancy	Actual-ideal	.151*	.127*	.112
	Actual-ought	-.103	-.121*	-.097
Compliance			-.292**	-.291**
Dimensions of attachment to friends	Anxiety			.100*
	Avoidance			-.144**
Model summary				
R		.277	.396	.426
Adj R ²		.071	.150	.171
ΔR^2		.077**	.080**	.025**

* $p < .05$; ** $p < .01$; 0 – male; 1 – female

Abbreviations: R – coefficient of multiple correlation; Adj R² – adjusted coefficient of multiple determination; ΔR^2 – change of coefficient of multiple determination

Based on the results of the correlation analysis (Table 2) and hierarchical regression analysis (Table 3), the second hypothesis of this study was not supported, as self-discrepancies did not significantly contribute to explaining susceptibility to peer pressure. Surprisingly, no relationship was found between susceptibility to peer pressure and self-discrepancies.

This result is somewhat unexpected, given that discrepancies between the actual and ideal self are often linked to feelings of weakness, anxiety, worry, and tension (Higgins, 1987; Strauman & Higgins, 1988). Individuals typically strive to eliminate such negative feelings by avoiding undesirable outcomes. In the context of friendships, these undesirable outcomes could include ridicule, loss of status within the group, or even rejection by group members.

The lack of association between susceptibility to peer pressure and self-discrepancies may be attributed to how discrepancies were operationalized in the measurement instrument used (Watson, 2004). The scale assessing self-discrepancies comprises 28 generalized adjectives, some of which may not be directly relevant to the specific aspects of self-concept related to adolescents' susceptibility to peer pressure.

Moreover, the self-discrepancies operationalized by this scale are calculated as the absolute difference between the actual and ideal self or the actual and ought self. This approach accounts only for the magnitude of the discrepancy, ignoring its direction. Consequently, the fact that the scale contains adjectives that could be characterized as desirable traits and others that could be considered undesirable traits is disregarded.

Neglecting the direction of the discrepancy leads to equating adolescents who believe that their friends do not expect positive traits that they think they possess and adolescents who believe that their friends expect positive traits that they do not possess. It is plausible that the distinction between these types of discrepancies is critical for understanding susceptibility to peer pressure. This issue should be addressed in future research to better capture the nuances of self-discrepancies and their impact.

The correlations in Table 2 indicate that susceptibility to peer pressure is correlated only with compliance, and contrary to our expectations based on the basic principles of peer influence (Brown et al., 2008), the correlation is negative. Higher compliance is associated with lower susceptibility to peer pressure.

While compliance significantly contributes to explaining susceptibility to peer pressure toward risky behavior (Table 3), the relationship is in the opposite direction to what was hypothesized, leading us to reject the third hypothesis. We initially expected a positive relationship, assuming that adolescents with personalities inclined toward avoiding oppositionality in their relationships would struggle to assertively advocate for acceptable attitudes and behaviors, making them more likely to conform.

However, it is possible that adolescents who are highly susceptible to peer pressure exhibit pronounced oppositional tendencies but do not express these tendencies effectively in their peer relationships in ways that protect them from susceptibility. Analyzing the items measuring compliance reveals that individuals low in compliance are often characterized as confrontational, prone to conflict, and assertive. However, confrontation without valid arguments or assertive advocacy may not be an effective strategy for resisting peer pressure. In the absence of effective resistance skills, conformity may appear to be a logical way to avoid the negative identity that peers might attribute to them.

Since compliance represents a facet of personality, it seemed logical to assume that individuals with this trait would exhibit it consistently across different contexts and relationships. However, the results suggest that adolescents, even if they display pronounced compliance, may not resist their peers in the same way they resist their parents or others with whom they have relationships. This aligns with Steinberg's (2002) assertion that adolescents differentiate their self-concept across relationships with various individuals. Therefore, an adolescent might perceive and exhibit entirely different characteristics and behaviors in relationships with their

mother, father, close friends, peer group, or classmates.

The instructions provided to participants did not explicitly emphasize that they should evaluate themselves specifically in relation to friends or peers. As a result, it is possible that participants considered their relationships with parents or siblings when completing the compliance scale. If adolescents exhibit oppositionality in their relationships with parents and other adults while simultaneously being more susceptible to peer pressure, this oppositionality in relationships with adults could act as a powerful motivator for maintaining peer relationships, thereby making susceptibility to peer pressure more acceptable.

Future studies should address this by asking participants to rate their compliance in relation to both parents and peers. This approach would allow researchers to examine whether adolescents express this trait differently across relationships and to explore how these distinct evaluations contribute to explaining susceptibility to peer pressure.

The final hypothesis of this study proposed that anxiety and avoidance in friendships would significantly contribute to explaining susceptibility to peer pressure toward risk-taking behavior. Specifically, it was hypothesized that higher anxiety and lower avoidance would predict greater susceptibility to peer pressure. The results of the hierarchical regression analysis confirm this hypothesis.

Anxious individuals are characterized by a fear of rejection and abandonment (Brennan et al., 1998). They often hold a negative view of themselves, perceiving themselves as inadequate, unworthy, and not deserving of attention, while viewing others positively, as good and deserving of attention. During adolescence, this relational stance can serve as a strong motivator to succumb to peer pressure in an attempt to avoid negative evaluation and rejection by peers.

In contrast, avoidance in relationships is marked by a tendency to limit intimacy and interdependence with others (Brennan et al., 1998). Individuals with pronounced avoidance perceive others as unreliable and insensitive to their needs. They lack trust in others and anticipate rejection (Collins et al., 2004). Consequently, adolescents with higher levels of avoidance are less likely to invest in peer relationships, which helps explain their lower susceptibility to peer pressure.

However, it is important to note that the effects of attachment dimensions in friendships on susceptibility to peer pressure are relatively small, explaining only 2.5% of the variance in susceptibility. Thus, while these findings provide some insight into the relationship between attachment and susceptibility to peer pressure, conclusions should be drawn cautiously. Further research is necessary to better understand these relationships.

232 The study has several limitations that should be acknowledged. The most significant limitation is the use of a convenience sample, which restricts the generalizability of the findings to the

entire adolescent population. The results can only be generalized to second-year high school students in Zagreb. It would be valuable to investigate whether these findings are applicable to students from other schools and regions in Croatia.

Since the sample consists of students from a specific type of school and grade, it is relatively homogeneous in terms of the measured characteristics. This homogeneity likely results in less variability in the findings compared to what might be observed in a more heterogeneous sample. Such sample homogeneity presents a particular challenge when examining attachment to friends. A small percentage of the general population exhibits pronounced anxiety and avoidance in relationships, making it challenging to include participants with these traits even in a random sample. It is possible that the limited presence of individuals with high levels of anxiety and/or avoidance in the sample contributed to the small observed effects of attachment on susceptibility to peer pressure.

Given that the conceptual model of peer influence proposed by Brown et al. (2008) is quite broad in its consideration of factors affecting peer influence, various constructs can be selected within its categories and operationalized in various ways. This breadth allows for the possibility of obtaining different results when testing the model's principles. In this study, self-discrepancy was chosen as an individual factor. However, it was not identified as a significant predictor of susceptibility to peer pressure. This finding highlights the need to explore the contributions of other individual factors.

The scientific contribution of this study lies in testing the three basic principles of peer influence within the conceptual model of peer influence. However, the findings indicate the need for a more specific model of peer pressure. A general model with broad principles that can incorporate various constructs to explain this important phenomenon lacks the precision needed to predict adolescents' responses to peer pressure. Furthermore, it does not provide concrete recommendations for preventing risk-taking behaviors influenced by peer pressure.

Although this study has limitations related to the sample and the limited generalizability of its results, several practical recommendations can be made. The findings highlight the importance of empowering adolescents in their peer relationships.

First and foremost, efforts should focus on reducing anxiety in these relationships by helping adolescents develop a positive self-image in relationships with peers, thereby alleviating their fear of rejection. Additionally, the results suggest that adolescents with lower compliance—characterized by behaviors such as contradicting others, engaging in conflicts, insulting others, and being confrontational or pushy—are more susceptible to peer pressure.

This indicates that teaching conflict resolution skills could promote increased cooperation in relationships with both peers and parents, potentially reducing susceptibility to peer pressure.

Conclusion

The results of the study conducted on second-year high school students in Zagreb reveal that young males have higher susceptibility to peer pressure. The discrepancy between the actual and ideal self, as well as the actual and ought self, did not significantly contribute to explaining susceptibility to peer pressure. Compliance emerged as a significant predictor, with adolescents displaying higher levels of compliance being less susceptible to peer pressure.

Additionally, higher anxiety and lower avoidance in friendships were associated with greater susceptibility to peer pressure among adolescents. While the conceptual model of peer influence was partially supported, the findings highlight the need for a more specific model with clearly defined predictors to better explain susceptibility to peer pressure in adolescents.

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Students with visual impairment and ADHD: Practical challenges

SUMMARY

The education of visually impaired students within the regular educational system is often without adequate professional support. The Integration Department of the Vinko Bek Education Centre is the only one in the Republic of Croatia that systematically implements programs for the inclusion of visually impaired users in the regular education system, covering all regions of the Republic of Croatia. The department employs "mobile educational rehabilitators" (specialists in education and rehabilitation) who, in their daily work with users, often encounter difficulties, that are not only related to vision difficulties. In practice most commonly it is diagnosed ADHD.

In cases where the user has a dual diagnosis that includes both vision impairment and ADHD, the vision problems can worsen the symptoms of ADHD disorder. The reason for this commonly is that student puts greater effort to visually focus and understand their world which leaves them less energy to use for executive functioning, organization, and task completion. By providing support to students in inclusive education, the practice of professional in the field of special education presents a challenge in working with students, their parents, and teachers. It is for this reason that cooperation is important when creating quality support within the system for students who have both diagnoses. The aim of this paper is to provide an insight into the specificity of the functioning of students with visual impairment and ADHD, as well as ways of support for their successful inclusion in the regular education system.

Keywords: *ADHD, visual impairment, interplay, prevalence*

Introduction

Although the coexistence of two overlapping diagnoses – visual impairment and ADHD – is a relatively new area of research, their association has been demonstrated in recent studies (Kutzbach et al., 2007, Lee et al., 2014, DeCarlo et al., 2015, Nazari et al., 2020, Bellato et al., 2023).

The World Health Organization (WHO, 2023) defines visual impairments as encompassing both blindness and low vision. The criteria for blindness are as follows (WHO, 2023):

- Residual vision in the better eye (with correction) of up to 0.05 (5%) or residual vision in the better eye of up to 0.10 (10%), with a narrowed field of vision of 20 degrees or less.

- Residual vision in the better eye with a corrective lens of less than 0.10 (10%) or residual central vision in the better eye with a corrective lens of up to 0.25 (25%), with a narrowed field of vision to 20 degrees or less.

The criteria for low vision (WHO, 2023):

- Residual vision in the better eye with correction of up to 0.40 (40%), though this criterion may also apply to individuals with a progressive diagnosis and more than 40% residual vision.

According to the DSM-V (APA, 2013), ADHD is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, whereby:

- Five or more symptoms of inattention and/or five or more symptoms of hyperactivity-impulsivity persist for six or more months to a degree that is inconsistent with the individual's developmental level and negatively affects social, academic, or occupational activities.
- Some symptoms (inattention or hyperactivity-impulsivity) were present before the age of 12.
- Some symptoms (inattention or hyperactivity-impulsivity) are evident in two or more settings (e.g., at home, at school, work).

There is clear evidence that the symptoms interfere with or diminish the quality of social, academic, or occupational functioning. These symptoms do not occur exclusively during episodes of schizophrenia or another psychological disorder and are not better explained by another mental disorder, such as a mood or anxiety disorder.

According to the DSM-V classification (APA, 2013), the following types of ADHD are identified:

1. Combined Type: Meets the criteria for both inattention and hyperactivity-impulsivity, with symptoms present within the past six months.
2. Predominantly Inattentive Type: Meets the criteria for inattention but not for hyperactivity-impulsivity, with symptoms present within the past six months.
3. Predominantly Hyperactive-Impulsive Type: Meets the criteria of hyperactivity-impulsivity but not for inattention, with symptoms present within the past six months.

While earlier studies tended to differentiate between the symptoms of visual impairment and ADHD (Butros, 2021; Damari et al., 2007; Vilines, 2021), recent research highlights significant similarities between the two conditions (Nazari et al., 2020; Lee et al., 2014; Ghasemi et al., 2023). Some studies report a high incidence of visual impairment in children with ADHD, suggesting a potential relationship between these diagnoses (Groenlund et al., 2007; Faraone et al., 2021). This emerging field of research is uncovering the intricate interplay between visual impairment and ADHD in children.

240 Several studies have explored this connection, with evidence pointing to early deficits in visual sensory integration as a contributing factor to the relationship between vision and ADHD

(Nazari et al., 2020; Lee et al., 2014). For instance, a study by DeCarlo et al. (2015) involving a sample of 264 children aged 4 to 17 years found that 22.9% of children with visual impairment had a prevalence of ADHD disorders. This rate was statistically significantly higher than the reported national rate of 14.3% and the national prevalence of 9.5%.

Building on these findings, the authors conducted a large-scale national survey with a representative sample of 75,171 children and adolescents aged 4 to 17 years. The results revealed a significantly higher prevalence of ADHD ($p < 0.0001$) in children with visual impairment (15.6%) compared to those with normal vision (8.3%). These findings suggest that children with visual impairments are twice as likely to develop ADHD as their typically developing peers.

Attention and behavior are not primarily interpreted as visual problems (DeCarlo et al., 2016). Recent research by Bellato et al. (2023) provides meta-analytical evidence of a significant association between ADHD and both self-reported and objectively determined functional vision problems. Children with visual impairments often struggle with school tasks due to challenges related to functional vision. They frequently exhibit distraction, a short attention span, carelessness, incomplete tasks, and restlessness. A comparison of these characteristics with the symptoms of ADHD reveals striking similarities between the two diagnoses.

Table 1. *Symptoms overlap: Comparative behavioral characteristics of children with visual impairment and children diagnosed with ADHD (American Optometric Association, 2023; DSM-V, 2013)*

Symptoms	ADHD	Functional visual problems
Inattention		
Often fails to give close attention to details or make careless mistakes	X	X
Often has difficulties sustaining attention during tasks or play activities	X	X
Often does not seem to listen when spoken to directly	X	X
Often does not follow instruction and fails to finish schoolwork, chores or duties in a workplace (e.g. Loses focus, side – tracked)	X	X
Often has trouble organizing tasks and activities	X	X
Often avoid, dislike or is reluctant to task that require mental effort over a long period of time (such as schoolwork, homework)	X	X
Is often easily distracted	X	X
Is often forgetful in daily activities	X	X
Often avoid, dislike or is reluctant to engage in task that require sustained mental effort	X	X

Hyperactivity and / or impulsivity		
Often fidgets with hands or feet, or squirms in seat	X	X
Often leave sit in situations when remaining seated is expected	X	
Often runs about or climbs in situations where it is not appropriate	X	
Often unable to play or take part in leisure activities quietly	X	
Is often "on the go" acting as if "driven by a motor"	X	X
Often talks excessively	X	X
Often blurts out an answer before a question has been completed	X	X
Often interrupt or intrudes on others (e.g., butts into conversation or games)	X	X

It is evident from this overview that many behaviors typical of ADHD and visual impairments overlap, underscoring the importance of accurately identifying the primary diagnosis.

The aim of this study is to examine the specific functioning and the presence of comparable behavioral characteristics in children with ADHD and functional visual disorders. Data were collected from medical records and files of 210 students aged 7–18, who are supported by the Vinko Bek Center for Education.

The data were analyzed using the SPSS program. Descriptive statistics were generated, and the chi-square test was employed to examine relationships between categorical variables.

Research Objectives and Hypotheses

The aim of this quantitative research is to analyze the presence of ADHD characteristics in children with visual impairments and to explore differences in the prevalence of these characteristics based on pregnancy type (risk vs. normal pregnancy), type of visual impairment, and the presence of a family history of visual impairment.

The research hypotheses derived from the research objective are as follows:

H1: The prevalence of ADHD characteristics in children with visual impairments differs based on the risk level of pregnancy.

H2: The prevalence of ADHD characteristics in children with visual impairments varies according to the type of visual impairment.

H3: The prevalence of ADHD characteristics in children with visual impairments differs depending on the presence of a family history of visual impairment.

Research Sample

This study employs a non-probabilistic convenience sampling method. The sample comprises children with visual impairments aged 7 to 18 years, enrolled in elementary and high school. Among the total sample of N = 210 students, there are N = 120 boys (57.1%) and N = 90 girls (42.9%).

Table 2. Sample comprised of male and female children with visual impairment age 7 to 18

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	120	57.1	57.1	57.1
	Female	90	42.9	42.9	100.0
	Total	210	100.0	100.0	

According to age, the students are divided into four subgroups:

- **Ages 7–9 years:** 47 students (22.4%)
- **Ages 10–12 years:** 49 students (23.3%)
- **Ages 13–15 years:** 64 students (30.5%)
- **Ages 16–18 years:** 50 students (23.8%)

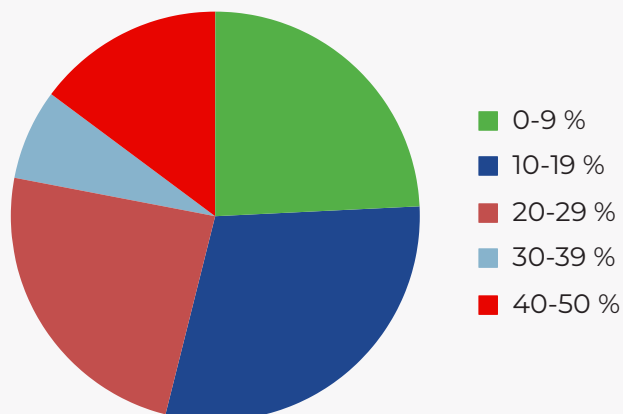
These subgroups represent the distribution of students with visual impairments within the total sample.

According to the degree of visual impairment in the sample, the students are categorized as follows based on their percentage of remaining vision:

- **0–9% remaining vision:** 51 students (24.3%)
- **10–19% remaining vision:** 62 students (29.5%)
- **20–29% remaining vision:** 51 students (24.3%)
- **30–39% remaining vision:** 15 students (7.1%)
- **40–45% remaining vision:** 31 students (14.8%)

This distribution reflects the varying degrees of visual impairment among the students in the sample.

Figure 1. Visual impairment in percentages

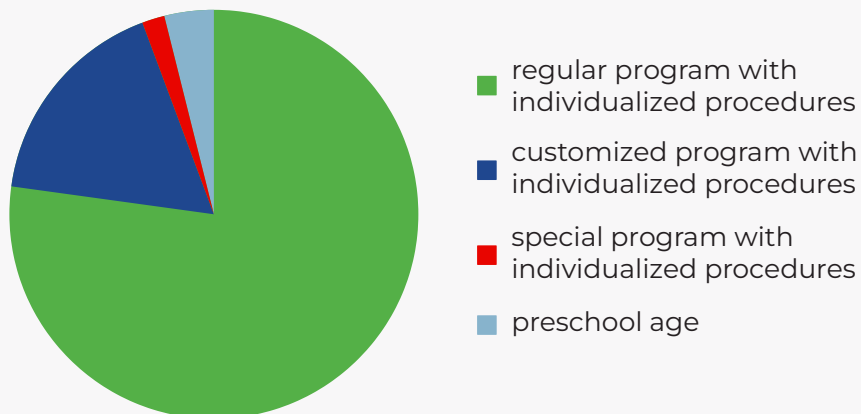


According to the form of education, the students are categorized as follows:

- **Regular program with individualized procedures and teaching methods:** 162 students (77.1%)
- **Regular program with content adaptation and individualized procedures and teaching methods:** 36 students (17.1%)
- **Special program with individualized procedures and teaching methods:** 4 students (1.9%)
- **Preschool-age children:** 8 students (3.8%)

This breakdown illustrates the educational approaches utilized for the students in the sample.

Figure 2. Form of education



Results and Discussion

In the entire sample of visually impaired students (N = 210), the prevalence of diagnosed ADHD (based on medical documentation) was 9.5% (20 students). According to the Vinko-Bek Center psychologist's internal assessment, 11% of students (23 students) were suspected of having ADHD, 15.7% (33 students) exhibited mild psychomotor agitation, and 63.8% (134 students) did not meet any of the ADHD criteria.

When combining students with a prior ADHD diagnosis and those suspected of having ADHD based on internal assessments, the total prevalence rises to 20.48% (43 students). This finding aligns with previous research by DeCarlo et al. (2014), which demonstrated that children with visual impairments are more likely to be diagnosed with ADHD compared to children in the general population.

Table 3. Frequency of the presence and diagnosis of ADHD

		ADHD			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes / Diagnose of ADHD	20	9.5	9.5	9.5
	No / ADHD	134	63.8	63.8	73.3
	Suspicion of ADHD	23	11.0	11.0	84.3
	Mild psychomotor restlessness	33	15.7	15.7	100.0
	Total	210	100.0	100.0	

The methods employed in this study included descriptive statistics to describe sample characteristics such as gender, age, degree of visual impairment, forms of education, type of pregnancy, type of visual impairment, presence of visual impairment in the family, and presence of ADHD traits. Absolute and relative frequencies were calculated, and the results were presented graphically.

To examine differences in the occurrence of ADHD traits based on pregnancy type, type of visual impairment, and family history of visual impairment, a Chi-square test was performed. The results and discussion addressed Hypothesis H1: Is there a difference in the occurrence of ADHD traits in children with visual impairments based on pregnancy risk? Contingency Table 3 displayed data on expected and observed frequencies.

Some studies indicate a greater risk of ADHD among children born prematurely, those from high-risk pregnancies, or those with a genetic predisposition related to pregnancy factors (Vander, 2016; Roige-Castelvi et al., 2021; Havdal et al., 2023). Additionally, a higher incidence of ADHD has been reported in children with some type of visual impairment (DeCarlo et al., 2013).

This study also observed an increased prevalence of ADHD among children born from risk pregnancies but found no difference in the incidence of ADHD symptoms between visually impaired children born from risk pregnancies and those born from normal pregnancies. A Chi-square test was conducted, with the contingency table displaying the expected and observed frequencies for each group based on the type of pregnancy (risk vs. normal) and the presence of ADHD symptoms (yes/no).

The results of the Chi-square test ($p = 0.719$) indicate no significant difference in the incidence of ADHD symptoms among visually impaired children based on the type of pregnancy.

Table 4. Differences in the occurrence of ADHD traits based on type of pregnancy

ADHD Incidence of Second Category * Crosstabulation					
			PREGNANCY		Total
			Risk Pregnancy (Neurorisk Child)	Normal Pregnancy and Birth	
ADHD Incidence	1	Count	28	36	64
		Expected Count	26.9	37.1	64.0
	2	Count	38	55	93
		Expected Count	39.1	53.9	93.0
Total		Count	66	91	157
		Expected Count	66.0	91.0	157.0

Regarding the type of visual impairment, earlier studies have indicated that certain vision problems are associated with ADHD (Su et al., 2019; Remet et al., 2021; Bellato et al., 2023).

A comprehensive study that included 35 meta-analyses and 42 studies in a narrative synthesis, encompassing a total of 3,250,905 participants, provided meta-analytic evidence of an increased risk of hypermetropia, astigmatism, hyperopia, unspecified vision problems, strabismus, and heightened self-reported vision problems in individuals with ADHD compared to those without the disorder (Bellato et al., 2023).

To address Hypothesis H2—whether there is a difference in the incidence of ADHD symptoms

in children with impaired vision based on the type of visual impairment—a Chi-square test was conducted. The results indicated no significant difference in the incidence of ADHD symptoms across the various types of visual impairments.

The visual impairments examined for differences in the incidence of ADHD characteristics using the Chi-square test included strabismus ($p = 0.509$), nystagmus ($p = 0.958$), amblyopia ($p = 0.152$), hypermetropia ($p = 0.770$), astigmatism ($p = 0.897$), albinism ($p = 0.144$), cataract ($p = 0.520$), glaucoma ($p = 0.876$), esotropia ($p = 0.963$), retinal dystrophy ($p = 0.956$), and pseudophakia ($p = 0.664$). Due to the small number of students with cerebral visual impairment in the sample ($N = 6$), this group was excluded from the analysis as it was insufficient for a statistically relevant evaluation.

This study aimed to explore the correlation between the incidence of ADHD in children with visual impairments and the presence of visual impairments in their family history, building on findings that suggest a significant relationship between ADHD diagnoses and visual impairments in children (DeCarlo et al., 2014, 2017). A Chi-square test was used to analyze the data, with a contingency table presenting the expected and observed frequencies for each group of participants based on the presence of prior visual impairments in the family. This analysis addressed Hypothesis H3: There is a difference in the prevalence of ADHD characteristics in children with visual impairments based on the presence of visual impairment in the family.

Table 5. *Prevalence of ADHD characteristics in children with visual impairments based on family history of visual impairment*

ADHD Incidence of Second Category * Visual Impairment in Family Crosstabulation					
			Visual impairment in family		Total
			yes	no	
ADHD Incidence of Second Category	1	Count	9	65	74
		Expected Count	10.4	63.6	74.0
	2	Count	19	106	125
		Expected Count	17.6	107.4	125.0
Total		Count	28	171	199
		Expected Count	28.0	171.0	199.0

Considering the prior existence of visual impairments in the family, the results indicate no significant difference in the incidence of ADHD symptoms in children with visual impairments,

as determined by the Chi-square test ($p = 0.551$). Specifically, children with visual impairments from families with a history of ADHD symptoms exhibit an equivalent incidence of these symptoms compared to those without such a family history.

Unfortunately, the existing literature does not provide comparable research to validate this finding. Therefore, further studies would be highly valuable to confirm the accuracy of this conclusion: that there is no difference in the incidence of ADHD among children with visual impairments based on whether their families have a history of visual impairment.

Conclusion

Research suggests that children with difficulties should be regularly monitored for signs and symptoms of ADHD, particularly in students with visual impairments, to ensure appropriate support for both diagnoses. Unfortunately, in Croatia, data on students with visual impairments and those with ADHD enrolled in mainstream schools remain insufficient and poorly documented. While the data collected for this study were reliable, it is assumed that the actual number of children with visual impairments is higher than reported. This discrepancy may result from a lack of parental awareness about available support for children with visual impairments, particularly in rural areas, or parental reluctance to acknowledge their child's condition. Even parents who are aware of their child's visual impairment often resist the possibility of a co-occurring ADHD diagnosis.

Given the limited research on the interplay between visual impairments and ADHD, further investigation into this topic is crucial. It would be particularly valuable to explore predictors of ADHD symptoms in children with visual impairments. For instance, is there a significantly higher incidence of ADHD symptoms in children whose visual impairment is linked to certain types of perinatal brain damage? Additionally, existing literature suggests the possibility of a shared underlying cause for both conditions.

Accurate diagnosis, early recognition, and adequate support for students with a dual diagnosis are essential. Providing such support will help prevent negative educational experiences and foster better outcomes for these students.

Collaboration among all parties involved in the educational process is essential to reduce undesirable outcomes for students in this population. Such outcomes can be mitigated through timely intervention, education, and a deeper understanding of their needs. This underscores the justifiable need for further research in this area.

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The relationship between gender, self-compassion, and psychological distress among adolescents

SUMMARY

The period of adolescence is marked by various changes in physical, psychological, and social development, which make adolescents particularly vulnerable to mental health issues. Gender asymmetry in the prevalence of internalized mental health problems is well established, and one factor that could protect adolescents is self-compassion—a positive attitude toward oneself when faced with adversity or self-perceived inadequacy. The aim of this study was to examine the predictive contribution of gender and self-compassion in explaining symptoms of psychological distress in adolescents. A total of 3,438 first-grade high school students (55.41% female) with a mean age of 15.12 (SD = 0.39) participated in the study. The Self-Compassion Scale for Youth (Neff et al., 2021) was used to assess the level of self-compassion, and the Depression Anxiety Stress Scale (Lovibond & Lovibond, 1995) was used to assess the adolescents' symptoms of depression, anxiety, and stress. The results of hierarchical regression analysis showed that gender, self-compassion, and their interaction explained 46% of the variance in symptoms of psychological distress. The obtained results have important implications for the mental health promotion of adolescents. Possibilities for prevention will be discussed, with a special emphasis on who can gain the most benefits from strengthening self-compassion.

Keywords: *self-compassion, gender asymmetry, psychological distress, prevention*

Introduction

Adolescence is known as a developmental period marked by various changes in physical, psychological, and social development (Ernst et al., 2006). Additionally, adolescence can be understood as a critical period in life for achieving the potential for further development, as it is during this time that adolescents acquire physical, emotional, cognitive, social, and economic resources, which form the foundation for health and well-being later in life (Patton et al., 2016). Moreover, it is a dynamic maturational period in which adolescents' lives can pivot rapidly, in

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both positive and negative directions (Dahl et al., 2018). Therefore, the period of adolescence is characterized by increased vulnerability and adjustment (Steinberg, 2005).

The results of The Global Burden of Disease Study (GBD) indicate that the most common mental health problems among adolescents are anxiety and depression (Calsteipetra et al., 2022). Similarly, the results of a national study in Croatia revealed that anxiety and depression are the most common mental health problems among secondary school students (Ričković & Ladika, 2021).

The COVID-19 pandemic has worsened the mental health status of adolescents. The results of a meta-analysis conducted by Racine and colleagues (2021), which included 29 studies and 80,879 youth globally, showed that the prevalence of mental health problems after the COVID-19 pandemic doubled compared to pre-pandemic estimates. The post-pandemic prevalence estimates of clinically elevated anxiety and depression symptoms were 20.5% and 25.2%, respectively. Furthermore, the analysis of potential moderators revealed that the prevalence estimates were higher when the data was collected later in the pandemic, among older adolescents and girls.

Gender disparities in mental health issues during adolescence are well-documented empirically. For instance, the gender difference in depression is considered one of the most robust findings in psychiatry and psychology (Hyde & Mezulis, 2019), with women being twice as likely to be diagnosed compared to men (Eid et al., 2019; Kuehner, 2017). Moreover, a study conducted on a sample of Belgian late teens and young adults found gender differences in depression, anxiety, and stress, with girls reporting significantly higher scores than boys (Van Droogenbroeck et al., 2018).

The gender gap in mental health was also found in a cross-national study that included 566,829 adolescents across 73 countries, with results indicating that girls report worse average mental health than boys (Campbell et al., 2021). Several other studies have confirmed that adolescent girls report more symptoms of internalized mental health problems than boys (Torsheim et al., 2006; West & Sweeting, 2003; Yoon et al., 2022). According to Hyde and Mezulis (2019), underlying gender differences in mental health problems may be affective (e.g., temperament), biological (e.g., genetics, hormones), or cognitive vulnerabilities (e.g., rumination, negative cognitive cycle).

One factor that could protect adolescents from developing and worsening mental health issues is self-compassion. Self-compassion is a psychological construct that involves a positive emotional attitude toward oneself, characterized by care and tenderness (Neff, 2003a). According to Kristin Neff's (2003a) conceptualization, self-compassion consists of three main components, each with its opposing counterpart: (1) self-kindness versus self-judgment, (2) common humanity versus isolation, and (3) mindfulness versus over-identification.

Self-kindness implies being tender and understanding with ourselves, whereas self-judgment refers to being overly critical or judgmental. Common humanity entails recognizing that everyone makes mistakes, sometimes fails, and feels inadequate in some way, while isolation refers to feeling disconnected during difficult times. Finally, mindfulness involves being aware of the present moment in a balanced way, while over-identification refers to becoming obsessive or excessively fixated on negative thoughts and emotions (Neff, 2011).

Self-compassion could serve as an important protective factor in maintaining mental health and promoting mental well-being, given that it has been found to be negatively associated with symptoms of mental health problems such as depression, anxiety, and stress (e.g., MacBeth & Gumley, 2012; Marsh et al., 2017; Neff & McGehee, 2010). Moreover, several studies have identified positive associations between self-compassion and successful psychological adjustment in both adults (MacBeth & Gumley, 2012; Neff & McGehee, 2010) and adolescents (Neff & McGehee, 2010; Zessin et al., 2015).

The studies on gender differences in self-compassion are not entirely consistent. Some studies have identified gender differences, with women reporting lower levels of self-compassion than men (e.g., Neff, 2003b; Neff & McGehee, 2010), while other studies have found no significant gender differences (e.g., Neff, Kirkpatrick et al., 2007; Neff, Rude et al., 2007; Neff et al., 2008). A meta-analysis by Yarnell and colleagues (2015), based on the results of 88 previously conducted studies, identified gender differences in self-compassion, with men on average reporting higher levels of self-compassion. However, it is important to note that the effects of these gender differences were weak.

These gender differences have also been confirmed in adolescent samples. A study conducted by Bluth and Blanton (2015) found that older adolescent girls report significantly lower levels of self-compassion compared to boys of the same age, as well as to younger adolescents regardless of gender.

Objectives

The aim of this study was to examine the predictive contribution of gender and self-compassion, as well as their interaction, in explaining the symptoms of psychological distress (including combined symptoms of depression, anxiety, and stress) in adolescents.

Problems

1. To examine whether gender predicts symptoms of psychological distress.
2. To examine whether self-compassion predicts symptoms of psychological distress.
3. To examine whether the interaction between gender and self-compassion predicts symptoms of psychological distress.

Hypotheses

1. Girls will report more symptoms of psychological distress compared to boys.
2. Adolescents with lower levels of self-compassion will report more symptoms of psychological distress compared to adolescents with higher levels of self-compassion.
3. Girls with lower levels of self-compassion will report more symptoms, while boys with higher levels of self-compassion will report fewer symptoms of psychological distress.

Methods

Participants and Procedures

The present study was part of the larger project: "Testing the 5C Framework of Positive Youth Development: Traditional and Digital Mobile Assessment - P.R.O.T.E.C.T.," funded by the Croatian Science Foundation (UIP-2020-02-2852). The sample included participants who were, at the time, first-year students enrolled in secondary public schools in Croatia and living in the cities of Zagreb (47.5%), Varaždin (18.7%), Rijeka (15.9%), Osijek (9.1%), and Split (8.8%), or in their metropolitan areas. A total of 3,438 students (55.41% girls) with a mean age of 15.12 (SD = 0.38) were included.

Regarding the type of school, 43.80% of students were enrolled in four- or five-year vocational schools, 17.07% in three-year vocational schools, and 39.12% in grammar schools. Data were collected during late winter and early spring of 2022, after obtaining approvals from the Ethics Committee of the Faculty of Education and Rehabilitation Sciences, University of Zagreb, the Ministry of Science, Education and Youth, and the National Agency for Education. Additionally, active consent was obtained from the adolescents and written consent from their parents.

Head teachers, school counsellors, or research assistants, all following a standard research protocol, administered surveys via the SurveyMonkey platform during school hours. Participation was confidential and voluntary.

Instruments

Our battery included socio-demographic questions and several self-assessment questionnaires.

Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995). The scale consists of 21 items that measure the experience of symptoms of depression, anxiety, and stress. Participants reported how they felt in the past week on a four-point Likert scale (0 = "did not apply to me at all"; 3 = "applied to me very much, or most of the time"). For the purposes of this study, and to operationalize the symptoms of psychological distress, we created a composite variable as the sum of all scale items. Previous studies found Cronbach's alphas between 0.92 and 0.95 (Ruiz et al., 2017), and in this study, it was 0.96.

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Self-Compassion Scale (SCS; Neff 2003b). The scale consists of 26 items to which participants

respond using a 5-point Likert-type scale (1 = "almost never"; 5 = "almost always"). The scale assesses the three main components of self-compassion and their three negative counterparts: Self-kindness vs. Self-judgement, Common Humanity vs. Isolation, and Mindfulness vs. Over-identification. Prior to forming the composite score, all items related to the negative dimensions of self-compassion were recoded, means of the subscales were calculated, and then the average of the six subscales' means was computed to form the indicator of global self-compassion. Cronbach's alpha in Neff's original (2003b) study was 0.92, and in this study, it was 0.93.

Statistical Analysis

To answer the research question, several statistical analyses were conducted. Preliminary confirmatory factor analysis, conducted in Mplus version 8 (Muthén & Muthén, 2012; license number: SABCB0028723), showed a good model fit for the tested one-factor solution (RMSEA = .08, CFI = .92, TLI = .91, SRMR = .04). This model fit was assessed based on common guidelines for acceptable model fit (RMSEA ≤ .08, CFI & TLI ≥ .95, SRMR ≤ .10; Hu & Bentler, 1999; Marsh et al., 2005). Moreover, all items were highly and significantly saturated with one global factor. These results align with previous findings that support the underlying unidimensional structure of the Depression Anxiety and Stress Scales (e.g., Ruiz et al., 2017; Yeung et al., 2019).

Descriptive statistics, including indicators of normality and intercorrelations of the examined variables, are presented. A hierarchical regression analysis was conducted to examine how gender and self-compassion, as well as their interaction, predict symptoms of depression, anxiety, and stress.

Results and Discussion

Descriptive statistics, skewness, and kurtosis of the examined variables are presented in Table 1.

Table 1. Descriptive statistics, skewness, and kurtosis of the variables

Variables	Male		Female		Total					
	M	SD	M	SD	M	SD	min	max	Skew	Kurt
Psychological distress	12.19	11.95	23.16	16.28	18.56	15.67	0	63	.84	-.11
Self-compassion	3.24	.50	2.98	.61	3.09	.58	1	4.94	-.09	.63

The obtained results showed that the average values of symptoms of psychological distress are below the middle of the range. Moreover, when examining the average values separately for boys and girls, the results indicated that girls, on average, report higher levels of symptoms of psychological distress. This was further supported by the results of the t-test ($t = 21.28$, $df = 3211$, $p < .01$). Regarding self-compassion, the average values are slightly above the middle of the range, with girls reporting somewhat lower levels of self-compassion compared to boys (t

= -12.61, df = 3121, p < .01). The results also revealed that all the examined variables have a normal distribution, as their skewness values fall within the +/-3 range, and their kurtosis values are within the +/-10 range (Kline, 1998).

Associations between psychological distress, gender, and self-compassion were tested using Pearson's correlation coefficients.

Table 2. Correlation Matrix of the study variables

	2.	3.
1. Gender	.22**	-.35**
2. Self-compassion	-	-.64**
3. Psychological distress		-

p < .05* p < .01**; females = 0; males = 1

The intercorrelation matrix showed that the correlation between psychological distress and gender is significant, negative, and low, while the correlation between psychological distress and self-compassion is significant, negative, and moderate. The obtained correlation between gender and self-compassion is significant, positive, and low.

Next, a hierarchical regression analysis was performed to examine whether gender and self-compassion, as well as their interaction, predict symptoms of psychological distress. In the first step, gender was introduced as the only predictor. In the second step, self-compassion was added, and in the third and final step, the interaction term between gender and self-compassion was included.

Table 3. Results of the hierarchical regression analysis predicting psychological distress by gender and self-compassion

	Psychological distress		
	1 st step β	2 nd step β	3 rd step β
Gender	-.35**	-.23**	-.71**
Self-compassion		-.58**	-.65**
Gender x Self-compassion			.52**
R ²	.13**	.45**	.46**
ΔR ²		.32**	.01**

Legend: β = beta coefficients; R² = R-squared, ΔR² = delta R-squared

p < .05* p < .01**

We tested a hierarchical regression model with psychological distress as the criterion variable on a sample of Croatian youth at the beginning of their high school education. The results obtained are summarized in Table 3. In the first step, gender was identified as a negative predictor of psychological distress, indicating that girls reported more mental health problems. The second step revealed that self-compassion was also a negative predictor of mental health problems, operationalized through the overall score on the scale. Therefore, adolescents who reported lower levels of self-compassion also reported more symptoms of mental health problems. The result of the third step, which included the interaction term between gender and self-compassion, revealed that girls with lower levels of self-compassion reported higher levels of mental health problems, while boys with higher levels of self-compassion reported lower levels of mental health problems. All predictors together explained 46% of the variance in symptoms of psychological distress.

We have confirmed our hypotheses; the main effects of gender and self-compassion, as well as their interaction, were found to be significant in the tested hierarchical regression model. In line with previous research, our study also found a gender gap in mental health problems (Campbell et al., 2021; Torsheim et al., 2006; Van Droogenbroeck et al., 2018; West & Sweeting, 2003; Yoon et al., 2022), with female adolescents reporting more symptoms of depression, anxiety, and stress, as well as more overall psychological distress than their male counterparts.

The underlying mechanism of the gender gap in mental health issues among adolescents is not entirely understood, but the disparities observed may be associated with socially defined gender roles that expose adolescents to gender-specific stressors (Van Droogenbroeck et al., 2018), with women being more emotionally sensitive and expressive (Brody, 1985). Biological vulnerabilities, including genetic factors, the modulation effects of sex hormones on dopaminergic, serotonergic, and GABAergic neurotransmitter systems, and greater activity of the hypothalamic-pituitary-adrenal axis in women, might also explain gender differences in mental health problems (Kuehner, 2016).

Furthermore, the obtained results show that as levels of self-compassion increase, levels of total psychological distress decrease. This suggests the protective role of self-compassion in maintaining the mental health of adolescents. These findings were also supported by previous studies, which identified a negative association between self-compassion and symptoms of depression, anxiety, and stress in both adults (MacBeth & Gumley, 2012) and adolescents and younger adults up to the age of 24 years (Marsh et al., 2017; Neff & McGehee, 2010). Moreover, self-compassion was recognized as an indicator of good psychological adjustment (MacBeth & Gumley, 2012; Neff & McGehee, 2010; Zessin et al., 2015) that could potentially weaken the effects of negative experiences through the mechanism of cognitive reframing, shifting the balance between positive and negative experiences in favor of positive ones (Zessin et al., 2015).

The obtained interaction effect between gender and self-compassion revealed that girls with lower levels of self-compassion reported more symptoms, while boys with higher levels of self-compassion reported fewer symptoms of observed mental health problems. Therefore, girls may be especially vulnerable to developing mental health problems, particularly if they have low levels of self-compassion.

The results obtained suggest that the construct of self-compassion represents a protective factor in the prevention of internalized problems. Implementing interventions focused on increasing levels of self-compassion could lead to improvements in the mental health of adolescents. Several existing interventions focus on developing and strengthening self-compassion, such as "Friends with Yourself: A Mindful Self-Compassion Program for Teens" (Bluth et al., 2016) and "Cognitive-Based Compassion Training" (Reddy et al., 2013). Moreover, the observed interaction effect and previous findings regarding the positive effects of self-compassion on mental health suggest that adolescent girls could benefit most from such interventions. These findings, therefore, present important implications for developing public policies aimed at promoting mental health. A potential first step could be implementing self-compassion interventions into Croatian high school curriculums.

The limitations of this study should also be emphasized. This paper presents the results from the first wave of a longitudinal study. To provide more valid conclusions and gain insights into the changes in the relationship between gender and self-compassion, as well as the maturation effect on the dynamics of the relationship, a longitudinal design should be applied. Additionally, the self-report method was used in this study, and the obtained findings should be reinforced by employing additional methods.

Conclusions

The hypotheses of this study were confirmed. Gender, self-compassion, and their interaction predict symptoms of psychological distress. Girls and adolescents who reported lower levels of self-compassion also reported more symptoms of psychological distress compared to boys and adolescents who reported higher levels of self-compassion. The findings of this study highlight the need for the implementation and evaluation of interventions focused on developing and strengthening self-compassion in the Croatian context, with particular emphasis on the different needs of boys and girls, given the observed gender differences in both mental health problems and self-compassion.

Acknowledgments

The authors of this paper would like to express their gratitude to the participants for their willingness to participate in the study. They would also like to thank the other project members who contributed to data collection and the design of the study.

Study Funding: This paper is part of the project “Testing the 5C Framework of Positive Youth Development: Traditional and Digital Mobile Assessment - P.R.O.T.E.C.T.” funded by the Croatian Science Foundation (UIP-2020-02-2852).

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Experiences of violence against autistic people, including gender-based violence, and access to victim reporting and support services

SUMMARY

Recent research has shown that autistic people are at a greater risk of an array of violence compared to those who are not autistic. In particular, autistic women and girls are exposed to a much higher level of violence than those who are not autistic. For example, Cazalis et al. (2022) reported that nine out of ten autistic women have survived sexual violence, while Gibbs et al. (2022) found that more than 75% reported multiple types of violence occurring in repeated instances. Furthermore, autistic children are up to three times as likely as non-autistic children to be targets of bullying, physical or sexual abuse, with high prevalence of maltreatment and adversity, including risk for suicidality (Hoover and Kaufman, 2018). This study was developed as part of the European Council of Autistic People's (EUCAP) "Violence against autistic women and girls in Europe" project, funded by the European Women's Lobby, to gain further data on the experiences of violence of autistic people and their difficulties and experiences concerning accessing services to report violence and/or support services for victims of violence, especially gender-based violence. The survey was constructed in English and subsequently translated into Portuguese, Croatian, French, Spanish, and Greek, and distributed virtually in all languages. We included individuals over 18 years of age who were diagnosed with or self-identify as autistic.

Keywords: *autism, violence, GBV, ableism, self-advocacy*

Introduction

Current research indicates that autistic¹ individuals face a significantly higher risk of various forms of violence compared to the non-autistic population (Trundle et al., 2022; Paul et al., 2018; Hoover & Kaufman, 2018; Sreckovic et al., 2014). Additionally, autistic individuals often encounter unique challenges when reporting violence and seeking support (Cazalis et al., 2022; Gibbs et al., 2021).

¹ This paper, authored by autistic and otherwise neurodivergent individuals, uses identity-first language (i.e., "autistic person(s)") as it is the form preferred by the majority of the autistic community and self-advocates. However, we acknowledge that some individuals within the community may prefer person-first language (i.e., "person(s) with ASD") when referring to themselves.

Regarding experiences of victimization, Weiss and Fardella (2018) found that autistic individuals were 27.1 times more likely to report teasing from peers and 3.7 times more likely to report experiencing bullying from peers during childhood compared to non-autistic individuals. Similarly, Rothman et al. (2021) reported that autistic college students were more likely to report physical victimization (8.4% vs. 5.7%) and were twice as likely to report past-year emotional victimization (44% vs. 26%). Furthermore, autistic participants were four times more likely to report experiencing a form of child maltreatment, including physical abuse or psychological and emotional abuse by adults.

Liu et al. (2022) found that among 219 autistic adolescents without intellectual disabilities, 20.54% reported being victims of multiple types of harassment, including school bullying, cyberbullying, and teacher harassment. Greenlee et al. (2022) reported that among 105 autistic adolescents (50 girls and 55 boys), 88.0% of girls and 70.9% of boys experienced at least one instance of bullying.

Gibbs et al. (2022) found that a significantly higher proportion of autistic adults reported experiencing all examined forms of violence compared to non-autistic adults. Specifically, 75.4% of autistic adults reported sexual harassment compared to 56.4% of the non-autistic group. Similarly, 58.5% of autistic adults reported stalking and harassment compared to 27.3% of non-autistic adults. Additionally, 56.8% of autistic adults reported experiencing sexual violence and 58.5% reported physical violence, compared to 28.2% and 36.4%, respectively, among non-autistic adults. Moreover, 76.3% of autistic adults reported experiencing multiple types of violence compared to 46.4% of the non-autistic group. Autistic adults were also significantly more likely to experience repeated instances of at least one form of violence (76.3%) compared to non-autistic adults (54.5%).

The overlap between autism and gender must also be considered. Autistic women are not only at a high risk of gender-based violence but are also chronically underdiagnosed or misdiagnosed, making research on their experiences, including victimization, a relatively recent development. Existing studies highlight differences in the prevalence of victimization among autistic women compared to both autistic and neurotypical men, as well as neurotypical women.

Shepler (2018) found significant gender differences between autistic and non-autistic adults regarding the total number of potentially traumatic events and the number of negative social events. Women reported higher exposure compared to men, with a significant difference observed between autistic and non-autistic women, but no significant difference between the two male groups for traumatic events. A marginally significant difference was noted for negative social events.

264 Reuben et al. (2021) reported that autistic cisgender women and gender minorities experienced a significantly higher number of interpersonal traumas (IPT), such as physical and sexual

violence, and were significantly more likely than cisgender men to experience sexual IPT and meet the criteria for PTSD.

According to Gibbs et al. (2021), a significantly higher proportion of autistic women reported instances of sexual violence compared to non-autistic women, with 61% of autistic women reporting sexual violence compared to 34.5% of non-autistic women. In a subsequent study, Gibbs et al. (2022) found that 46.5% of autistic women reported experiencing sexual violence compared to 17.5% of autistic men. Autistic women were also more likely to report being victims of physical violence (42.9% vs. 28.6%).

Cazalis et al. (2022) found that nearly 9 out of 10 autistic women were sexually victimized, with 88.4% of participants reporting experiences of some form of sexual violence. Furthermore, 56% experienced multiple instances of violence from different perpetrators, and 68% were 18 years old or younger when the first instance occurred. Among the victims, 84.9% experienced revictimization, with young age identified as a significant factor in increased risk of revictimization later in life.

Regarding reporting, its outcomes, and the experiences of autistic individuals during this process, Gibbs et al. (2021) found that, in cases of physical and sexual violence, only 25.5% of the incidents identified ($n = 75$) were initially perceived as crimes. Of those, 41 incidents were reported to the police. However, only 5 of the 41 reported cases resulted in a conviction.

For the 34 incidents that were not reported to the police, the most common reasons included a belief that the police could not provide assistance, a lack of trust in law enforcement, fear of the legal process, concerns about not being believed, fear of retaliation from the perpetrator, feelings of shame and embarrassment, and communication challenges.

According to Cazalis et al. (2022), only 34.6% of autistic victims reported their experiences of sexual assault. Among those who did report, 75.4% found that reporting had no effect, as no medico-legal action was taken. Additionally, 18 out of the 52 participants were not believed by the authorities. Of the few participants whose testimonies led to action ($n = 17$), only 13 received care, and only 12 proceeded to file a formal complaint.

The challenges autistic individuals face when reporting violence are not limited to the outcomes—or lack thereof—but also extend to their experiences during the reporting process. Crane et al. (2016) highlighted discrepancies between the experiences of police officers, autistic adults, and parents of autistic individuals. While 42% of police participants expressed satisfaction with their interactions with the autistic community and 47% reported being "fairly knowledgeable" about autism, only 21% reported dissatisfaction. In contrast, most parents (74%) and autistic adults (69%) expressed dissatisfaction, citing discrimination, a lack of clarity and explanation, and unmet needs.

Moreover, many autistic participants reported that inappropriate physical environments, combined with inadequate support and explanations, contributed to emotional stress and communication breakdowns during their interactions with authorities.

Objective

A combined quantitative and qualitative approach was employed through an online survey to examine the prevalence of 12 types of violence experienced by autistic participants, with a particular focus on gender perspectives and gender-based violence, such as sexual and domestic violence. The survey also explored the experiences of autistic individuals during the reporting process and their interactions with victim support services.

Research problems and hypotheses

The prevalence of various types of violence and the differences between victimized and non-victimized groups were analyzed based on type of violence, age at diagnosis, gender, presence of other disabilities or chronic illnesses, membership in other minority groups (e.g., BIPOC, refugee/migrant, LGBTQIA+), and experiences of institutionalization.

H1: Autistic individuals will have experienced a higher prevalence of violence compared to available data for non-autistic individuals.

H2: Age at diagnosis, gender, presence of other disabilities or chronic illnesses, belonging to other minority groups, and experiences of institutionalization will result in statistically significant differences between victimized and non-victimized groups.

Methods

An anonymous cross-sectional community survey was conducted in January and February 2023, involving 259 respondents (65.25% women, 15.44% men, and 19.31% non-binary and other genders) aged 18 and older without intellectual disabilities. Participants were from 19 European countries (Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Netherlands, Portugal, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom) and 9 non-European countries (Chile, Costa Rica, Mexico, Uruguay, Venezuela, Brazil, Australia, Canada, and Ecuador).

The survey was translated into and published in six languages: English, Portuguese, Croatian, Greek, Spanish, and French. A pilot test was conducted to evaluate the survey, which was reviewed by experts and consultants to ensure ethical standards. The finalized survey was distributed online.

266 Participants could save and close the survey at any time and resume later via an email link; however, email addresses were not recorded. They could also exit the survey at any point, and

unless submitted, their responses were not processed. To support participants, a list of help-lines for survivors of abuse in each country was provided at the beginning and end of the survey. Additionally, a disclaimer about potentially sensitive topics was included at the start.

To enhance transparency, a full copy of the survey in PDF format was made available in the introduction, allowing participants to review the questions before beginning and decide if they felt comfortable participating. Before submitting their responses, participants were shown a summary of their answers for review and confirmation.

The survey combined quantitative and qualitative questions. The quantitative section focused on the types of violence participants had experienced, including harassment, hate crimes, psychological/emotional abuse, verbal abuse, physical violence, financial abuse, sexual violence, bullying or mate crime, neglect, and trafficking. For each type of violence, participants provided details about their relationship with the perpetrator, the perpetrator's gender, the context in which the violence occurred, and the age at which the victimization took place.

Participants were asked to further specify the types of violence they experienced within certain categories. For sexual violence, the options included sexual harassment, sexual abuse, online sexual violence, attempted rape, rape, female genital mutilation, and incest. For violence in medical settings, participants could specify instances of overmedication, psychiatric confinement, harmful treatments for autism, institutionalization, forced sterilization or abortion, and denial of care, diagnosis, or necessary adaptations.

The survey also investigated whether instances of violence were reported. For unreported cases, participants explained their reasons for not reporting. For reported cases, they indicated to whom the violence was reported, rated their experience during the reporting process, described any difficulties or barriers they faced, and noted the consequences of reporting.

Additionally, the survey examined whether participants had tried to access support services for victims of violence, specifying the type of support sought, the difficulties encountered, and the impact of these experiences on their mental health.

Statistical analysis was conducted using chi-square tests for comparisons of categorical variables. Fisher's exact tests were applied in cases where frequency values were below five.

In the qualitative section, the survey aimed to provide participants with an opportunity to share personal experiences. Open-ended questions invited participants to describe other types of violence not covered by the predefined options, share any additional difficulties or negative experiences they encountered during the reporting process or while accessing services, and highlight good practices or positive experiences. Additionally, participants could discuss topics not directly addressed in the survey but which they considered important to include.

Results

Of the 259 participants, 216 (83.4%) were officially diagnosed with autism, 37 (14.29%) were self-diagnosed, and 6 (2.32%) were questioning whether they might be autistic. The latter group was included in the self-diagnosed category.

In terms of gender identity, 169 participants identified as women (65.25%), 40 as men (15.44%), and 50 as non-binary (NB) (19.31%). Among these, 5 women (2.96%), 4 men (10%), and 45 non-binary participants (90%) identified as gender non-conforming or transgender.

Regarding additional minority identities, participants who selected "Others" included religious minorities, individuals experiencing poverty, those who were institutionalized, and neurodivergent individuals.

Table 1. Participant Demographic Data (N = 259)

Variable	Category	Women		Male		Non-binary		Total	
		N	%	N	%	N	%	N	%
N (%)		169	65.25	40	15.44	50	19.31	259	100
N of gender non-conforming or transgender (%)		5	2.96	4	10	45	90	54	20.85
Age, years	Under 25 years old	24	14.2	6	15	23	46	53	20.5
	25 - 39 years old	85	50.3	23	57.5	22	14.2	130	50.2
	40 - 60 years old	55	32.54	0	0	5	10	60	23.2
	Over 60 years old	5	2.96	11	27.5	0	0	16	6.2
X(6) = 30.38, p < .0001									

Age of diagnosis, years	Before 5 years old	2	1.18	4	10	0	0	6	2.3
	6 - 10 years old	2	1.18	4	10	0	0	5	1.9
	11 - 14 years old	2	1.18	3	7.5	3	6	14	5.4
	15 - 18 years old	6	3.55	5	12.5	9	18	21	8.1
	19 - 25 years old	7	4.14	5	12.5	21	42	57	22
	26 - 39 years old	31	18.34	5	12.5	16	32	104	40.2
	40 - 60 years old	76	44.97	12	30	1	32	51	19.7
	Over 60 years old	1	0.59	0	0	0	0	1	0.4
X(14) = 62.2345, p < .0001									
Diagnosis status	Officially diagnosed	147	86.98	34	85	35	70	216	83.4
	Self-diagnosed or waiting assessment	19	11.24	4	10	14	28	37	14.29
	I'm not sure but questioning	3	1.78	2	5	1	2	6	2.32
X(2) = 8.12, p = 0.0172									
Disability or chronic illness status	Without any other disability or chronic illness	34	20.12	13	32.5	7	14	54	20.8
	With other disabilities or chronic illness	114	67.46	20	50	33	66	167	64.5
	Did not answer	21	12.43	7	17.5	10	20	38	14.7
X(2) = 3.739, p = 0.154									

Do you identify with any other marginalized group?	Does not apply	87	51.48	20	50	2	4	109	42.1	
	Black and people of color	3	1.78	2	5	3	6	8	3.1	
	Romani	0		0	0			0	0	
	Other ethnic / cultural minorities	10	5.92	1	2.5	4	8	15	5.8	
	Gender non-conforming (non-binary or transgender)	5	2.96	4	10	45	90	54	20.8	
	LGBTQIA+	53	31.36	12	30	45	90	110	42.5	
	X(2) = 57.31, p < .0001									
	Indigenous	3	1.78	0	0			3	1.2	
	Refugee or asylum seeker	1	0.59	0	0			1	0.4	
	Migrant	13	7.69	3	7.5	6	12	22	8.5	
	Other	15	8.88	9	22.5	3	6	27	10.4	

Table 2 shows the prevalence of the 12 types of violence examined. Categories marked with an asterisk indicate significant differences between genders.

Table 2. Prevalence of the Examined Types of Violence

Types of violence	Women		Men		Non-binary		Total		
	N	%	N	%	N	%	N	%	
Harassment	161	95.27	36	90.0	46	92.00	243	93.82	
Hate crime	86	50.89	20	50.0	25	50.00	131	50.58	
X(2) = 0.0185, p = 0.9908									
Psychological / emotional	156	92.31	36	90.0	45	90.00	237	91.51	
Verbal	162	95.86	38	95.0	47	94.00	247	95.37	
Physical	126	74.56	30	75.0	32	64.00	188	72.59	

X(2) = 2.299, p = 0.317								
Financial	65	38.46	17	42.5	19	38.00	101	39.00
X(2) = 0.248, p = 0.884								
Sexual*	136	80.47	14	35.0	39	78.00	189	72.97
X(2) = 34.71, p < .0001								
Bullying or mate crime	153	90.53	34	85.0	47	94.00	25	90.35
Neglect	60	35.50	13	32.5	19	38.00	167	35.52
X(2) = 0.294, p = 0.864								
Trafficking	6	3.55	0	0.0	3	6.00	250	3.47
Medical violence	113	66.86	22	55	32	64	167	64.48
X(2) = 1.994, p = 0.369								
Domestic violence by a partner	93	55	15	37.5	25	50	133	51.35
X(2) = 4.024, p = 0.1337								
Domestic violence by a family member	129	76.33	25	62.5	37	74	191	73.75
X(2) = 3.198, p = 0.202								

A total of 93.8% of participants reported experiencing harassment at some point in their lives. Among them, 74% of women, 70% of NB participants, and 62.5% of men reported multiple instances. The most common perpetrators were friends and colleagues, with school and the workplace being the most frequent contexts for the harassment. The most common age of victimization was adolescence for men and women, while it was preadolescence for NB participants.

A total of 50.6% of participants reported being victims of a hate crime at some point in their lives, with 18.4% of women, 24% of NB participants, and 20% of men experiencing multiple instances. The most common perpetrators were strangers for women, while for men and NB participants, they were friends and colleagues. Hate crimes most frequently occurred in adulthood and took place in schools or workplaces across all three gender groups. Being BIPOC, a refugee, or a migrant was significantly associated with experiencing hate crimes ($\chi^2(1) = 9.5, p = 0.002$), as was having been institutionalized at some point ($\chi^2(1) = 13.7, p = 0.0002$) or having other disabilities or chronic illnesses ($\chi^2(1) = 13.45, p = 0.0002$).

A total of 91.5% of participants reported experiencing psychological and/or emotional violence at some point in their lives. Among them, 68% of women, 64% of NB participants, and 60% of men reported multiple instances. The most common perpetrators for women were parents,

while for men and NB participants, they were friends and colleagues. Psychological and/or emotional violence most often occurred at home for women and in school or the workplace for men and NB participants. For all three groups, the most common age of victimization was adolescence, followed by preadolescence for men and NB individuals and adulthood for women.

A total of 95.4% of participants reported experiencing verbal abuse, with 76.3% of women, 64% of NB participants, and 67.5% of men reporting multiple instances. The most common perpetrators for women were parents, while for men and NB participants, they were friends and colleagues. The most frequent context for verbal abuse was school or the workplace for men and NB participants, while for women it was at home. The most common age of victimization was adolescence for women and preadolescence for men and NB participants. Having other disabilities or chronic illnesses was significantly associated with experiencing verbal abuse ($p = 0.0040$).

A total of 72.6% of participants reported experiencing physical violence at some point in their lives. Among them, 52.1% of women, 42% of NB participants, and 57.5% of men experienced multiple instances. The most common perpetrators were parents, and the most frequent age of victimization was preadolescence. Having other disabilities or chronic illnesses was significantly associated with experiencing physical violence ($\chi^2(1) = 9.67, p = 0.0019$).

A total of 39% of participants reported experiencing financial violence, with 16.6% of women, 14% of NB participants, and 15% of men experiencing it on multiple occasions. The most common perpetrators were parents, followed by a spouse or partner for women and NB participants, and institutional or support workers or personal assistants for men. Financial violence most often occurred at home and primarily during adulthood. Experiencing institutionalization at some point ($\chi^2(1) = 26.58, p < 0.0001$) or having other disabilities or chronic illnesses ($\chi^2(1) = 8.249, p = 0.0041$) was significantly associated with experiencing financial violence.

A total of 73% of participants reported experiencing sexual violence at some point in their lives. Among them, 80% of women and 78% of NB participants reported surviving sexual violence, compared to 35% of men. When adjusted for sample sizes (with the male sample size of 40 taken as the standard), chi-square analyses demonstrated a statistically significant difference between genders ($p < 0.001$), indicating that women and NB participants experienced sexual violence significantly more often than men, consistent with existing literature.

Multiple instances of sexual violence were reported by 56.8% of women, 48% of NB participants, and 25% of men. The most common perpetrators for women (45.59%) and NB participants (48.72%) were spouses or intimate partners, followed by friends or colleagues. For men, strangers were the most common perpetrators (42.86%), followed by spouses or partners. Regarding the gender of the perpetrator, men were responsible in 94.85% of cases involving women, 78.57% of cases involving men, and 97.44% of cases involving NB participants. Chi-square analyses revealed statistically significant differences in the distribution of perpetrator

gender across all three survivor groups ($p < 0.001$ for women, $p = 0.002$ for men, $p < 0.001$ for NB participants).

The most common context for sexual violence was "at home." The most frequent age of victimization for women (63.97%) and men (42.86%) was adulthood, while for NB participants, it was adolescence (ages 14–19) at 58.97%. More than a quarter of participants across all genders experienced sexual violence during childhood. Several factors were associated with experiencing sexual violence, including being diagnosed after the age of 18 ($\chi^2(1) = 17.9$, $p < 0.0001$, OR: 3.96 [2.04, 7.36]), identifying as LGBTQIA+ ($\chi^2(1) = 8.92$, $p = 0.003$, OR: 2.4 [1.34, 4.32]), gender ($\chi^2(1) = 34.71$, $p < 0.0001$), and having other disabilities or chronic illnesses ($\chi^2(1) = 6.95$, $p = 0.0084$).

A total of 90.3% of participants reported experiencing bullying or mate crime. Among them, 74% of women, 80% of NB participants, and 60% of men experienced multiple instances. The most common perpetrators were friends and colleagues, with the incidents primarily occurring in school or the workplace during preadolescence.

A total of 35% of participants reported experiencing neglect, with 23.1% of women and 20% of NB participants reporting multiple instances. The most common perpetrators were parents, with the neglect primarily occurring at home during childhood for women and men and during preadolescence for NB participants. Neglect was significantly associated with having been institutionalized at some point in life ($\chi^2(1) = 11.03$, $p = 0.0009$, OR: 2.75 [1.495, 5.052]) and with having other disabilities or chronic illnesses ($\chi^2(1) = 4.33$, $p = 0.037$).

Only a small portion of the sample reported experiencing trafficking. Four women (2.37%) reported experiencing trafficking once, one (0.59%) reported multiple instances, and one (0.59%) indicated uncertainty but chose to continue answering. Among non-binary participants, two (4%) reported experiencing trafficking once, and one (2%) mentioned uncertainty. No men reported being victims of trafficking.

Being institutionalized at some point in life was associated with experiencing trafficking ($p = 0.023$, two-tailed), with 5 out of the 9 individuals who reported trafficking having been institutionalized at some point. However, only one individual reported that trafficking occurred while institutionalized.

A total of 64.5% of participants reported experiencing medical violence, with 66.9% of women, 64% of NB participants, and 55% of men reporting multiple instances. Among them, 40.83% of women and 54% of NB participants reported experiencing trauma due to interactions with psychiatric or mental health practitioners. Common forms of medical violence:

- **Overmedication:** Reported by 32.5% of women, 30% of men, and 16% of NB participants.
- **Harmful Autism Treatments:** Most common among men (15%).
- **Violence from Disability Support Services:** Reported by 12.5% of men.

Autistic individuals diagnosed before the age of 18 were more than twice as likely to experience harmful treatments (17.4% vs. 6.1% for those diagnosed after 18). This aligns with the higher prevalence of harmful treatments among men, as 58% of men were diagnosed before 18, compared to only 10% of women and 9% of NB participants.

A total of 7.5% of men, 3% of women, and 4% of NB participants reported being institutionalized at some point in their lives. More than one in ten participants experienced restraint or seclusion at some point. Women (7.7%) and NB participants (10%) were more likely to be isolated to prevent them from reporting. Access to medical care was denied to 20.9% of autistic individuals in the sample. Denial of diagnosis was more frequently reported by women (32.5%) and NB participants (46%) compared to men (12.5%). Additionally, 14.7% of participants were denied access to disability aids. Being institutionalized at some point ($\chi^2(1) = 13.41, p = 0.0002$) and having other disabilities or chronic illnesses ($\chi^2(1) = 6.58, p = 0.0103$) were significantly associated with experiencing violence in medical settings.

The prevalence of domestic violence was not examined directly but was inferred based on participants who identified a parent, other family members, or a spouse or intimate partner as perpetrators. Domestic violence by a family member was the most common form, reported by 76.3% of women, 62.5% of men, and 74% of NB participants. Intimate partner violence followed, with 55% of women, 37.5% of men, and 50% of NB participants reporting experiences of abuse from a partner.

Being institutionalized at some point in life was significantly associated with experiencing domestic violence from a family member ($p = 0.0001$, two-tailed). Additionally, having other disabilities or chronic illnesses was also associated with family-related domestic violence ($\chi^2(1) = 6.59, p = 0.0103$). Domestic violence by a partner was linked to receiving a late diagnosis ($\chi^2(1) = 9.8, p = 0.0017, OR: 2.89 [1.46, 5.73]$). Among those diagnosed after the age of 18, 55.9% reported experiencing intimate partner violence, compared to 30.4% of those diagnosed before the age of 18.

Table 3 shows the rates of non-reporting of violence experiences by type and gender (expressed as the percentage of participants who experienced each type of violence).

Table 3. Percentage of Non-reporting by Violence Type and Gender

Type of violence	Female participants (%)	Male participants (%)	NB participants (%)
Harassment	53.4	50	55.6
Hate crime	60.5	60	60
Psychological / emotional violence	54.5	50	57.8

Verbal abuse	54.4	50	48.9
Physical violence	54	46.7	56.3
Financial violence	72.3	52.9	79
Sexual violence	55.2	51.3	64.3
Bullying/mate crime	49	38.2	57.5
Neglect	60	53.9	79

Table 4 shows to whom the violence was most commonly reported and the most frequent difficulties faced by each gender, while Table 5 presents the percentage of reported cases in which no action was taken, categorized by violence type and gender.

Table 4. *Reporting*

Type of violence	Gender		
		Most commonly reported to (in order of frequency)	Most common difficulties when reporting
Harassment	F	a carer, family member or friend; healthcare providers	'They blamed me/considered me responsible for the violence I experienced' (45.33%)
	M	teachers	'Lack of knowledge about Autism and autistic traits' (50%)
	NB		'They blamed me/considered me responsible for the violence I experienced' (47.83%)
Hate crime	F	a carer, family member or a friend; others	'They blamed me/considered me responsible for the violence I experienced' (44.12%)
	M	a carer, family member or a friend; teachers	'They blamed me/considered me responsible for the violence I experienced' (62.5%)
	NB	a carer, family member or a friend; others	'Other' (50%)
Psychological/emotional violence	F	a carer, family member or friend; others	'Lack of knowledge about Autism and autistic traits' (40.85%)
	M	a carer, family member or friend; teachers	'Lack of knowledge about Autism and autistic traits' (61.11%); 'They blamed me/considered me responsible for the violence I experienced' (61.11%)
	NB	a carer, family member or friend; others	'They blamed me/considered me responsible for the violence I experienced' (47.37%)

Verbal abuse	F	a carer, family member or a friend; healthcare professionals	'They blamed me/considered me responsible for the violence I experienced' (32.43%)
	M	a carer, family member or a friend; teachers	'They blamed me/considered me responsible for the violence I experienced' (47.37%)
	NB		'They blamed me/considered me responsible for the violence I experienced' (48.83%)
Physical violence	F	a carer, family member or a friend; healthcare professionals	'They blamed me/considered me responsible for the violence I experienced' (36.21%)
	M	a carer, family member or a friend; teachers	'They blamed me/considered me responsible for the violence I experienced' (50%)
	NB		'They blamed me/considered me responsible for the violence I experienced' (50%)
Financial violence	F	a carer, family member or a friend; healthcare professionals	'They blamed me/considered me responsible for the violence I experienced' (33.3%), 'They didn't think I was credible enough' (33.3%), 'Lack of knowledge about Autism and autistic traits' (33.3%)
	M	a carer, family member or a friend; teachers	'Lack of accessibility for communication' (75%)
	NB		'Lack of knowledge about Autism and autistic traits' (50%)
Sexual violence	F	a carer, family member or a friend; healthcare professionals	'They blamed me/considered me responsible for the violence I experienced' (24.6%)
	M		'They did not believe me' (40%)
	NB		'They did not believe me' (21.1%)
Bullying / mate crime	F	a carer, family member, or a friend; teachers	'They blamed me/considered me responsible for the violence I experienced' (34.6%)
	M		'Lack of accessibility for communication' (57.1%)
	NB		'They blamed me/considered me responsible for the violence I experienced' (45%)
Neglect	F	healthcare professionals	'They blamed me/considered me responsible for the violence I experienced' (41.7%)
	M	carers, family members or friends	various
	NB		

Table 5. Percentages of Reported Cases with No Consequences After Reporting

Type of violence	Cases by female participants (%)	Cases by male participants (%)	Cases by nb participants (%)
Harassment	58.67	55	87.5
Hate crime	67.6	62.5	90
Psychological / emotional violence	53.2	77.8	63.2
Verbal abuse	70.3	78.9	75
Physical violence	62.1	68.8	64.3
Financial violence	66.7	75	50
Sexual violence	44.3	40	23
Bullying/mate crime	65.4	85.7	65
Neglect	50	66.7	50

Discussion

H1 was partially confirmed, as the prevalence of physical, sexual, and emotional violence, harassment, bullying, and neglect in our sample was higher than that reported for non-autistic individuals in available data. Comparisons were made only for the types of violence with existing comparative data between autistic and non-autistic groups, as using general prevalence statistics might result in inaccurate comparisons.

H2 was also partially confirmed. Age of diagnosis, gender, having other disabilities or chronic illnesses, belonging to other minority groups, and experiences of institutionalization created statistically significant differences between victimized and non-victimized groups in relation to hate crime, verbal abuse, physical violence, financial violence, sexual violence, neglect, trafficking, medical violence, and domestic violence.

Some limitations of the study include a limited sample size with an uneven gender ratio, which made statistical analysis more challenging and potentially less valid and reliable. Although examples were provided in the survey, variations in personal interpretations of each type of violence may have influenced the results and should be considered when interpreting findings. Additionally, the broad scope of the survey limited detailed insights into each specific type of violence.

Future improvements could include cross-checking the existing survey with a survey using experiential statements to assess recognition rates of certain types of violence and compare

results between the two methods. The reliance on digital literacy for participation due to on-line distribution may have excluded some individuals. Furthermore, the survey's length and language may have made it inaccessible to certain groups, such as individuals with ADHD or intellectual disabilities. Lastly, the study was limited in its focus on the effects of intersectionality on the experiences examined, which presents an area for further exploration.

Conclusion

In conclusion, violence against autistic individuals—particularly autistic women and non-binary individuals—is alarmingly prevalent, while specialized and informed support for reporting and accessing services remains insufficient. A particularly concerning trend identified is the lack of autism knowledge among authorities and support service providers, coupled with a tendency to disbelieve victims and engage in victim-blaming.

The authors of this research propose the following measures to enhance the safety of autistic individuals and improve support systems in cases of violence: criminalization or regulation of harmful practices; research and data collection grounded in the social model of disability; inclusion of autistic voices in public health and social policies; development of specialized community support services; ensuring accessibility in victim services and training programs; promoting early diagnosis; improving access to justice; and implementing inclusive EU strategies on equality.

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Differences in parental behavior towards children with different types of disabilities

SUMMARY

In addition to the impact of developmental disabilities, parental behaviour can affect how children acquire competencies for future achievements related to independent living. The aim of this study was to investigate the differences in the behaviour of parents towards children with intellectual disability (ID), autism spectrum disorders (ASD), attention deficit hyperactivity disorder (ADHD), learning disabilities (LD), motor disorders (MD), vision impairment (VI), and hearing impairment (HI). The research sample consisted of parents of primary school age children with disabilities (N = 315) who filled out the Parental Behaviour Questionnaire URP-29. The results show statistically significant differences in the behaviour of parents towards children with different types of difficulties in the aspects of autonomy, parental knowledge, and punishment, as well as in the dimensions of parental support and restrictive control. Parental support, which includes aspects of warmth, autonomy, parental knowledge, and inductive reasoning, was significantly higher among parents of children with LD, ADHD, HI, and VI compared to parents of children with ID and ASD. On the other hand, restrictive control, which includes aspects of intrusiveness and punishment, was used less frequently by parents of children with ASD and MD compared to parents of children with ADHD, VI, and HI. Parents of children with LD were less restrictive than parents of children with HI. The behaviour of parents of children with different disabilities will be discussed further and the differences in parental support needs depending on the child's disability will be considered.

Keywords: *children with disabilities, parental behavior, parental support, permissiveness, restrictive control*

Introduction

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Parenting practices are specific behaviors employed by parents to socialize their children and support their development into well-adjusted adults (Calders et al., 2020). These practices are

often categorized into parenting dimensions, which are broad constructs that focus on general tendencies rather than specific behaviors (Power, 2013). Despite the cultural variability of parental behaviors (Keresteš et al., 2012) and their adaptation to child development, parental behavior is typically described within three dimensions: support, psychological control, and behavioral control (Power, 2013; Calders et al., 2020).

The support dimension encompasses warmth, parental responsiveness, acceptance, and engagement—behaviors that contribute to a child's well-being. Psychological control, on the other hand, describes intrusive parental behaviors aimed at controlling a child's feelings, thoughts, and emotions through verbal and non-verbal communication, such as eliciting guilt or anxiety (Barber, 1996). Behavioral control refers to parental efforts to regulate a child's behavior to align with social and familial norms (Soenens & Vansteenkiste, 2010). This form of control is implemented across expected behaviors (e.g., rule setting), ongoing behaviors (e.g., activity awareness and monitoring), and past behaviors (e.g., feedback and punishment) (Calders et al., 2020; Smetana & Daddis, 2002).

Baumrind (1967; 2005) proposed a widely referenced categorization of parenting styles, distinguishing among three types: authoritative, authoritarian, and permissive. Authoritative parents combine warmth and responsiveness with high expectations for their child's achievement and maturity. In contrast, authoritarian parents exhibit a lack of warmth and responsiveness while maintaining similarly high expectations for achievement and maturity. Permissive parents, however, set minimal rules and limits, often yielding to the child's demands.

Most research on parenting assumes that parenting style influences children's adjustment; however, it is also suggested that children's adjustment may influence parenting practices, indicating a bidirectional relationship (Aunola & Nurmi, 2005). This bidirectional dynamic is particularly significant when examining parenting styles among parents of children with disabilities. These parents face unique challenges due to the child's maladaptive behaviors, which may shape their choice of parenting style. Consequently, the selected parenting style is often influenced by both the child's characteristics and the contextual factors surrounding their development.

Research on parenting children with disabilities has revealed that the lack of reciprocal relationships and communication challenges—common in parenting children with autism spectrum disorder (ASD) and intellectual disability (ID)—can diminish parental warmth and encourage more protective and controlling behaviors (Rutgers et al., 2007; Woolfson & Grant, 2006). Parenting children with intellectual disabilities poses particular challenges for employing authoritative techniques, as these children often struggle to understand and remember behavioral expectations and explanations (Woolfson & Grant, 2006).

Hutchison et al. (2016) found that a permissive parenting style was more frequently employed

by parents of children with ADHD or ASD compared to parents of typically developing children. Similarly, permissive parenting was observed more often in families of children with hearing loss or hearing impairment (HI) than in families with typically hearing children, whereas authoritative and authoritarian parenting behaviors were comparable between the two groups (Chang et al., 2022). According to Chang et al. (2022), some parents may adopt an overly permissive approach as a way of compensating for the frustrations and challenges their children face. Interestingly, the study noted that while permissive parenting was associated with more negative outcomes for typically hearing children, this association was not observed for children with HI.

A meta-analysis conducted by Dyches et al. (2012) on parenting styles and developmental outcomes in children with developmental disabilities revealed that authoritative and positive parenting styles had an overall beneficial effect. These styles were associated with lower levels of maladaptive social skills and reduced externalizing behaviors in children.

Research indicates that parental stress significantly influences parenting style. Stressed mothers are more likely to focus on the negative aspects of their children's behavior and form negative attributions, which reduces their tolerance for misbehavior and increases the likelihood of suboptimal parenting (McPherson et al., 2009). Studies on both typically developing children and those with ADHD or ASD have shown that parental stress is positively correlated with permissive and authoritarian parenting styles, as stressed parents tend to be more irritable and engage in harsher parenting (Hutchison et al., 2016).

Phillips et al. (2017) reported that for parents of children with Down syndrome and typically developing children, higher parental stress levels were associated with increased use of permissive parenting and decreased use of authoritarian parenting. Similarly, Chang et al. (2022) found that stressed parents are more inclined to adopt authoritarian and permissive parenting styles, while being less likely to utilize authoritative approaches, regardless of their children's hearing status.

These findings suggest that negative parenting styles are linked to problematic behaviors in children (Hutchison et al., 2016; Gau et al., 2008). It is hypothesized that highly stressed parents may resort to controlling or permissive strategies to manage their children's behavior, while less stressed parents are more patient and more likely to provide clear explanations for rules and expectations (Chang et al., 2022).

In their examination of risk factors for coercive parenting practices in children with intellectual and developmental disabilities, Day et al. (2021) identified the parent-child relationship as a critical factor. Other significant factors included the intensity of the child's behavioral problems, parental adjustment, and parent confidence. Coercive parenting practices were found to be more prevalent among parents who were younger at the time of their child's birth, as well as among co-parenting and working parents—both of which are associated with elevated lev-

els of parenting stress (Day et al., 2021).

This Study

Parental behavior plays a crucial role in child development, prompting previous research to explore the impact of parenting practices and styles on the development of children with disabilities, as well as the factors influencing these practices and styles. Although an increasing number of studies have examined these issues by considering children with different disabilities as a single group, research specifically focusing on differences in parenting practices among children with various types of disabilities remains limited.

Aim

This study aims to address this research gap by examining differences in parental behavior towards children with various types of disabilities in Croatia. Specifically, it seeks to investigate parental behavior towards children with intellectual disability (ID), autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), learning disabilities (LD), motor disorders (MD), visual impairment (VI), and hearing loss/hearing impairment (HI). The hypothesis posits that differences will be observed in parental support, restrictive control, and permissiveness across these groups, reflecting the distinct characteristics associated with each type of disability.

Parental behavior is assessed across three global dimensions: parental support, restrictive control, and permissiveness. Parental support includes warmth (expressing love, acceptance, and closeness), granting autonomy (respecting the child's decisions and psychological independence), inductive reasoning (disciplining through explanations and clear arguments), and parental knowledge (monitoring and being aware of the child's activities). Restrictive control comprises intrusiveness (attempts to control the child's feelings, criticize, and induce guilt) and punishment (harsh disciplinary methods, such as shouting and corporal punishment). Permissiveness refers to yielding to the child's wishes and demands.

The study's findings will offer valuable insights into developing support programs tailored to the needs of parents of children with different disabilities. These programs will aim to help parents cultivate warm, positive, and nurturing relationships with their children, addressing the specific challenges associated with each type of disability.

Methods

Participants

This study included parents of primary school-aged children with various disabilities (N=315). The inclusion criteria required participants to be parents or caregivers of children with diag-

nosed disabilities aged 7–14 years, residing in the Republic of Croatia. According to parental reports, the children's primary disabilities were distributed as follows: intellectual disability (ID) (N=32), autism spectrum disorder (ASD) (N=69), attention deficit hyperactivity disorder (ADHD) (N=45), learning disabilities (LD) (N=105), motor disorders (MD) (N=25), visual impairment (VI) (N=14), and hearing impairment (HI) (N=25).

The majority of participants were female (91%) with an average age of 41.9 years. Educational backgrounds varied, with 55.9% of participants holding a high school diploma, 37.2% having an undergraduate or graduate university degree, and 7.1% reporting either an elementary school diploma or some high school experience. Most families (75%) reported an average household income, and the same percentage indicated living with their partner in a household with children. Regarding educational settings, 72.4% of participants stated that their children with disabilities attended mainstream schools with individual education plans, while the remaining parents reported their children attending special schools.

Instrumentation

Parental behavior towards children was assessed using the Parental Behavior Questionnaire – PBQ29 (*Upitnik roditeljskog ponašanja – URP-29*, Keresteš et al., 2012). The PBQ29 is a reliable and valid instrument comprising 29 items that measure various aspects of parental behavior across three dimensions, each with subscales:

- **Parental Support** consists of four subscales: parental warmth (4 items), autonomy (4 items), inductive reasoning (5 items), and parental knowledge of the child's activities (4 items).
- **Parental Restrictive Control** includes two subscales: parental intrusiveness (4 items) and use of punishment (5 items).
- **Permissiveness** is measured by a three-item scale.

Each item is rated on a 4-point Likert scale, where the lower number indicates disagreement with the statement and the higher number indicates agreement with the statement (1 – "strongly disagree," 2 – "disagree," 3 – "agree," and 4 – "strongly agree").

Previous studies validating the PBQ29 (Keresteš et al., 2012) demonstrated satisfactory internal consistency across all subscales and dimensions, with Cronbach's alpha values ranging from 0.60 to 0.81. The instrument has also been shown to be sensitive to individual differences. In the current study, Cronbach's alpha ranged from 0.55 to 0.75 for the subscales and from 0.72 to 0.85 for the three dimensions, indicating acceptable to good reliability.

Procedure

An invitation to participate in the online version of the PBQ29 was sent to professionals working

with children with disabilities and to principals of mainstream and special elementary schools across Croatia between September 2021 and April 2022. These professionals and principals distributed the invitation to parents, who independently and anonymously completed the PBQ29 along with a brief demographic questionnaire.

Statistical Analysis of the Data

Statistical analysis was conducted using IBM SPSS Statistics for Windows. The dataset contained no missing values. The Kolmogorov-Smirnov test was employed to assess the normality of the distribution. Descriptive statistics were calculated, including frequency and percentage (measures of count), median (measures of central tendency), and interquartile range (measures of variation).

As the PBQ29 subscales did not exhibit a normal distribution, the non-parametric Kruskal-Wallis test was used to identify significant differences in scores among the various subgroups.

Results

The descriptive results are summarized in Table 1. Overall, statistically significant differences were observed in two dimensions of the PBQ29 among parents of children with different disabilities: parental support ($H(6) = 15.9, p = .014$) and restrictive control ($H(6) = 21.0, p = .002$). However, no significant differences were found among the parent subgroups on the permissiveness subscale ($H(6) = 2.36, p = .884$).

Table 1. Descriptive statistics for PBQ29 dimensions and subscale scores by parental subgroups

		Type of Child's Disability						
		ID (N=32)	ASD (N=69)	MD (N=25)	VI (N=14)	HI (N=25)	ADHD (N=45)	LD (N = 105)
Inductive Reasoning	Mean	12.37	12.42	13.32	13.64	12.84	13.47	13.40
	Median	12.50	13.00	14.00	14.00	13.00	14.00	14.00
	SD	2.21	2.66	1.63	.84	1.72	1.65	1.82
	Mean rank	127.92	140.33	163.98	169.36	138.94	172.93	173.98
	IQR	3	4	2	1	2.5	2	2
	Min	7.00	5.00	10.00	12.00	9.00	7.00	7.00
	Max	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Warmth	Mean	10.94	11.35	11.32	10.93	11.32	11.29	11.01
	Median	11.00	12.00	12.00	12.00	12.00	12.00	12.00
	SD	1.24	1.14	1.22	1.94	1.07	1.25	1.40
	Mean rank	135.50	169.38	167.78	154.32	165.84	168.70	149.09
	IQR	2	1	1	1.25	1	1	2
	Min	8.00	8.00	7.00	5.00	9.00	7.00	5.00
	Max	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Autonomy	Mean	10.81	10.81	11.44	11.50	11.32	11.42	11.42
	Median	11.00	12.00	12.00	12.00	12.00	12.00	12.00
	SD	1.45	1.80	1.16	.85	1.18	1.08	1.24
	Mean rank	127.98	137.38	173.44	169.07	161.96	165.94	171.20
	IQR	2.75	2	0.50	1.25	1	1	1
	Min	7.00	3.00	8.00	10.00	8.00	8.00	6.00
	Max	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Parental Knowledge	Mean	9.75	9.28	10.84	10.36	11.20	10.58	10.49
	Median	10.00	10.00	11.00	11.00	12.00	11.00	11.00
	SD	2.11	2.45	1.31	2.27	1.35	1.51	1.58
	Mean rank	135.23	123.57	180.30	170.29	205.54	168.00	165.01
	IQR	3.75	5	2	3	1	2.50	3
	Min	3.00	3.00	8.00	4.00	6.00	6.00	6.00
	Max	12.00	12.00	12.00	12.00	12.00	12.00	12.00

Parental support	Mean	43.87	43.86	46.92	46.43	46.68	46.76	46.31
	Median	44.00	46.00	48.00	49.00	48.00	48.00	47.00
	SD	5.52	6.63	3.89	5.30	4.47	3.96	4.80
	Mean rank	121.42	132.22	176.44	176.36	174.30	173.53	168.71
	IQR	7	7.50	3	5.75	4	5.50	5
	Min	26.00	22.00	37.00	31.00	33.00	35.00	29.00
	Max	51.00	51.00	51.00	51.00	51.00	51.00	51.00
Intrusiveness	Mean	5.53	4.51	4.56	6.00	5.96	5.47	5.46
	Median	6.00	5.00	5.00	6.50	6.00	6.00	5.00
	SD	2.51	2.73	2.43	3.37	2.86	2.69	2.75
	Mean rank	166.42	134.78	134.20	182.93	179.64	163.58	165.49
	IQR	3	4	3	5.75	4.50	3	4.50
	Min	1.00	.00	.00	.00	1.00	.00	.00
	Max	12.00	10.00	11.00	12.00	12.00	12.00	12.00
Punishment	Mean	5.34	4.23	4.04	6.29	6.96	6.51	4.81
	Median	5.00	4.00	4.00	5.50	7.00	7.00	5.00
	SD	3.11	2.99	2.52	3.83	3.56	3.11	3.05
	Mean rank	164.69	132.18	127.68	181.43	205.18	197.64	148.80
	IQR	4	5	3.50	5.50	5	5	5
	Min	.00	.00	.00	1.00	.00	.00	.00
	Max	15.00	12.00	10.00	14.00	14.00	15.00	13.00
Restrictive control	Mean	10.88	8.74	8.60	12.29	12.92	11.98	10.27
	Median	11.00	8.00	8.00	12.50	12.00	12.00	11.00
	SD	4.61	5.04	4.36	6.13	5.25	5.01	5.05
	Mean rank	166.08	130.21	124.32	186.43	200.44	185.22	156.26
	IQR	5.75	8	6.50	7.50	8.50	5.50	7.50
	Min	4.00	.00	1.00	3.00	2.00	2.00	.00
	Max	27.00	20.00	21.00	25.00	23.00	27.00	25.00
Permissiveness	Mean	4.56	4.38	4.28	4.50	4.88	4.22	4.63
	Median	4.00	5.00	5.00	4.00	5.00	4.00	5.00
	SD	2.12	2.30	2.05	1.91	2.19	2.09	2.21
	Mean rank	156.56	156.70	150.10	159.61	170.58	143.51	164.17
	IQR	3	3	3	2.50	3	2	3
	Min	1.00	.00	.00	.00	.00	.00	.00
	Max	9.00	9.00	9.00	7.00	9.00	9.00	9.00

Legend: IQR – interquartile range

Table 2. *Kruskal-Wallis test results for URP29 subscales and dimensions with Bonferroni corrections*

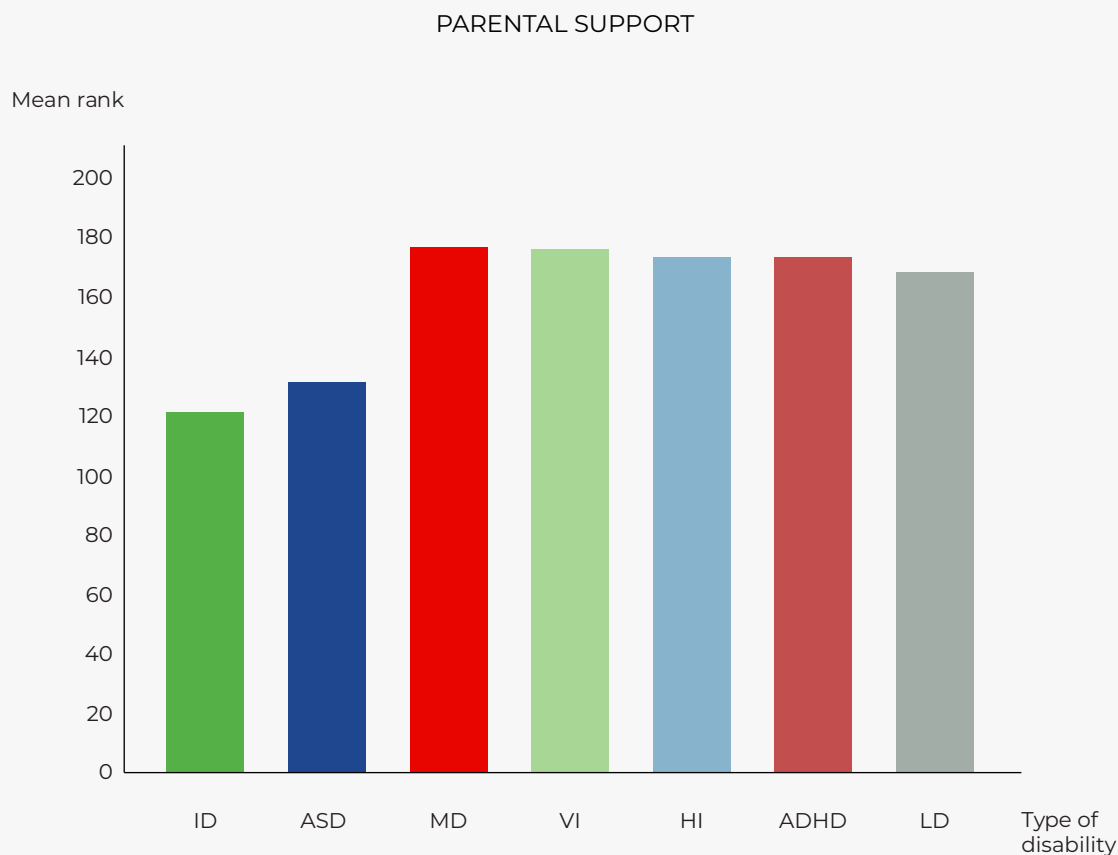
	K-W H-test	Sig.	Significant Differences Between Groups
Parental Support	15.987	0.014*	ID < MD; HI; ADHD; LD ASD < MD; HI; ADHD; LD
Inductive Reasoning	12.495	0.052	/
Warmth	6.577	0.362	/
Autonomy	14.706	0.023*	ID < MD; ADHD; LD ASD < MD; ADHD; LD
Parental Knowledge	22.968	0.001*	ID < HI; ASD < MD; HI; ADHD; LD LD < HI
Restrictive Control	21.022	0.002*	ASD < VI; HI; ADHD MD < VI; HI; ADHD LD < HI
Intrusiveness	9.918	0.128	/
Punishment	25.987	0.001*	ASD < HI; ADHD MD < HI; ADHD LD < HI; ADHD
Permissiveness	2.362	0.884	/

Note: Only groups with significant differences in results are included.

Parental Support

Overall, the parental groups differed significantly on this dimension (Figure 1). Parents of children with ID and ASD had the lowest scores, which were statistically lower compared to parents of children with LD, ADHD, MD, and HI. However, no significant difference was observed between the ID and ASD groups in parental perceptions of the support they provide to their child ($H = 10.8, p = .557$).

Figure 1. URP-29 Parental Support scores of parents of children with various disabilities

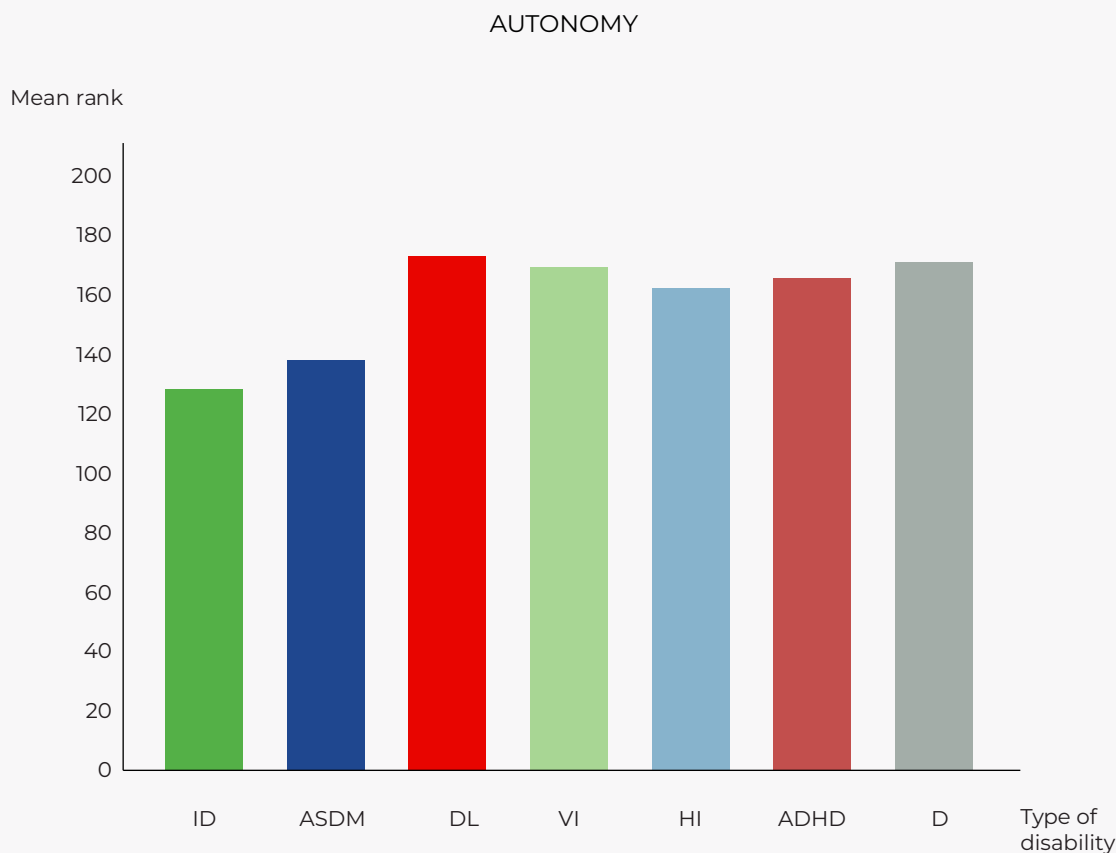


Significant differences between the subgroups were found for the subscales Autonomy ($H = 14.7, p = .023$) and Parental Knowledge ($H = 22.9, p = .001$). However, no significant differences were observed between the subgroups for the subscales Inductive Reasoning and Warmth.

Autonomy

The results indicate that parents of children with ID and ASD grant their children significantly less autonomy compared to parents of children with ADHD, LD, and MD (Figure 2). Although parents of children with VI and HI reported higher mean autonomy scores, these did not differ significantly from the scores of parents of children with ID and ASD. Furthermore, no significant differences in autonomy scores were observed among parents of children with ADHD, LD, MD, VI, and HI.

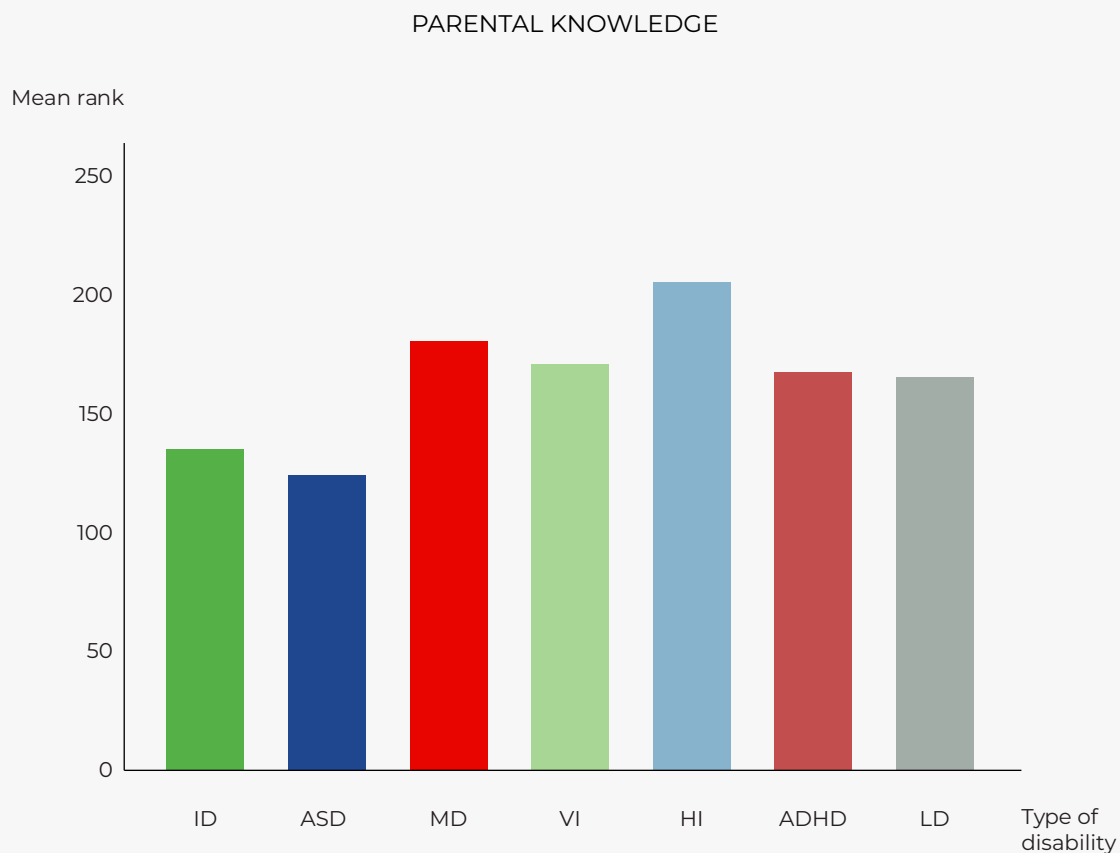
Figure 2. URP-29 Autonomy scores of parents of children with various disabilities



Parental Knowledge / Supervision

Parents of children with ID (mean rank = 135.23) and ASD (mean rank = 123.57) had lower average scores on the Parental Knowledge scale compared to parents in other subgroups (Figure 3). Scores for parents of children with ASD were significantly lower than those of parents of children with LD ($p = .002$), ADHD ($p = .009$), MD ($p = .006$), and HI ($p = .001$). Parents of children with HI achieved the highest scores, which were significantly higher than those of parents of children with ID, ASD, and LD. These findings reflect a higher level of supervision by parents of children with HI, including greater awareness of their child's activities, physical location, school assignments and tests, as well as familiarity with their child's friends.

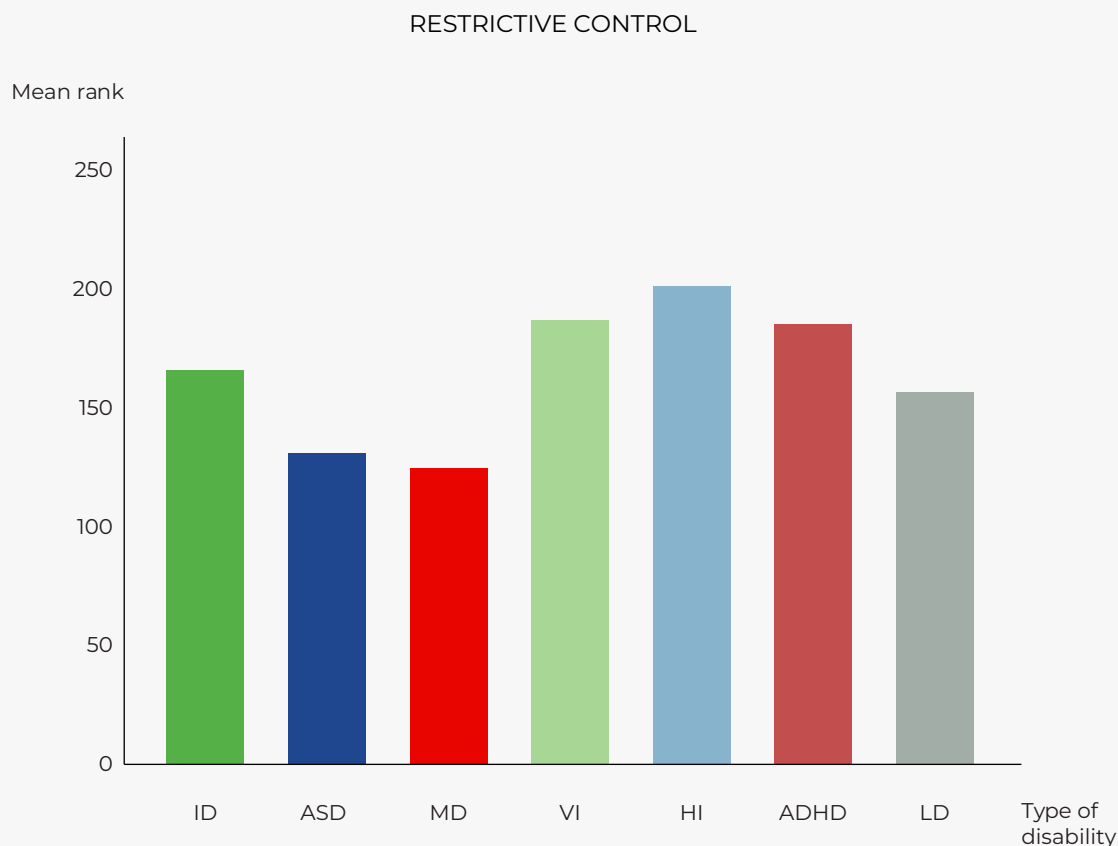
Figure 3. URP-29 Parental Knowledge scores of parents of children with various disabilities



Restrictive Control

Overall, parents of children with ASD and MD demonstrated the lowest levels of undesirable parental behaviors, such as intrusive control and punishment, compared to parents of children with ADHD, VI, and HI (Figure 4). The latter three groups, which did not differ significantly from each other, had the highest scores on the Restrictive Control dimension, with parents of children with HI being the most controlling (mean rank = 200.44).

Figure 4. URP-29 Restrictive Control scores of parents of children with various disabilities

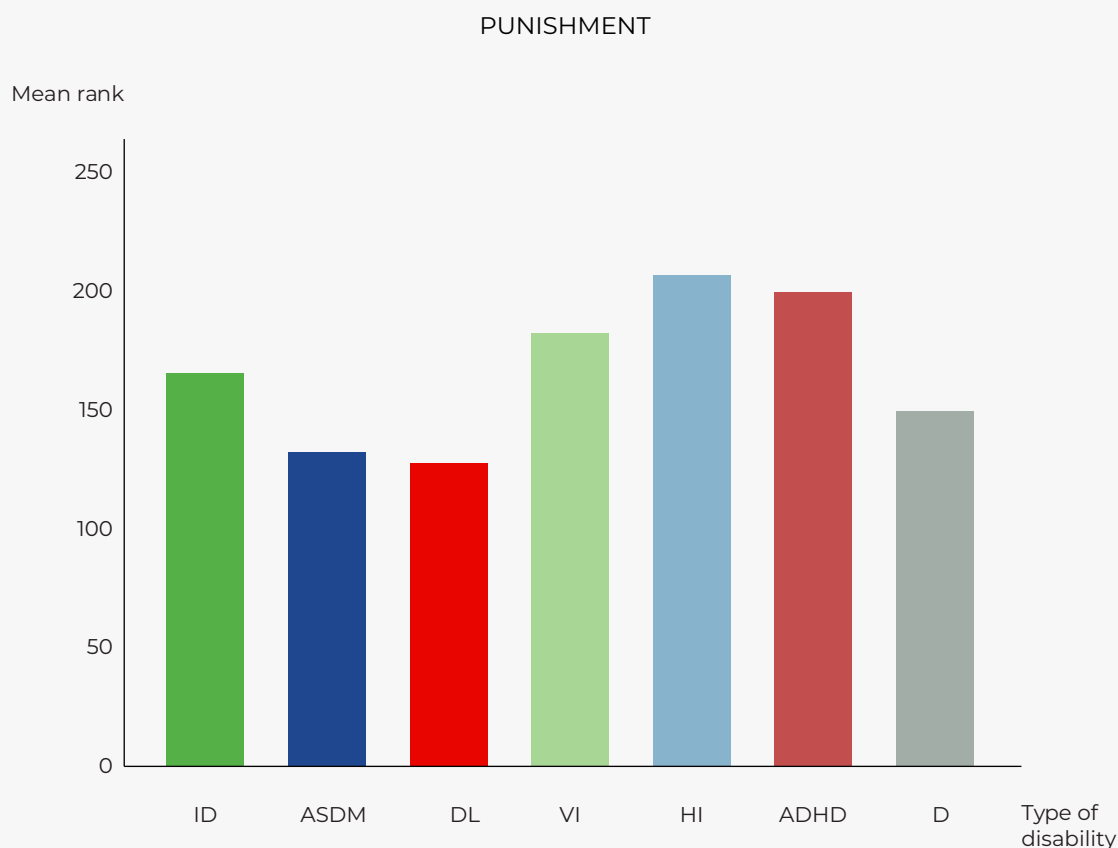


Although the groups did not differ significantly on the Intrusiveness scale ($H(6) = 9.92, p = 0.128$), it is notable that parents of children with ASD and MD had the lowest mean rank scores. In contrast, parents of children with sensory disabilities (vision and hearing impairments) had the highest scores, indicating a greater tendency to be more intrusive and critical toward their children.

Punishment

The results on the Punishment scale followed a similar trend to the previous findings (Figure 5). The groups differed significantly in their parental punishment practices ($H(6) = 25.9, p = 0.001$). Parents of children with ASD and MD had the lowest scores, while parents of children with ADHD, as well as those with visual and hearing impairments, had the highest scores. This indicates a greater tendency among these parents to use punishment methods such as removing privileges, yelling, or physical discipline.

Figure 5. URP-29 Punishment scores of parents of children with various disabilities



Permissiveness

No statistical differences were found between the groups, suggesting that parents demonstrate similar levels of leniency and compliance with their child’s wishes, regardless of the type of disability. The lowest scores, indicating lower levels of permissive parental behavior, were observed among parents of children with ADHD (mean rank = 143.5). In contrast, parents of children with HI had the highest scores (mean rank = 170.6), reflecting a stronger tendency to be lenient and permissive toward their child’s wishes.

Discussion

The current study explores variations in parental behavior towards children with different disabilities, including intellectual disability (ID), autism spectrum disorder (ASD), motor disorders (MD), visual impairment (VI), hearing impairment (HI), attention deficit hyperactivity disorder (ADHD), and specific learning disabilities (LD). These differences are analyzed across three key dimensions: parental support, restrictive control, and permissiveness. The study employs the Parental Behavior Questionnaire (PBQ29) to assess these dimensions and their associated subscales.

Previous research has often grouped parents of children with various disabilities together, comparing them to parents of typically developing children (Gagnon et al., 2020). However, fewer studies have specifically examined parenting behaviors in families of children with distinct disabilities (Dyches et al., 2012; Hutchison et al., 2016; Marston et al., 2022).

In general, research indicates that parents of children with disabilities are less likely to exhibit authoritative parenting behaviors, which typically include warmth, granting autonomy, reasoning-based discipline, and responsiveness to the child's needs. Instead, they are more inclined toward authoritarian or permissive parenting styles.

Authoritarian parenting is characterized by low responsiveness and a heightened need for control, often accompanied by rigid disciplinary practices. In contrast, permissive parenting, while also lacking sensitivity to the child's needs, is marked by poor boundary setting and, in some cases, may verge on neglect (Baumrind, 2005).

The results of the current study reveal that parental behavior varies significantly based on the type of disability their child has. Specifically, the parent groups showed significant differences in two dimensions of the Parental Behavior Questionnaire (PBQ29): parental support and restrictive control.

Parental Support

The results indicate that parents of children with ID and ASD tend to exhibit lower levels of parental support, including subscales such as parental knowledge and autonomy, compared to parents of children with LD, ADHD, MD, and HI. According to the PBQ authors (Keresteš et al., 2012), the global dimension of parental support encompasses expressing love, acceptance, and closeness (as measured by the warmth subscale), respecting the child's choices and individuality (autonomy subscale), and teaching through explanations and clear reasoning (inductive reasoning subscale). The parental knowledge subscale reflects parents' positive involvement in their child's life by paying attention to their interests and actively monitoring their activities.

A recent secondary data analysis by Marston et al. (2022) explored a similar research topic, examining parenting styles in families of children with developmental disabilities. The study employed Baumrind's (1967) well-known typology, categorizing parenting styles into three main types: authoritative, authoritarian, and permissive.

The findings of Marston et al. (2022) indicate no significant differences in parenting styles among parents of children with three main diagnoses (ASD, ID, and spina bifida) when considering authoritative parenting (characterized by warmth, autonomy, and reasoning). All three groups scored near the maximum points, demonstrating that parents predominantly engaged in a "positive mode of parenting," primarily authoritative in nature.

Similarly, the current study found no significant differences in parental warmth or inductive

reasoning among parents in all groups (which included ASD, ID, MD, and four other diagnoses). However, unlike the results reported by Marston et al. (2022), the current study revealed that parents of children with ID and ASD reported providing less parental support (encompassing autonomy and reasoning) compared to parents of children with motor disorders.

Using the PBQ29, Kardum et al. (2022) compared parenting practices among two groups of parents of children with ASD, categorized based on the presence or absence of challenging behaviors in their child. The study found significant differences in the global dimension of parental support, particularly in two aspects of this dimension: parental knowledge and autonomy. Parents of children with ASD who were not evaluated as exhibiting challenging behaviors were more inclined to grant autonomy, had better knowledge of their child's activities, and were more willing to explain their actions and provide reasoning compared to parents of children with challenging behaviors.

In terms of parental warmth, research suggests that parents are not significantly influenced by their child's disability status and remain engaged in their parenting roles (Glidden et al., 2010). Similar findings were reported by Kardum et al. (2022), who found no differences in parental warmth based on the presence or absence of challenging behaviors in children with ASD. Likewise, Su et al. (2017) observed comparable levels of warmth among mothers of children with ID and mothers of children without intellectual disabilities.

Given the cultural context and the predominance of mothers' involvement in parenting, this finding is not surprising. Most parents, regardless of their child's diagnosis, consistently express love and closeness toward their children.

However, studies also report variations in maternal responsiveness and behavior towards children with disabilities, such as ASD and other developmental disabilities. For example, Gau et al. (2010) found that in Chinese families, parents of children with ASD self-reported being less affectionate compared to parents of typically developing (TD) children. At the same time, they exhibited higher levels of psychological control.

Van Steijn et al. (2013) found that children with ASD perceived lower levels of parental acceptance compared to their typically developing siblings. Parental stress is another potential factor influencing behavior. Dabrowska and Pisula (2010) highlighted the role of emotion-oriented coping, which was associated with higher levels of parental stress in families of children with ASD and Down syndrome. In contrast, they found that in families with typically developing children, parental stress was predicted by task-oriented coping strategies.

Conversely, Ventola et al. (2017) observed no significant differences in parental acceptance between children in the typically developing group and those in the ASD group.

Ekim and Ocakci (2015) reported that hearing parents of deaf children exhibited fewer positive

parenting dimensions, such as warmth, structure, and autonomy granting. Similarly, studies on children with ADHD suggest that parental warmth and support are lower for children with ADHD compared to children without ADHD (Uçar et al., 2020; Alizadeh et al., 2007). However, comparisons between parents of children with ADHD and those of children with other types of disabilities are limited in the literature.

While previous studies indicate lower levels of parental support for children with HI and ADHD, the present study found no such differences. Instead, parents of children with MD, VI, HI, ADHD, and LD demonstrated similar levels of parental support, which were higher than the support reported by parents of children with ID and ASD.

Autonomy-granting behaviors during childhood play a crucial role in preparing children with disabilities for more independent living in adulthood (Aran et al., 2007). In the present study, parents of children with ID and ASD were found to grant significantly less autonomy compared to parents of children with ADHD, LD, and MD. This finding aligns with Su et al. (2017), who observed lower autonomy granting among mothers of children with ID compared to mothers of typically developing children.

Parental support in the form of autonomy granting involves encouraging the child's initiative and demonstrating empathy for their diverse behaviors by adapting to the child's developmental pace and rhythm (De Clercq et al., 2019). According to De Clercq (2019), such parenting fosters a positive context for meeting the child's needs, enabling better social functioning and more effective emotional regulation. However, the unique characteristics of various disabilities can influence parental sensitivity and communication (Howe, 2006).

Support for a child's initiative was assessed using items from the PBQ Autonomy subscale, such as: *I teach my child that it is important to fight for their own ideas... and I encourage my child to talk about what is happening in their life...* (Keresteš et al., 2012).

In our study, parents of children with ID reported greater difficulty adjusting to the pace and rhythm of their child's development compared to parents of children with MD, ADHD, or LD. One possible explanation for this finding is that many skills—both verbal and non-verbal—are suboptimally developed in children with ID, as outlined by the American Psychiatric Association (2013).

The cognitive and communication limitations of children with intellectual disabilities can present significant challenges for parents in respecting their children's autonomy in decision-making. Our findings also reveal that parents of children with VI and HI do not differ statistically from parents of children with ID and ASD in granting autonomy.

296 This somewhat unexpected result may stem from shared characteristics in how parents approach autonomy granting for children with VI and HI. Communication difficulties between

hearing parents and children with hearing loss often result in lower levels of autonomy granted to the child (Ekim & Ocakci, 2015). Similarly, parenting children with visual impairments tends to lean toward overprotection, driven by safety concerns and a desire to compensate for the child's disability. However, this overprotectiveness can simultaneously restrict the child's autonomy (Pinquart & Pfeiffer, 2011).

In the present study, no significant differences were observed between parents of children with different developmental disabilities in the use of inductive reasoning. However, with a marginal significance level ($p = 0.052$), it is possible that this difference might reach significance in a larger sample.

In contrast, previous research has reported notable differences in the frequency and quality of verbal reasoning used to explain behavior. For instance, Kardum et al. (2022) found that parents of children with ASD who did not exhibit challenging behaviors employed inductive reasoning more frequently. Similarly, Antonopoulou et al. (2012) reported that parents of children with hearing loss often provided inadequate explanations and made fewer efforts to help the child understand the implications of their behavior compared to their hearing siblings.

Parental knowledge, a reflection of positive parenting behavior, is defined by the parent's interest in their child's activities, social life, and school-related matters. In our study, parents of children with ASD and ID reported significantly lower parental knowledge scores compared to parents of children with HI, LD, MD, and ADHD. This finding aligns with previous research suggesting that parents of children with developmental disabilities tend to be less knowledgeable and less engaged with their children's activities (Rogers et al., 2009), despite the critical role such involvement plays in a child's success in school.

Part of the explanation for differences in parental knowledge likely lies in the developmental characteristics of the children and the socio-cultural constructs surrounding the perceived consequences of specific disabilities on a child's competencies. For instance, Kardum et al. (2022) found that some mothers of children with ASD experienced similar difficulties in knowing their child's activities and routines. Since mothers are typically primary caregivers involved in children's daily activities and routines (Gaspar et al., 2022), lower maternal knowledge of their child's routines may be associated with reduced understanding of how to prevent negative behaviors in children with ASD (Kardum et al., 2022).

Conversely, parents of children with hearing loss often report being highly vigilant about their child's activities. They tend to have more detailed knowledge about their child's whereabouts, schoolwork, tests, and social circles. While parental knowledge is theoretically a component of positive authoritative parenting, this heightened awareness among hearing parents of children with hearing loss may stem from a perceived need to compensate for societal assumptions that deaf and hard-of-hearing individuals are less competent (Hauser et al., 2010). As a

result, these parents may feel compelled to maintain stricter control over and involvement in their child's activities.

The overlap between granting autonomy and reduced supervision of a child's activities is closely tied to parents' understanding of the developmental characteristics of their children with disabilities (Di Renzo et al., 2020). Di Renzo et al. (2020) found that parents of children with various diagnoses, including autism spectrum disorder (ASD), who had greater knowledge of child development were more likely to engage actively with their children. This greater parental attunement also predicted more positive attitudes toward the child's independence, which, in turn, positively influenced the child's social skills.

The study emphasized the importance of parental understanding and knowledge of child development, confirming that parents of children with different diagnoses (including ASD) are more engaged in parenting when they are attuned to their child's developmental needs. Di Renzo et al. (2020) also hypothesized that when parents respond appropriately to their child's developmental level and needs, they are better able to anticipate opportunities for their child to gain independence, thereby fostering the child's social competencies.

Although generally positive and nurturing, parents of children with disabilities often face challenges in maintaining an authoritative parenting style, which can become increasingly unstable as their children grow older. Research also highlights a bidirectional relationship between parenting and child behavior—parental responsiveness is influenced by the child's behavior and developmental progress (Woolfson & Grant, 2006).

When considering parental characteristics, studies on children with ADHD suggest that certain parental traits may evolve in response to the child's unique developmental trajectories and adaptations in specific areas of life (Deault, 2010; Gau & Chang, 2013).

Restrictive Control

In the current study, parents of children with ASD and MD were observed to exert less intrusive control and use less punishment compared to parents of children with ADHD, VI, and HI. Parents of deaf and hard-of-hearing children, similar to parents of children with ADHD and visual impairments, were found to be the most controlling and more likely to use punitive measures. These findings align with previous research, such as the study by Antonopoulou et al. (2012), which reported that parents of children with hearing loss used disciplinary punishment measures more frequently than with their hearing children.

Communication difficulties within families of children with hearing loss play a significant role in the upbringing of deaf and hard-of-hearing children (Calderon & Greenberg, 2011; Barker et al., 2009). Inefficient communication between a hearing parent and their deaf or hard-of-hearing child can lead to frustration, which may prompt the parent to adopt punitive disciplinary

measures (Sullivan et al., 1991).

The findings of this study align with those of Alizadeh et al. (2007), who reported that parents of children with ADHD are more likely to use punitive measures compared to parents of children without ADHD. Similarly, Uçar et al. (2020) found that children with ADHD are more likely to perceive criticism and punishment within the family environment compared to their peers in a control group.

Certain characteristics of children with ADHD—such as disregard for house rules, disrespect towards parents, impulsive reactions, low frustration tolerance, and poor emotional regulation, which often result in anger and dissatisfaction—pose significant challenges for parental behavior (Aili et al., 2015). In response, parents may resort to punishment to control and shape their child's behavior, aiming to reduce undesirable actions and reinforce desirable ones.

However, this approach can lead to unintended and counterproductive outcomes (van der Oord & Tripp, 2020), including a strained parent–child relationship and exacerbation of functional impairments (Furukawa et al., 2019).

Numerous studies (e.g., Piquart, 2013) highlight a more frequent use of strict and, at times, neglectful parenting behaviors among parents of children with disabilities compared to parents of typically developing (TD) children. The reasons for this are undoubtedly multifaceted. As Woolfson and Grant (2006) explain, these unfavorable parenting practices can be attributed to the heightened stress levels experienced by parents of children with disabilities, as well as the children's greater need for structured and organized environments. Additionally, clear and directive communication is often necessary to aid the comprehension of children with disabilities, further shaping parental behavior.

Permissiveness

Remarkably, no significant differences in permissiveness were observed, indicating that parental behavior remains consistently permissive regardless of the type of disability. Previous research has suggested that permissive parenting is more prevalent among parents of children with ADHD and ASD (Hutchison et al., 2016) and those with Down syndrome (Phillips et al., 2017) compared to parents of typically developing children. However, the findings of the current study indicate that parents of children with different types of disabilities exhibit similar levels of permissiveness.

Conclusions

The aim of the present study was to explore differences in parental behavior toward children with disabilities in Croatia. Specifically, it examined variations in parental behavior toward children with intellectual disability (ID), autism spectrum disorder (ASD), attention deficit hyperac-

tivity disorder (ADHD), learning disabilities (LD), motor disorders (MD), visual impairment (VI), and hearing impairment (HI).

The parent groups differed significantly on the general dimension of parental support, with parents of children with ID and ASD reporting the lowest scores compared to parents of children with LD, ADHD, MD, and HI. However, parents of children with ID and ASD did not differ significantly in their self-perception of the support they provide.

Differences were also observed in the autonomy and parental knowledge subscales. Parents of children with ID and ASD scored lower on average in parental knowledge compared to parents of other subgroups. Parents of children with HI demonstrated higher levels of supervision and awareness of their child's activities, significantly surpassing parents of children with ID, ASD, and LD.

Interestingly, parents of children with ASD and MD were found to exercise the least intrusive control and punishment compared to parents of children with ADHD, VI, and HI. The latter three groups, which did not differ significantly from one another, had the highest scores on the restrictive control dimension, with parents of children with HI being the most controlling.

Despite the growing body of research enriching our understanding of parenting in families of children with disabilities, a comprehensive model for studying the parenting process in these families remains elusive, as noted by Billen et al. (2022). Researchers suggest that parenting choices are influenced by a combination of the child's characteristics, parenting skills (Kutero-vac Jagodić et al., 2007), and the parents' ability to adapt to the child's specific disability.

Children with disabilities differ significantly in various developmental domains, presenting unique challenges for parents. For instance, children with ID often experience impairments in language comprehension, cognitive and perceptual skills, as well as quantitative and abstract reasoning. In children with ASD, social interaction difficulties, impaired communication, and restricted or repetitive behaviors are the most prominent developmental challenges.

Children with VI and HI have specific needs for support in communication and socialization, requiring tailored strategies to foster interaction and inclusion. Motor development disorders present challenges in ensuring adequate mobility and access to everyday activities, which can impact both independence and participation in social settings.

For children with ADHD, challenging behaviors and executive function deficits often complicate parent-child interactions. Similarly, the diverse nature of LD—arising from the variability in brain network structure and function—can make establishing effective and satisfactory interactions particularly difficult for parents.

Given the aforementioned characteristics, the parent-child relationship, along with factors such as the cultural and social context, plays a crucial role in shaping parental behaviors and influencing the quality of parenting that children with disabilities receive (Sanders & Turner, 2018).

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Zagreb, December 2024

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