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## TEACHERS' PERCEPTIONS OF METACOGNITIVE STRATEGIES AND ASSESSMENTS USED WITH D/DEAF AND HARD OF HEARING STUDENTS

*Original scientific paper*

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### ABSTRACT

*This qualitative case study investigated two teachers' use of metacognitive strategies during reading instruction and the types of metacognitive assessments used to assess students' metacognitive strategies. Data collection was performed using a case study methodology via two semi-structured interviews, observations of five reading instruction lessons, and two self-recorded question responses, known collectively as the experience sampling method (ESM). The data collected were coded based on three time periods: planning before reading, monitoring during reading, and evaluating after reading. The findings reveal that the two teacher-participants spent a substantial amount of time activating their students' prior knowledge and building vocabulary. In addition, both teachers only used think aloud assessments to examine the type of metacognitive strategies that their students used during reading sessions. There is a need to consider other metacognitive strategies, including evaluating strategies, and to utilize alternative methods of assessment alongside think aloud, such as interviews.*  
**Keywords:** d/Deaf and hard of hearing students, metacognitive assessments, metacognitive knowledge/awareness, metacognitive regulation, metacognitive strategies

Since the 1970s, research has demonstrated that metacognition is an essential contributor to students' reading comprehension and academic success (Baker & Brown, 1984; also, see Israel & Duffy, 2009; for d/Deaf and hard of hearing students, see Strassman, 1997; Trezek et al., 2011; Yan & Paul, 2021). With respect to d/Deaf and hard of hearing (d/Dhh) students, it has even been argued that much of their reading difficulty is due to issues with the executive or metacognitive function, not only with print-access skills such as decoding and word identification (Marschark et al., 2009). D/dhh students experience difficulty with a major metacognition strategy—comprehension

monitoring—and are generally unaware of a range of effective strategies to use during reading. Previous research has suggested that reading comprehension is directly related to metacognition (e.g., Paul et al., 2013; Strassman, 1997; Trezek et al., 2011).

It is difficult to teach and assess metacognitive strategies (Flavell, 1979; Flavell et al., 1970; Myers & Paris, 1978; Pearson & Cervetti, 2017). Williams (1995) reported a limited amount of research investigating teachers' perceptions to understand and improve d/Dhh students' reading outcomes (as cited in Ewoldt et al., 1992; Luckner & Ayantoye, 2013). There is, to our knowledge, no existing research that

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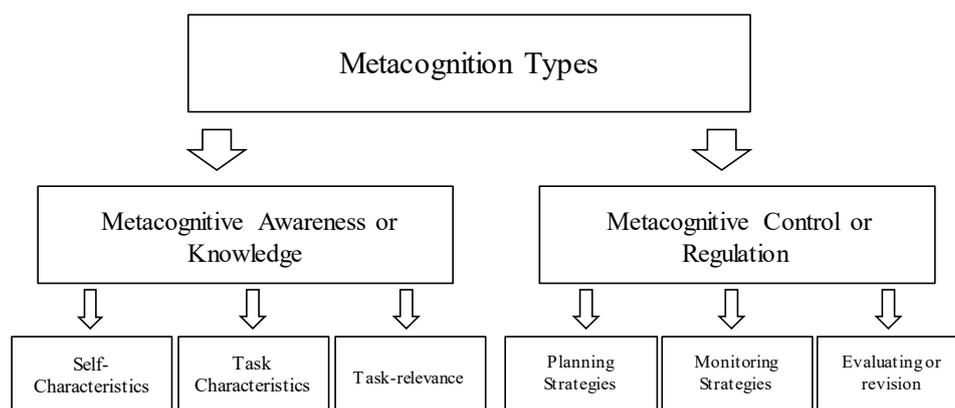
has investigated teachers’ perceptions of the assessment of d/Dhh students’ metacognitive strategies. There is some research focused on teachers’ perceptions of metacognitive strategies utilized by their d/Dhh students (Ewoldt et al., 1992; Reed, 2003; see also, the reviews of Strassman, 1997; Yan & Paul, 2021). Additional research is needed to explain teachers’ perceptions and awareness of d/Dhh students’ metacognitive strategies and the types of assessment employed in the classroom. In the ensuing sections, we cover strategies, assessment, and teachers’ perceptions to provide the framework for the focus of the present study.

### The Constructs of Metacognition: Knowledge and Regulation

Baker and Brown (1984) divided metacognition into two main areas: (a) metacognitive knowledge or awareness and (b) metacognitive control or regulation. Metacognitive knowledge is an individual’s awareness of what they do and do not know. McCormick (2003) proposed that metacognitive knowledge has three components: (a) declarative, or what; (b) procedural, or how; and (c) conditional, or when and where.

Declarative knowledge addresses the extent of a reader’s knowledge on the topic. Procedural knowledge is necessary to process and use metacognitive skills to achieve an overall learning goal such as learning to perform a task effectively and efficiently. For example, before they start reading, students may need to look at the pictures to understand the text, underline unfamiliar words, and consider the context clues. The third type, conditional knowledge, refers to knowing when, where, and why to use particular metacognitive strategies; it also is the ability to know how the reader is able to use a specific procedure or strategy to understand the text (Pressley & Harris, 2006; Schmitt, 2005).

Metacognitive regulation or control encompasses strategies associated with reading comprehension. Most research has focused primarily on metacognitive regulation strategies, which are important for improving students’ reading comprehension skills (e.g., Israel, 2007; Pressley & Afflerbach, 1995; Schmitt, 2005). Research into metacognition regulation strategies can be divided into three categories: planning, monitoring, and evaluation (see Figure 1 below).



**Note:** Metacognition theory in relation to reading comprehension developed by Schmitt (2005), based on Baker and Brown’s (1984) work.

Figure 1. Metacognitive Awareness and Regulation

### Metacognitive Regulation Strategies

One of the main foci of the present study is on metacognitive regulation strategies. Many studies have found that metacognitive regulation is vital for learning, particularly for reading comprehension, and that it can be taught during instruction (Efklides & Misailidi, 2010; Hacker et al., 2009; Winne & Azevedo, 2014). Metacognitive regulation, particularly strategies for comprehension-monitoring, entails three main groups of categories, depending on whether they occur before (planning), during (monitoring), or after (evaluating) reading (Baker & Brown, 1984; Liang et al., 2005; Pressley & Afflerbach, 1995; Schmitt, 2005).

Metacognitive planning strategies involve strategies that occur before reading to activate prior knowledge. An example of a planning strategy is the reviewing of textual information to understand details before or while reading the text. Other examples that

activate and enhance prior knowledge include the use of a semantic or word map and other graphic organizers or the asking of prediction questions (Paul, 2009; Trezek et al., 2010). According to Schirmer (2003), prior knowledge can be divided into three components. The first is textual schema or the mental representations of the text’s structure. For example, students may use their knowledge of structure and grammar to comprehend the text. The second component of prior knowledge is content schema, which concerns the readers’ background knowledge about the content of the passage. Students may use prior knowledge and life experiences related to a topic to understand the text. The final component of prior knowledge involves vocabulary schema, which addresses readers’ vocabulary knowledge.

Using monitoring strategies during reading is the most common metacognitive strategy in classroom settings. Two major monitoring strategies

recommended by the National Reading Panel (2000) are self-questioning and prediction. Student may develop, and possibly answer, their own questions while reading a passage (Rosenshine et al., 1996). While reading a story, students may also predict what happens next, and then either confirm their prediction as they read or revise it when it is not accurate. Students may also predict a word's meaning by either examining the context, re-reading sentences to determine the meaning, or looking at pictures.

The third type of regulation strategies is metacognitive evaluation strategies. These strategies are used after reading and are the most difficult strategies to employ because they require high-level skills such as evaluating, revising, and critiquing, for example, the text and author's writing style. Readers may also evaluate and critically review the passage, reading level appropriateness, grammatical errors, difficult concepts, and the type of language used (Israel, 2007). Readers, especially younger readers, rarely utilize evaluation strategies (Baker & Brown, 1984).

### **Metacognitive Assessment**

Metacognitive assessment is another focus of the present study. Harris and Hodges (1995) and Paris and Flukes (2005) defined metacognitive assessment as an evaluation of the thinking process to assess one's reading ability and self-regulation (see also, Zimmerman, 1990). A number of researchers and scholars have asserted that metacognitive assessment strategies require a high level of cognitive skills, which are crucial for tasks such as problem solving and making inferences (Baker & Beall, 2009; Siegler, 1992). Metacognitive assessment is important because it provides an in-depth awareness for teachers on how to improve students' metacognitive strategies (Paris & Flukes, 2005). Teachers are able to support students' development and use of effective metacognitive strategies during reading.

For the successful incorporation of metacognitive assessment into instructional goals, it is important that teachers create appropriate instructional lessons and materials, and that they also identify the appropriate metacognitive assessment to be implemented before, during, and after instruction. Students' feedback on the assessment should be taken into consideration, and assessment results should be used to evaluate teachers' instructional goals.

### **Types of Assessments**

According to Paris and Flukes (2005), there are three major types of research-based metacognitive assessments: interviews, surveys and inventories, and think-alouds. All three metacognitive assessments are valid and can be used with different individuals, including d/Dhh readers (e.g., Banner & Wang, 2011; Strassman, 1992, 1997; Yan & Paul, 2021). It is also possible to combine them; for example, an investigator can interview research participants using either think-

aloud methods or a survey. Discussion of these major types of assessment is based on the work of Israel (2007).

#### *Interviews*

Israel (2007) cited two reasons why using interviews is facilitative to assess students' metacognitive ability. First, when students answer open-ended questions, researchers can collect substantial information on a particular metacognitive strategy. The interviewer may obtain specific information about a student's ability to use planning strategies such as overviewing information before reading the passage, monitoring strategies such as using keywords to find the meaning, or even evaluation strategies, such as critiquing the author's writing. The second reason is that interviews may help to determine the most effective strategies that could be implemented to help individuals understand fiction and/or non-fiction texts.

#### *Surveys or Questionnaires*

According to Israel (2007), surveys and questionnaires are less time-consuming than other metacognitive strategy tools and are a useful and effective way to acquire information from large populations as well as smaller groups. Benefits of using questionnaires include the possibility of asking students questions and then read the answers for clarity in making an inference. This also allows teachers to ask students to read and then answer the questions in the questionnaire. Struggling readers might find it difficult to understand a survey; therefore, teachers need to meet with them and explain the meanings of words in the survey to encourage a more effective and confident response. Surveys and questionnaires can be more useful if combined with other assessment tools, such as interviews. However, teachers should ensure to explain the interview's purpose and also provide participants directions for the assessment to save time.

#### *Think aloud*

According to Ericsson and Simon (1993), the think-aloud approach is the most valid and effective method for assessing the student's inner cognitive processes. While using a verbal report, participants may reveal their metacognitive strategies and describe how and why they use them. Think aloud and the verbal protocol are the same procedure. When using verbal protocol, the participants think aloud and do not usually write responses. This method involves the researcher collecting verbal information (Krockow et al., 2016). Israel (2007) has argued that the verbal protocol is the most common method used to assess the dimensions of metacognition.

The think-aloud and interview methods are more commonly used to explain d/Dhh students' metacognitive strategies. Schirmer (2003) used a verbal protocol interview with d/Dhh participants to describe their thinking skills and asked about the metacognitive strategies they used while reading. Schirmer et al. (2004) replicated Schirmer's (2003) study using think aloud and interviews to assess d/Dhh students'

metacognitive controlling strategies. A good review of the various methods used with d/Dhh students can be found in Strassman (1997) and Yan and Paul (2021).

### **Metacognition for d/Dhh Students**

There is a need for evidence-based research to identify and develop more effective reading instruction practices for individuals who are d/Dhh (Paul, 2009; Paul et al., 2013). Teachers may be the best source to help identify effective metacognitive strategies and instruction for developing literacy skills in d/Dhh students (Schirmer & Schaffer, 2010). This section reviews research on teachers of d/Dhh students' perceptions of metacognition and reading instruction.

Williams (1995) used an interview method to understand three preschool teachers' theoretical and pedagogical perspectives on language and literacy development in relation to their d/Dhh students. Williams found that teachers did indeed improve students' receptive language skills (e.g., listening/signs). The teachers also gained increased experience with metacognitive instruction and teaching methods as well as improving their fluency in sign language. Teachers can change their perspective regarding the use of specific instructional methods when they have gained more experience in teaching (Schirmer & Schaffer, 2010).

Teaching experience plays an important role in teaching students effectively, especially for those teachers who work toward determining the best metacognitive strategies to help students understand reading comprehension instruction (Reed, 2003). Reed found that itinerant teachers prefer to use different practices to develop their students' literacy skills depending on the students' literacy needs. Similar to the findings of other studies (e.g., Leko et al., 2018), teachers of young children who are d/Dhh need to focus more on decoding instruction before transitioning to other reading skills. Therefore, teachers need to help young d/Dhh students master early literacy skills; then, they can progress to other reading skills with students in upper grades and focus more on reading to learn skills.

Watson and Swanwick (2008) compared the perceptions of parents with teachers' perceptions of d/Dhh children between the ages of three and five. The researchers interviewed two groups of families; one of these groups used British Sign Language (BSL) during literacy events and the other used spoken language. The parents in the latter group focused on information in the text and used phonemic awareness strategies among other strategies, such as pointing out vocabulary and grammar when reading with their children. The parents also asked children questions about the text so that the children could reflect on their prior knowledge in the context of the passage's message. The teachers placed with the families using BSL shared the same phonemic awareness strategies and asked children about information in the text. According to Watson and Swanwick (2008), teachers who used spoken language with families, who also used spoken language, created

an engaging environment. While reading, the use of expressions and body language along with spoken language was found to improve students' ability to understand the text.

The BSL group, however, focused more on textual meaning rather than on other literacy skills like phonemic awareness (Watson & Swanwick, 2008) using books that can be shared with Deaf children who prefer to read fairy stories and fables. Some metacognitive strategies such as prediction can help Deaf students in the reading process to understand not only the structure of the story, but also its components. Children must learn to use some metacognitive strategies; for example, looking at pictures and considering context is a particularly useful metacognitive strategy to help children understand a passage.

Despite the importance of using metacognitive instruction to understand d/Dhh students' metacognitive strategies, there is limited research on teachers' perceptions (Browder et al., 2006; Hollenbeck, 2013; Fenty & Brydon, 2017; Watson & Swanwick, 2008). Researchers need to study the perceptions of teachers on teaching metacognitive strategies to their d/Dhh students. These findings also call for more research on the assessments used to measure teachers' perceptions of developing and assessing their d/Dhh students' metacognitive strategies.

### **Assessment of Teachers' Perceptions**

Fives and Gill (2014) argued that researchers in their earlier works struggled to find a valid assessment of teachers' perceptions. In addition, Fives and Gill (2014) proffered the following research methods to assess and explain teachers' perceptions in detail: questionnaires, interviews, observations, self-reflecting writing, tests and exams, vignettes, scaled responses, portfolios, and classroom artifacts. Two of these research methods are used in the present qualitative research study:

- Interviews. Researchers have designed interviews for their participants and asked teachers' questions that identify their perceptions and beliefs. Such a detailed assessment helps researchers obtain a deeper understanding of the teachers' responses. The use of interviews enables researchers to ask teachers to clarify their responses, elaborate on an observation made, and provide further information related to a specific question to allow inferences to be made. In the present qualitative case study, the researchers used semi-structured interviews at the beginning and end of the study, as discussed in the methodology. The data from the interviews were used to clarify the observation data.
- Observation. Researchers have observed teachers while they taught and recorded interactions and engagement in and/or outside the classroom during activities. They have also compared teachers' actual interactions with students to their responses made in questionnaires and in interviews. In the present qualitative case study, we observed teachers to deduce whether they

ask students directly about the metacognitive strategies they utilize during reading. The present study also assessed through observation whether teachers use metacognitive instruction with d/Dhh students in the classroom and sought to explain the types of instruction used.

However, teachers may use additional different strategies that may not fall within any of the above categories—and these were also documented.

## The Present Study

The present qualitative case study explored teachers' use of metacognitive strategies and assessments. The present study attempted to answer two major questions: (a) What metacognitive strategies do teachers of d/Deaf and hard of hearing students encourage their students to use before, during, and after reading? and (b) How do teachers assess their d/Deaf and hard of hearing students' use of metacognitive strategies?

## METHODOLOGY

### Participants

The present study involved d/Deaf and hard of hearing students at a middle-school level in a school district in the midwestern area of the US. Two deaf teachers served as participants. One teacher teaches 7th grade d/Deaf and hard of hearing students with additional disabilities. Their reading grade levels ranged from 2nd grade to 5th grade. The second teacher works with 8th graders, whose reading levels range from 5th grade to 6th grade. Students' hearing losses in both classrooms were in the moderately severe to profound range.

Two different grade levels were selected to examine how students' age, reading level, and other factors influence teachers' perceptions of metacognitive instruction, assessments, and teaching materials used with their d/Dhh students. Specific information was collected, including demographics (age, teaching experience, etc.) to explore ways in which these factors might influence teachers' perceptions about metacognitive strategies and metacognitive assessments.

### Research Design

The research design was a multiple case study with multiple data collection methods involving observations, semi-structured interviews, and ESM (Experience Sampling Methodology). Figure 2 illustrates the sequence of data collection.

## Procedures

*Observations.* The first investigator conducted five different observations of the two teacher-participants, with each observation lasting about 30 minutes. During the observations, a checklist was used to document the types of metacognitive strategies and assessments teachers used when instructing d/Dhh students (see **Appendices A, B, & C**). Appendix A illustrates the types of metacognitive strategies that were targeted during observations; Appendix B documents the type of metacognitive strategies that teachers used during reading instruction; and Appendix C was used to check the type of metacognitive assessments that teachers used during reading instruction.

*Semi-structured interviews.* Teachers were asked to answer interview questions at the beginning and the end of the observations. Each interview took approximately an hour, was audiotaped with permission, and took place at each teacher's convenience.

The first interview was conducted following the initial observation. Depending on the events of the observation stage, additional follow-up questions could be added, or the original questions may be changed or modified. The first semi-structured interviews solicited information on the backgrounds of the teachers (see **Appendix D**). The use and understanding of metacognitive strategies were also included in the interview, including the following questions: What activities/strategies do you use before reading (planning strategies)? What activities/strategies do you use during reading (mentoring strategies)? What activities/strategies do you use after reading (evaluating strategies)? Several follow-up questions requested examples of these strategies.

The next group of questions concerned the teaching and assessing d/Dhh students' metacognitive strategies. These questions were: How do you know your students are using specific strategies during reading? Do you monitor this situation? How do you monitor the use of these strategies?

The second interview was conducted at the end of the observations. During this interview, the participants were asked again about their perceptions on metacognition and reading instruction and metacognitive assessments; however, these questions were follow-up questions based on the first interview, ESM (see below), and observations.



Figure 2. The Sequence of Data Collection

The data collected were coded into three categories: planning or before reading, monitoring or during reading, and evaluating or after reading strategies.

These questions examine the reasons these teachers focused on such strategies and assessments and why they never used certain strategies or assessments.

Finally, the teachers were asked questions about their beliefs on using metacognitive assessments. At this point, the term metacognition was defined and teachers were asked to respond to: What do you believe about the role of metacognition in reading comprehension?

*Experience Sampling Method (ESM).* The ESM was used after the third observation and at the end of the last (fifth) observation. By using the ESM, researchers can ensure that the data were consistent with the interviews and observations. The teachers were directed to record (audio and/or written) their answers to the following questions, immediately after the third and fifth observations:

1. Did you use metacognitive strategies with your students? Describe them.
2. Did you think these strategies were helpful? How and why?
3. Did you assess your students' use of these metacognitive strategies? How?
4. What are the challenges with teaching metacognitive strategies?
5. What are the challenges with assessing metacognitive strategies?

## Data Analysis

The present study took place over a period of a month. At any time during this period, the teachers could ask to review their responses and review field notes from observations. The teachers could make suggestions for the final report, clarify their responses, and offer further insight into the types of metacognitive strategies they focused on with their d/Dhh students as well as the types of metacognitive assessments they used.

In the first stage of coding and analysis of the data, the first researcher reviewed the data collected during the initial observation to ascertain if there would be problematic questions during the interviews. The second stage involved collecting all the data from field notes taken during the observations, interviews, and ESM. This stage was also a time to review and code all data (notes, ESM, and interviews). During the third stage, all the coded data were reviewed and compiled from the previous stages. In this stage, multiple data were checked and compared to establish the trustworthiness with regard to the analyses and interpretations of the findings.

As mentioned previously, the data were categorized based on Baker and Brown's (1984) three main categories of metacognitive strategies: planning or before reading, monitoring or during reading, and evaluating or after reading. Additional categories were developed if the collected information did not fall into any of the three categories.

## Trustworthiness

The construct of trustworthiness addresses the issues of reliability and internal and external validity (Basse, 1999). Trustworthiness in a qualitative study is

achieved through the following processes: credibility, transferability, dependability, and confirmability (Amankwaa, 2016).

*Credibility.* This can be achieved through a process known as triangulation. In the present study, we triangulated multiple data collection methods to document teachers' perceptions and use of strategies and assessments. Furthermore, the first investigator observed classroom and virtual settings, recorded the teachers' responses during interviews, and took field notes during the classroom observation process. We analyzed the collected data and compare the findings to those of previous research on metacognitive strategies. The coding and data analysis were confirmed via interobserver agreement. Differences were resolved verbally.

*Transferability.* In qualitative research, transferability is analogous to what is known as "external validity" in quantitative research (Lincoln & Guba, 1985). In the present study, sufficient information regarding the procedures and other details that included the participants and the timeframe was provided. This information should facilitate replication to assess the generalizability of findings to similar settings or individuals.

*Confirmability.* Confirmability is also known as the neutrality of the researcher; it refers to the ability to ensure that the findings of the case study provide genuine reflections of the participants' responses and is not shaped by influences such as researcher bias, motivation, or interest (Amankwaa, 2016; Lincoln & Guba, 1985). In the present study, we "listen[ed] to data" and "report[ed] them as directly as possible" (Hays & Singh, 2012, p. 201).

*Dependability.* In qualitative research, dependability refers to the consistency of the data, specifically to ensure that it remains consistent over time (Lincoln & Guba, 1985). For example, when the first investigator examined the teachers' responses to ESM questions, it was necessary to ascertain whether their responses were consistent. Evaluating the consistency of responses is particularly important if there is a possibility of the inquiry being repeated with the same subject matter or in a similar context.

The present study was approved by the Institution Review Board associated with the researchers' university.

## RESULTS

This qualitative case study identified the metacognitive strategies and assessments that two teachers used with their students. The information in this Results section is organized as follows: 1) first, we provide some background information on the teachers and their classrooms; 2) then, we discuss the findings with respect to the two research questions: (a) What metacognitive strategies do teachers of d/Deaf and hard of hearing students encourage their students to use before, during, and after reading? and (b) How do teachers assess their d/Deaf and hard of hearing students' use of metacognitive strategies?

## Background Information about Teachers and Their Classrooms

### *Carmen and her Classroom*

Carmen (pseudonym) is deaf and has two degrees, including a bachelor's degree (licensure) in learning disabilities and a master's degree (licensure) in d/Deaf education. Carmen has taught d/Dhh students for 10 years. She has been teaching d/Dhh students in different settings. For instance, she stated, "I had a two-hour commute both ways to attend a self-contained classroom from 3-12, then I mainstreamed in my hometown's public schools with an interpreter." Carmen also said, "American Sign Language (ASL) is my mode of communication when I teach."

Carmen's students are seventh and eighth graders with moderately severe to profound hearing losses; their reading levels range from first to fourth grade. She spends a substantial amount of time providing her students with the necessary prior knowledge before they start reading the required passages. Carmen believed that developing students' linguistic (language) knowledge and vocabulary knowledge could be the most effective method for teaching reading. Her students possess insufficient knowledge of both English and ASL. They have more challenges due to their additional disabilities.

### *Sarah and her Classroom*

Sarah (pseudonym) graduated from Gallaudet University in 1989 with a bachelor's degree (BA) in secondary mathematics education; she also received a master's degree (MA) in the education of d/Deaf and hard of hearing students from Lewis and Clark College in 1991. She started teaching in the fall of 1991 and has taught for 29 years.

Sarah teaches middle-school students with moderately severe to profound hearing losses (grades 6–8) in mathematics and others in reading at the fifth and sixth grade levels. In contrast to Carmen's students, Sarah sees her students as good readers. She said, "My students are the top readers in middle school and some consider themselves bookworms!" She continued, "I have the highest level, which is challenging and fun." Sarah teaches reading through specific content areas (e.g., mathematics, science, etc.).

## Metacognitive Strategies

In the ensuing sections, we provide the findings associated with each teacher's use of metacognitive strategies before reading (planning), during reading (monitoring), and after reading (evaluative). These findings are based on data collected and coded from interviews, observations, and the ESM.

## *Metacognitive Planning Strategies*

Both teachers used several metacognitive planning strategies related to the activation of prior knowledge and the development of language skills, for example, building vocabulary, providing an overview of information in the text, and focusing on specific difficult sentence structures.

*Overview of The Vocabulary in The Texts. Carmen.* Carmen began the lesson by providing an overview of the new vocabulary for a particular passage. For example, Carmen showed pictures and conducted a vocabulary review. Then, she asked her students to look at the words and spell them via the use of fingerspelling (i.e., handshapes corresponding the letters of the alphabet).

The data collected also indicated that Carmen helped her students think about these words. She explained the meaning of the new vocabulary by demonstrating the signs for the words. She spent time ensuring that her students could spell and sign new vocabulary.

*Sarah.* Sarah also focused on a vocabulary pre-review as a before-reading strategy. For example, Sarah specifically taught her students new vocabulary selected from the passage prior to the reading session. In Sarah's classroom, students did not spend time spelling the words; alternatively, Sarah focused on the meanings and a strong understanding of the signs for new words.

*Overview of the Information in the Text. Carmen.* Carmen started her reading class by discussing general information related to the passage. She spent a good amount of time asking questions and having a conversation about the topic with her students. She mainly asked her students to think about the topic and encouraged them to access any prior knowledge about the topic.

*Sarah.* Sarah also spent time activating her students' prior content knowledge of the readings. Similar to Carmen, Sarah started with a conversation with her students about the reading topics. Sarah asked her students to look at the title. She also asked her students to think about the topic and connect the passage to their experiences.

Sarah then asked the students to discuss the passage before reading it. This endeavor can be labeled "thinking together." Although typically used before reading, Sarah often used this strategy during reading as well, asking her students to think together during the session.

*Overview of the Sentence Structures in the Text. Carmen.* Carmen encouraged her students to think about the words in sentences and the functions of those words. For instance, she asked her students about the word "blue." She stated that this word is an adjective used to describe a noun.

*Sarah.* Sarah did not put much emphasis on teaching spelling, grammar, and sentence structure. Sarah focused more on morphological knowledge when teaching grammar; this was particularly for prefixes and suffixes. She asked students to think of examples related to their experiences and encourage them to think about these structures in different contexts connected to their real-life experiences.

## Metacognitive Monitoring Strategies

The monitoring strategies used by both teachers include the think-together strategy, which was used along with other strategies, such as self-questioning, prediction, summarization, and graphic organizers. The teachers also focused on strategies such as using context clues, rereading, categorizing, underlining words, and using other resources such as a dictionary. Another important strategy was the translation of English sentences into American Sign Language. A few of these strategies are discussed below.

*Think Together. Carmen.* Carmen's students have additional disabilities, and she worked with them individually. She encouraged her students to think together and work in a group. During thinking-together activities, Carmen prompted her students to think aloud and share experiences with others. When students think together, they shared their experiences from different contexts that are related to their cultural or prior knowledge. This strategy facilitated students' understanding of the texts because it encouraged them to learn about topics via ongoing interactions.

*Sarah.* Sarah encouraged her students to use this strategy before reading, during reading, and after reading. For example, prior to reading, when she was doing vocabulary reviews, she asked her students to discuss the meanings and the signs of the words. She also presented the title of the topic, and then asked her students to think together about the topic. By creating social group discussions/dialogues, the students shared their experiences with their peers. Sarah also got involved in the dialogues to ensure that the discussion was relevant and useful for students.

*Prediction. Carmen.* Carmen asked students to predict ideas that will be discussed in a particular passage. She then directed her students to keep reading and check their predictions; students could confirm their predictions or revise them if they were incorrect.

*Sarah.* Sarah found that her students enjoyed the prediction strategy when she combined it with the thinking together strategy. Her students discussed the story and predicted events or items in the story.

*Summarization.* Both teachers used this strategy during and after reading—combining it with graphic organizers and retelling. For example, Carmen read a passage with the students and asked them to retell what they learned. She also asked her students to look back at the passages, if necessary, and to look at the pictures, for support in the retelling process. Both teachers asked students to retell the story via signs/voice without writing it. Finally, both teachers stated summarization is challenging for d/Dhh students because it requires time and effort to locate the important information and other supporting details.

*Re-reading Sentences and Paragraphs. Carmen.* Carmen implemented this strategy along with the self-questioning strategy. She encouraged students to ask questions and then motivated them to reread the sentences and locate important information that would help them answer their questions. Carmen

always asked her students to reread each sentence if they made any mistake when they signed a word in the sentence. She corrected her students' errors by signing the sentence or the word; then she asked them to re-sign the word or the sentence.

*Sarah.* Sarah did not correct the students if they signed words incorrectly; instead, she prompted them to reread the sentence and ensured that they gave the correct sign for each word. Sarah used the re-reading strategy to encourage her students to think about an idea in a particular sentence.

*Read in English and Translate into ASL. Carmen.* Carmen reported that she always asks her students to read and sign the sentence in English then come back and translate in American Sign Language (ASL). The students signed the sentence word by word using Signing Exact English (SEE), which she interpreted to mean the students read the sentences by using ASL in an English order and then they explained the sentence in ASL. So, when students explained the sentences in ASL, Carmen could see if they really understood the sentence. Carmen maintained that she used this strategy to help her students develop their English morphological and syntactic knowledge.

*Sarah.* Similar to Carmen, Sarah also used this strategy often during her reading sessions. Sarah claimed that the reading in English and signing in ASL is the most beneficial strategy that students can use when they read narrative passages. Sarah argued that reading word by word is not a good strategy because students cannot understand the text. Therefore, Sarah stated that she is encouraging students to use this strategy to strengthen their English and ASL skills.

## Metacognitive Evaluating Strategies

Two evaluating strategies were promoted by both teachers: 1) reflection on the reading and 2) vocabulary review. One teacher reported the use of graphic organizers as an evaluating strategy.

*Reflection on the Reading. Carmen.* Carmen always asked her students to summarize and reflect on the information in the passage. Carmen dialogued with her students about the passage and asked them how it related to their experiences. Most students remarked that the passages were interesting or enjoyable; one student told Carmen that a specific passage was a little challenging.

*Sarah.* Sarah also encouraged her students to reflect on the information in the passage and report what messages they obtained from their reflection—that is, the “take-aways” or “take home points.” After reading, Sarah constantly motivated her students to discuss the topic with their peers and think together about the weaknesses and strengths of the passage.

*Vocabulary Review. Carmen.* When the students completed reading the passage, Carmen used flashcards with words. These flashcards contain nouns, verbs, and adjectives. Carmen required her students to use these flashcards to build sentences and then encouraged them to think about whether the

sentences were meaningful or not. Carmen also asked her students to reread the sentences and directed them to identify the function of each word in the sentence. She also prompted the students to find the noun, verb, adjective, and subject in each sentence.

*Sarah.* Sarah also used vocabulary review before, during, and after reading. She also did each review by using flashcards and then asked her students if they had any questions. After reviewing the vocabulary, she gave her students a quiz, especially a fill-in-the-blank activity. In this activity, the students were required to choose the correct word to fill in the blanks. The students also were asked to explain words according to their own experiences and understanding.

*Graphic Organizers.* Sarah is the only teacher who used and reported that graphic organizers are an evaluating strategy. By creating graphic organizers after they have read the passage, she helped students to remember and organize their ideas.

### *Metacognitive Assessments*

Both teachers only used the think-aloud method as a metacognitive assessment. They also explored the idea of providing students a list of metacognitive strategies and teaching a few of these strategies in the future.

*Think Aloud.* *Carmen.* Carmen asked her students about strategies they used to help them with comprehension. Carmen tried to understand the process of students' thinking or the strategies that they used. This occurred in three areas: 1) when students made errors while reading, 2) when they could not understand part of a sentence, or 3) when they failed to answer comprehension questions.

When students struggled to sign or to express the meaning of a word, Carmen started a dialogue to uncover strategies that they could use. For example, Carmen asked her students to look at pictures if they were unsure about the sign or meaning for a word.

Carmen remarked that she uses think aloud to collect information regarding her students' metacognitive strategies before, during, and after reading. This also means that she used think aloud to obtain information regarding her students' planning, monitoring, and evaluating strategies. She remarked that students do not know the names of strategies that they have used, but could show by example or explain what they did.

*Sarah.* Sarah also encouraged her students to think aloud when they struggled to understand a word or a sentence. That is, Sarah directed students to think aloud and discuss the strategies that they used. Sarah also believed that students may not know the strategy by name, but they can demonstrate the strategy when explaining to their peers what they did (i.e., the nature of the strategy).

The types of metacognitive strategies used by the two teachers can be found in **Appendix E**. The comparison of the teachers' use of metacognitive strategies and assessments can be found in **Appendix F**.

### **Challenges of the Study**

This section is not directly related to the research questions; however, it provides an overview of the challenges that needed to be addressed in the present study. In general, the challenges can be divided into two types: 1) challenges faced by the researcher, and 2) challenges faced by the participants.

#### *Researcher Challenges*

This study was conducted during the COVID-19 pandemic. The first investigator started the first two in-person observations and then the school was closed due to the coronavirus guidelines. This necessitated brainstorming about different methods to collect data and to conduct this study in a virtual setting. We had to reschedule observations, interviews, and ESMs. It became clear that a virtual setting is different from an in-person setting, especially for students who are d/Deaf and hard of hearing. For example, in an in-person setting, it is possible to observe the whole class, but in a virtual setting, the first investigator could only see the faces of the participants within a small "signing" area in front of them.

The D/dhh students used signing as their major mode for receptive and expressive communication. The Zoom screen did not always show the students, particularly when the teachers were doing screen shares. The teachers and the first investigator had to deal with this issue while attempting to observe the students' responses. When students and teachers signed at the same time, it was also difficult to see both of them signing. Due to these challenges, it was critical to confirm and verify the data via the use of interviews and ESM with the teachers.

#### *Participants' Challenges*

Carmen worked with d/Dhh students with additional disabilities. She stated that she needed to ensure that her students were not interrupted by any distractions in their home environments. The following information provides an example of her challenges with a virtual classroom setting.

"It is very challenging to provide support for a low-vision student who cannot see print very clearly. When I try to use screen share, it makes me look much smaller, and the students cannot see my signs. Therefore, I don't use screen share, but I have my teaching assistant hold up the print for my students to see me (signer) and the print at the same time. They need to associate print and sign at the same time to know its meaning." Carmen stated, "My big concern is how to keep my students focused."

Carmen also explained that her students cannot use the technology effectively due to their additional disabilities. Therefore, she needed to ensure that their parents were there to assist. She stated, "Strategies are limited when it comes to teaching virtually. It is challenging for students to provide more input when they are not taught how to use devices."

*Sarah.* Sarah also faced challenges when the in-person classroom was changed to a virtual classroom. “At first, many students and I were struggling with logging on to Zoom, finding the story in the reading website, and doing worksheets from their devices (iPad, Chromebook, laptop, etc.). They are getting better at it now after six weeks. I seemed to be chasing them to turn in their work online, whereas in school I usually saw their worksheets right there in their notebooks or textbooks. The other thing was their schedules—they often missed their Zoom meetings in the morning because they were sleeping. Luckily the reading session is at 12:30, and most students had just woken up. Sigh!” Sarah also remarked that some of her students lived out of state, and the time differences made it difficult for students to join a lesson.

Sarah encountered other challenges. She said that participation was not steady for the students. “My students for whatever reason are not focused on the task; sometimes I try my best to grab their attention, sometimes they rarely participated, and sometimes we did great together.” On the subject of virtual learning, Sarah also indicated that screen sharing had the associated issue of preventing her from seeing her students fully. Her students often forgot to mute their microphones, resulting in distracting background noises that were not apparent to them due to their deafness.

## DISCUSSION

### Interpretation of Findings: Cross Case Analysis

*First Research Question:* What metacognitive strategies do teachers of d/Deaf and hard of hearing students encourage their students to use before, during, and after reading?

*Metacognitive Planning Strategies.* Both teachers spent time teaching students’ vocabulary as well as developing their students’ linguistic knowledge (semantics and syntax). Additionally, most of their before-reading activities did not rely predominantly on teaching students via print. The teachers created activities within an ongoing social interaction environment; these activities include discussions about the new vocabulary and other topics to activate students’ prior knowledge and facilitate their inferential skills.

Vocabulary played a crucial role with the focus not only on teaching word meanings and related aspects such as orthography and morphology, but also for the activation of students’ prior knowledge. The teachers believed that vocabulary knowledge is important for reading comprehension and for the utilization of metacognitive strategies. Interestingly, both teachers believed that students could not learn words by themselves (via reading) so they needed to spend more time teaching new words by using different examples in various contexts. Similar to the results of other studies (e.g., LaSasso & Davey, 1987; Schirmer, 2003; see also, the reviews in Paul, 2009; Paul et al., 2013; Yan

& Paul, 2021), the teachers’ perceptions supported the assertion that students without sufficient vocabulary knowledge are not able to use the metacognitive strategies effectively for reading comprehension.

Both teachers agreed that students needed to learn the functions of words (e.g., noun, adjective, verb) with respect to their usage in sentences—that is, syntactic structures. Carmen spent a substantial amount of time on activities in this domain, more often than Sarah. The teachers’ perceptions are in line with the work of previous researchers. For example, Erickson (1987) argued that linguistic knowledge is important for metacognition and reading comprehension for d/Dhh readers. D/dhh students need to reach satisfactory levels in all components of language such as phonology, morphology, syntax, semantics, and pragmatics to develop advanced reading skills (Paul, 2009; Paul et al., 2013). Both teachers, particularly Carmen, emphasized semantic and syntactic knowledge.

Hoffmeister and Caldwell-Harris (2014) argued that the essential success of learning through social interaction is the triangulation of contexts. The emphasis here is on the use of students’ experiences in a social interactive setting. Both teachers in the present study believed that learning vocabulary in isolation is not completely adequate. The words needed to be linked to students’ experiences. The teachers created ongoing social interactions to discuss the new vocabulary and improve students’ inferential skills. They also believed that students needed to discuss new words with their peers in different contexts. Both teachers believed that students couldn’t learn language from print effectively. In addition to providing examples for the use of the words, the teachers also encouraged their students to come up with their own examples to ensure they understood the meanings of the words and sentences.

*Metacognitive monitoring strategies.* This category was the most commonly used throughout the present study. Several of the teachers’ strategies aligned with the findings of previous works, including Banner and Wang (2011) and Silvestri and Wang (2018). However, there were three strategies that were not discussed predominantly in previous investigations on d/Dhh students and metacognition: think aloud together, read in English and translate into ASL, and metacognitive strategies for mathematics.

*Think together.* In the present study, the teachers prompted students to think about the information in the passages and did not interfere unless students needed help. The teachers, particularly Sarah, permitted the students to discuss their thoughts and tried to guide their conversations to ensure that students remained focused and arrived at productive findings. This corresponds with the work of Aukerman (2015), who argued that instructors should encourage students to question and offer ideas through dialogues with their teachers and peers. These dialogues should help students create meaning and enhance their understanding of the passages. Think aloud together occurred mostly via a social interactive context, described previously.

*Read in English and translate into ASL.* In general, this metacognitive strategy is often a part of ASL-English bilingual programs—but has not been discussed much in the literature on metacognition and deafness (e.g., Paul, 2009; Yan & Paul, 2021). However, it is a specific strategy for facilitating the understanding of English sentences in passages. For example, the teachers attempted to facilitate the students' development of vocabulary knowledge in both English and ASL. Students were also directed to translate English sentences into ASL to enhance their understanding of the sentences.

*Mathematics metacognitive monitoring strategies.* The data collected from the second interview revealed that both teachers used similar metacognitive monitoring strategies for reading and mathematics, including word problems. Carmen remarked that she needed to spend more time explaining technical terms in mathematics. Sarah maintained that students could use think-together (or think aloud together) strategies to solve a mathematics problem. For example, during dialogues, individuals would think about the problem and make judgments concerning how to solve the problem.

*Metacognitive Evaluating Strategies.* Silvestri and Wang (2018) found that d/Dhh students with high-achieving reading levels were able to use more evaluating strategies than d/Dhh students who had low-achieving reading levels. In the present study, this was also the case. Sarah was able to encourage the use of evaluating strategies (e.g., reflection on the reading and graphic organizers) more often than Carmen. Similar to the findings of Silvestri and Wang, the reading skills of students in Sarah's classroom were higher than those in Carmen's classroom; Carmen's students had additional disabilities. The students in Carmen's classroom also engaged with passages that were easier than the ones used by Sarah.

*Second Research Question:* How do teachers assess their d/Deaf and hard of hearing students' use of metacognitive strategies?

The finding of this study revealed only one type of metacognitive assessment that was used with d/Dhh students: think-aloud. Teachers also remarked about the possible use of a second type in the future; that is, showing students a list of strategies and asking them about the strategies that they used.

*Think aloud.* Both teachers depended heavily on think-aloud assessments to ascertain their students' metacognitive strategies. For example, teachers asked students about the strategies they used when they made errors—students were encouraged to “think aloud” in explaining or demonstrating the strategy. Carmen asked her students to use the pictures in the text as part of their explanation or demonstration.

The teachers in the present study remarked that the think-aloud strategy was the most valid metacognitive assessment that they used during classroom instruction. The validity of the think aloud approach has been supported by other researchers. For example, Gormley (1982) found that think-aloud could

be used with second grade d/Dhh students to improve their metacognitive strategies. Ericsson and Simon (1993) asserted that a think-aloud approach could be used to assess students' inner mental processes. Teachers could have ongoing conversations with students to understand their metacognitive strategies and describe why and the way they use them. Finally, Israel (2007) stated that the think-aloud technique could be used with students in different grades and asserted that it is an informal effective assessment because teachers can design their instruction and give immediate feedback to their students.

### **Metacognitive Strategies**

With respect to strategies, the findings of the present study revealed the most commonly used ones were metacognitive monitoring strategies, followed by the planning strategies. The evaluating strategies were used the least—with the only form being the think aloud approach. Based on these findings, we recommend that teachers rethink how to implement the use of metacognitive evaluating strategies, especially with the use of passages with headings. We suggest the following evaluation strategies: encourage the students to think and evaluate the writing style, writing quality and grammar, and difficulties of the texts. Student should be able to reveal their enjoyment of or struggles with the text and share their opinions and ideas with the teacher or with their peers. These activities can be implemented using the think together approach in social interactive contexts, which was effective in the present study.

Finally, teachers need to implement more metacognitive assessments. This study found that both teachers focused only on the think-aloud approach despite the fact that they could have utilized other metacognitive assessment such as an interview, as is explained in previous works. Teachers may combine think-aloud with other metacognitive assessments; that is, during either a formal or informal interview, teachers may ask their students to read and think aloud to explain the metacognitive strategies they use.

### **RECOMMENDATIONS FOR FUTURE RESEARCH**

There is still a need for additional research on metacognitive strategies and assessments with d/Dhh students. To increase our understanding of the effects of metacognition, researchers need to investigate a number of factors that affect the reading comprehension skills of d/Dhh students such as language factors, prior knowledge, and inferential ability. Future researchers should examine the relationships between language knowledge and the use of metacognitive strategies. For example, future researchers can explore how an improvement in vocabulary knowledge can assist students in using metacognitive strategies. It is also important for future researchers to explore the use of metacognitive strategies and assessments within the

context of the teacher-student relationship because a teacher's choice of strategy or assessment is most likely driven by the language/cognitive abilities of a student. More research should also be conducted on how to teach specific metacognitive strategies to d/Dhh students to enable them to use these strategies independently.

Researchers may desire to replicate the present study, involving more teachers and extending the timeframe (i.e., longer than a month). Metacognitive studies should also be undertaken with a younger group of d/Dhh students, particularly at the upper elementary level. There is also a need for future research on metacognition strategies to target d/Dhh students with additional disabilities (e.g., see the discussion in Luckner & Ayantoye, 2013).

## LIMITATIONS

One limitation of this study was the short timeframe. It is possible that utilizing a longer timeframe would have captured a greater breadth of information regarding the improvement of reading comprehension through the use of metacognitive strategies. This study was conducted with only two teachers at the middle school level. Thus, the findings of this study cannot be generalized to all teachers at this level.

Although the first investigator acted as a non-participant, his presence during the classroom observation—either during the brief in-person situations or the virtual learning mode—could have influenced the behavior and attitudes of the teachers and students. For example, the teachers were aware of the focus on examining metacognition—and this may have influenced their teaching strategies or perceptions because they became even more aware of the importance of metacognition in developing reading comprehension. The inquiry about the limited use of metacognitive evaluating strategies may have prompted or, perhaps, encouraged the discussion of using a list of metacognitive strategies in the future with their students.

Finally, as this study was conducted during the COVID-19 pandemic, the participating teachers had to teach students virtually using Zoom; this created a number of challenges. As this was the teachers' first experience using a synchronous virtual mode as the primary avenue of instruction for d/Dhh students, they were not sufficiently prepared to teach their students via Zoom. The students also had no previous experience with using Zoom. In essence, the effects of the pandemic might have influenced teachers' perceptions and students' interactions.

## CONCLUSION

There has been limited research on the effects of metacognition on English reading comprehension for d/Dhh children and adolescents. The extant literature has documented that metacognition has a

positive impact on reading comprehension for typical literacy learners and, in the limited research, on d/Dhh literacy learners. The present study documented the need for more instruction and additional research on the use of metacognitive strategies and assessments. In essence, there needs to be more research to delineate evidence-based teaching strategies. The delineation and eventual instruction of effective metacognitive strategies should contribute to the improvement of reading comprehension skills of d/Dhh children and adolescents.

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### Appendix A. Observation Checklist on Teachers’ Metacognitive Strategies

Planning (before reading)	Monitoring (during reading)	Evaluating (after reading)
<ul style="list-style-type: none"> <li>● Activating prior knowledge (vocabulary knowledge, text structure knowledge, content knowledge)</li> <li>● Overviewing, reading other materials, and previewing</li> <li>● Skimming before reading</li> <li>● Looking at the title and preparing to read more information about the topic</li> <li>● Time considerations</li> <li>● Think about reading level of the text</li> </ul>	<ul style="list-style-type: none"> <li>● Self-questioning</li> <li>● Prediction</li> <li>● Making inferences</li> <li>● Summarization</li> <li>● Graphic organizer</li> <li>● Looking for important information</li> <li>● Categorize the information</li> <li>● Connect to the main ideas</li> <li>● Looking at illustration or picture</li> <li>● Looking at title</li> <li>● Re-read the same sentences, paragraphs</li> <li>● Using other resources, such as a dictionary</li> <li>● Asking for help</li> <li>● Underline the words, and keep reading; then come back later</li> <li>● Peer tutoring (working with peers/ thinking with peers)</li> </ul>	<ul style="list-style-type: none"> <li>● Thinking about the text like the author (provide feedback to the authors)</li> <li>● Evaluating the text, writing style, writing quality, grammar, difficulties of the text, and reveal their enjoyment, struggle with the text, surprise, confusion, or their satisfaction</li> <li>● Anticipating how the knowledge is useful</li> <li>● Students are able to report awareness of author’s bias</li> </ul>

**Note:** This observation checklist is divided into three categories, planning, monitoring, and evaluating. Each category includes different types of metacognitive strategies (Baker & Brown,1984; Israel, 2007; Pressley & Afflerbach,1995; Schmitt, 2005).

### Appendix B. Documentation of Teachers’ Metacognitive Strategies

Data and place Teacher’s code	Time of the observation				
	Length of the observation				
Metacognitive strategy category	First observation	Second observation	Third observation	Fourth observation	Fifth observation
Planning strategies (before reading)					
Monitoring strategies (during reading)					
Evaluating strategies (after reading)					
Other strategies					

**Note:** This table will be used to record the type of metacognitive strategies that teachers use during reading instruction.

### Appendix C. Observation Checklist for Teachers' Metacognitive Assessments

Data and place Teacher's code	Time of the observation Length of the observation		
Type of assessment	When (before reading, during reading, after reading)	Descriptions of assessment and activity	Number of times during activities
Think aloud			
Interview			
Other type of assessment			

**Note:** This observation checklist has divided metacognitive assessments into three types: think aloud, observations, and interviews. Also, it includes an additional row if teachers use different types of assessments (see also, Israel, 2007).

### Appendix D: First Round of Interview Questions

Topic	Questions
Teachers' Backgrounds	<ul style="list-style-type: none"> <li>● Could you give me a brief overview about your educational background?</li> <li>● What is your current educational level? When and where did you earn your degree, and what was your major?</li> <li>● Are you licensed to teach d/Dhh students? What teaching license do you have at the national/state level?</li> <li>● How did you become interested in teaching d/Dhh students?</li> </ul>
Teachers' Employment	<ul style="list-style-type: none"> <li>● What do you do in a typical day in your job/in your position?</li> <li>● How long have you been teaching d/Dhh students?</li> <li>● How long have you been teaching reading?</li> <li>● What subjects do you teach to your d/Dhh students?</li> <li>● What is your students' grade level?</li> <li>● Have you taught d/Dhh students in different educational settings (e.g., total communication, oral, bilingual-bicultural)?</li> </ul>
Communication	<ul style="list-style-type: none"> <li>● What is your students' communication preference (e.g., American Sign Language, spoken English, signed English, etc.)?</li> <li>● When your students sign English, do they speak and sign simultaneously?</li> <li>● What is their home language?</li> </ul>
Reading instruction and comprehension	<ul style="list-style-type: none"> <li>● What do you think makes for effective reading teaching?</li> <li>● How did you come to that conclusion?</li> <li>● How would you describe your d/Dhh students as readers (e.g., reading on grade or age level)?</li> <li>● How do you assess your students' reading comprehension?</li> </ul>

**Appendix E: Types of Metacognitive Strategies and Assessments**

	Types of metacognitive planning strategies/ before reading strategies	Assessment	Common strategies
Teacher one	<ul style="list-style-type: none"> <li>● Teaching vocabulary</li> <li>● Activate students’ experiences</li> <li>● Teaching grammar</li> <li>● Prediction</li> </ul>	Think-aloud	Focus heavily on the vocabulary
Teacher two	<ul style="list-style-type: none"> <li>● Vocabulary review</li> <li>● Activate students’ experiences</li> <li>● Prediction</li> <li>● Think together</li> </ul>	Think-aloud	Activate students’ experiences
	Types of metacognitive monitoring strategies/during reading strategies	Assessment	Common monitoring strategies
Teacher one	<ul style="list-style-type: none"> <li>● Think together</li> <li>● Self-questioning</li> <li>● Prediction</li> <li>● Summarization</li> <li>● Graphic organizer</li> <li>● Looking at the title headings</li> <li>● Looking for important information</li> <li>● Using context clues to figure out sentences or words’ meanings.</li> <li>● Categorizing the information.</li> </ul>	Think aloud	<ul style="list-style-type: none"> <li>● Looking at illustrations or pictures.</li> <li>● Re-reading the same sentences, paragraphs</li> </ul>
Teacher two	<ul style="list-style-type: none"> <li>● Looking at illustrations or pictures.</li> <li>● Re-reading the same sentences, paragraphs</li> <li>● Using other resources, such as a dictionary</li> <li>● Underlining the words, continuing to read; coming back later</li> <li>● Read in English and translate into ASL</li> </ul>	Think aloud	<ul style="list-style-type: none"> <li>● Read in English and translate into ASL</li> <li>● Think together</li> <li>● Using context clues to figure out sentences or words’ meanings</li> </ul>
	Types of metacognitive evaluating strategies/after reading strategies	Assessment	Common evaluating strategies
Teacher one	<ul style="list-style-type: none"> <li>● Reflect on the reading</li> <li>● Vocabulary review</li> </ul>	Think aloud	Vocabulary review
Teacher two	<ul style="list-style-type: none"> <li>● Graphic organizers (Teacher two only)</li> </ul>	Think aloud	Vocabulary review

**Note:** This table shows metacognitive strategies and assessments used by both teachers. This table also shows the most common strategies in each category.

**Appendix F: Comparison of Teachers' Use of Metacognitive Strategies and Assessments**

		Teacher one					Teacher two				
		1	2	3	4	5	1	2	3	4	5
Planning strategies/ Before reading	Vocabulary review	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Overview of the sentence structure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Overview of the information in the text	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitoring Strategies/ During reading	Think together	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Self-questioning		✓	✓		✓		✓	✓	✓	
	Prediction		✓	✓	✓	✓	✓	✓	✓	✓	
	Summarization		✓	✓	✓	✓	✓	✓	✓		
	Graphic organizers		✓		✓	✓		✓	✓		✓
	Looking at the title headings	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Looking for important information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Using context clues to figure out sentences' or words' meanings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Categorizing the information	✓	✓	✓	✓	✓	✓		✓		✓
	Looking at illustrations or pictures	✓	✓	✓	✓	✓	✓		✓		✓
	Re-reading the same sentences and paragraphs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reading in English and translating into ASL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Using other resources, such as a dictionary							✓		✓		
Underlining the words, continuing to read, and coming back later	✓	✓		✓		✓		✓		✓	
Evaluating Strategies/ After reading	Reflecting on the reading		✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reviewing vocabulary	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Using graphic organizers	✓		✓	✓		✓	✓	✓		✓
Metacognitive assessment	Think-aloud	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Students' grade levels	7th graders d/ Dhh students with additional disabilities					8th graders d/Dhh students				
	Students' reading levels	Reading grades ranged from 2nd grade to 5th grade					Reading levels range from 5th grade to 6th grade				

**Note:** Similarities and differences regarding metacognitive strategies and assessments are determined from the analysis of the data collected during a one-month period.



## MOLECULAR-GENETIC TYPING OF VNTR POLYMORPHISM eNOS GENE IN HUMAN POPULATION OF TUZLA CANTON

*Original scientific paper*

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### ABSTRACT

*The aim of the paper is to present the results of the VNTR gene polymorphism genetic variants molecular typing for endothelial nitric oxide synthase (eNOS) in human population of Tuzla Canton. Based on the analysis of the distribution of eNOS gene genotypes in the total sample of respondents, the highest frequency was recorded for the (b/b) genotype, which was 73.0%. For the heterozygous (a/b) genotype of the eNOS gene, a frequency of 24.0% was determined, and a frequency of 3.0% was recorded for the (a/a) genotype. The research resulted in a database of local and global significance, namely, the incorporation of these data into the existing regional and European genetic database.*

**Keywords:** Polymorphism, eNOS, Tuzla Canton

### INTRODUCTION

There is a great number of candidate genes that are associated with the development and occurrence of complex diseases. With regard to the significance of molecular research and diagnostics related to different types of diseases or predispositions for different diseases, the aim of this paper was the determination of allele and genotype frequencies of the eNOS gene in human population of Tuzla Canton. The presence of eNOS gene genotypes was analyzed according to sex and age groups of the respondents.

Nitric oxide (NO) is a vasoactive substance that is synthesised from L-arginine by neuronal (NOS1), endothelial (NOS3) and inducible (NOS2) nitric oxide synthases (Oliveira-Paula et al., 2016). Endothelial NOS (eNOS) is one of three isoforms of nitric oxide synthase enzymes (NOS), which is very important for maintaining the production of nitric oxide (NO), namely, for the regulation of cardiovascular homeostasis (Petranovic, 2013). Reduced production or activity of NO directly contributes to heart dysfunction (Thomas et al., 2013; Petranovic, 2013).

NOS3 gene is located in the 7q35-7q36 chromosome region of 7-th human chromosome (Marsden et al., 1993). There have been several polymorphisms of the eNOS gene of which three indicate the correlation with disease pathophysiology (Petranovic, 2013).

The role of eNOS gene three clinically significant polymorphisms: variable number of tandem repeats of 27 bp in intron 4 (VNTR 4b/a) (the longer allele has five tandem repeats of 27 bp (4b) while the shorter allele has four repeats (4a) (rs61722009)), a thymine (T) to cytosine (C) substitution at position 786 (rs2070744), and a guanine (G) to thymine (T) substitution in exon 7 at nucleotide position 894 (Glu298Asp) (rs1799983) has been the subject of various studies (Aziz Abbas et al., 2016; Thameem et al., 2008; Sivri et al., 2014; Afef et al., 2016).

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## MATERIALS AND METHODS

The study included 100 male and female respondents aged above 18 from the local population of Tuzla Canton. The study was conducted in accordance with the ethical principles as per the Declaration of Helsinki of the World Health Organization (WHO). One part of the molecular analysis, the isolation of the deoxyribonucleic acid sample (DNA) was conducted in the Laboratory for Genetics and Microbiology at the department of Biology, Faculty of Natural Sciences and Mathematics, University of Tuzla, while the molecular genetic DNA typing was performed in the Laboratory for Human Genetics at the Institute for Genetic Engineering and Biotechnology (INGEB), University of Sarajevo. Total genomic DNA was isolated from EDTA anti-coagulated whole blood using the FlexiGene DNA isolation Kit (Qiagen, GmbH, Hilden, Germany). Using the polymerase chain reaction, DNA segments of the eNOS gene were amplified according to the protocol (Ramírez-Patiño et al., 2013) that have been additionally optimized. The in vitro synthesis reaction was performed on a device for the polymerase chain reaction (Applied Biosystems, GeneAmp PCR System 9700) and Mastercycler gradient (Eppendorf, Njemačka). The PCR reaction of the final volume of 10  $\mu$ L contained 100 ng of the genome's DNA, 5  $\mu$ L of REDTaq® ReadyMix™ PCR Reaction Mix (Sigma Aldrich, Munich, Germany), 0,2  $\mu$ L of the primer (5' AGG CCC TAT GGT AGT GCC TTT-3' and 5'-TCT CTT AGT GCT GTG GTC AC-3') (Ramirez-Patino et al., 2013) and 3,6  $\mu$ L of sterile deionized water. The examination of the amplified PCR products of the eNOS gene was done by electrophoresis on a 2% agarose gel to which 5  $\mu$ L of Midori Green were added (Nippon Genetics Europe GmbH, Germany). In order to separate the amplified products, an ABI PRISM®3500 automatic sequencer (Genetic Analyser 3500, Applied Biosystems) was used, with eight capillaries 50 cm long, which enabled the separation and analysis of DNA fragments on the basis of capillary electrophoresis as well as detection by a CCD camera. ABI PRISM® PRISM Genotyper Software was used for the analysis and interpretation of the observed loci, which enabled the quantification and conversion of the results into the results for the genetic database.



Figure 2. Electropherogram of eNOS gene (390 and 417 bp; 417 bp; 417 bp; 390 and 417 bp) detected by capillary electrophoresis on ABI PRISM®3500 genetic analyser (Genetic Analyser 3500, Applied Biosystems)

Deviation of allele and genotype distribution from the Hardy-Weinberg equilibrium was assessed by the ( $\chi^2$ ) chi square test. Statistical significance was set at a P value of < .05.

## RESULTS

The study included 100 healthy male and female respondents from the local population of Tuzla Canton. Allele and genotype frequency of the eNOS gene was determined. Concerning the distribution of the respondents according to sex, 51 female respondents (51.0%) and 49 male respondents (49.0%) were analyzed in the total sample.

The respondents were divided into four age groups:  $\leq 44$ , 45-65, 66-85 and  $\geq 86$ . In the age group  $\leq 44$ , 31 respondents (31.0%) were analyzed. In the age group 45-65 years, 54 respondents (54.0%) were analyzed. In the age group 66-86 years, 14 respondents (14.0%) were analyzed, and in the age group  $\geq 86$  year, one respondent (1.0%) was analyzed (Figure 1).

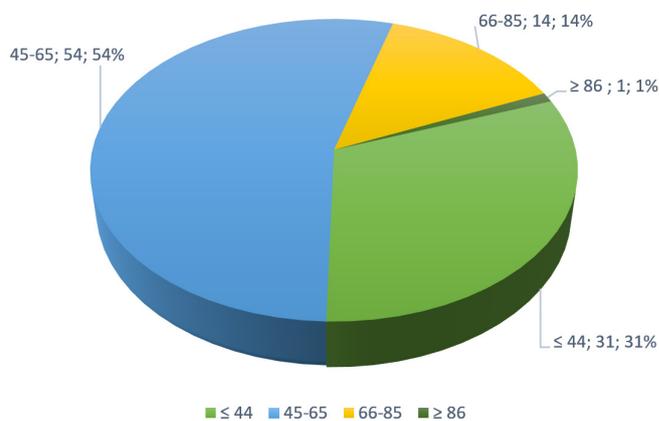


Figure 1. Distribution of respondents according to age group

Molecular genotyping of the eNOS 4a/b genotypes was detected by capillary electrophoresis on the ABI PRISM®3500 genetic analyzer (Genetic Analyser 3500, Applied Biosystems).

We determined that the 390 bp fragment represents a polymorphic genotype (a/a, 4 repeats). Two fragments at 390 and 417 bp indicated a heterozygous genotype (a/b), and fragment at 417 bp that represents the wild-type genotype (b/b; 5 repeats) (Figure 2).

The genotype distribution (absolute and relative genotype frequencies) of the eNOS gene (4a/b) was analyzed in 100 respondents of both sexes. Based on the results of molecular detection, there were 3 respondents of the (a/a) genotype, 24 respondents of the (a/b) genotype and 73 respondents of the

(b/b) genotype. The analysis of allele and genotype distribution of the eNOS 4a/4b polymorphisms in subsamples according to sex indicated the highest frequency for the bb genotype, which was registered in 38 (38.0%) female respondents and 35 (35.0%) male respondents (Table 1).

Table 1. Absolute and relative genotype frequencies of eNOS gene according to sex

eNOS 4(a/b)	N (%)	Sex		Total
		Female	Male	
Genotype (aa)	N (%)	1 (1.0%)	2 (2.0%)	3 (3.0%)
Genotype (ab)	N (%)	12 (12.0%)	12 (12.0%)	24 (24.0%)
Genotype (bb)	N (%)	38 (38.0%)	35 (35.0%)	73 (73.0)
Total	N (%)	51 (51.0%)	49 (49.0%)	100 (100.0%)

The analysis of statistical ( $\chi^2$ ) significance by comparing the presence of genotypes of the eNOS gene according to sex of the respondents did not show any significant differences in the distribution ( $\chi^2 = .417$ ;  $df = 2$ ;  $p = .812$ ;  $p > .05$ ) (Table 1).

The allele frequency according to sex in the investigated loci was obtained by the determination (counting) of alleles from genotype values. The allele frequency (a) was 7.0% in the female respondents and 8.0% in the male respondents. The allele frequency (b) was 44.0% in the female respondents and 41.0% in the male respondents (Table 2).

Table 2. Absolute and relative allele frequencies of eNOS gene in subsamples according to sex

eNOS 4a/b	Sex		Total N=100 (100.0%)
	Female N=51 (51.0%)	Male N=49 (49.0%)	
Allele (a)	14 (7.0%)	16 (8.0%)	30 (15.0%)
Allele (b)	88 (44.0%)	82 (41.0%)	170 (85.0%)

The obtained results of differences in allele frequency of the eNOS gene according to sex of the respondents using a chi-square ( $\chi^2$ ) test did not indicate any significant differences in the distribution ( $\chi^2 = .436$ ;  $df = 1$ ;  $p = .607$ ;  $p > .05$ ).

The genotype distribution of the eNOS gene was also analyzed according to age groups of the respondents ( $\leq 44$ , 45-56, 66-85 and  $\geq 86$ ) (Table 3 and 4).

Table 3. Absolute and relative genotype frequencies of eNOS gene according to age groups

eNOS 4a/b	Age group				Total
	$\leq 44$	45-65	66-85	$\geq 86$	
Genotype (aa)	1 (1.00%)	2 (2.00%)	0 (.00%)	0 (.00%)	3 (3.0%)
Genotype (ab)	7 (7.00%)	13 (13.00%)	4 (4.00%)	0 (.00%)	24 (24.0%)
Genotype (bb)	23 (23.00%)	39 (39.00%)	10 (10.00%)	1 (1.00%)	73 (73.0%)
Total	31 (31.00%)	54 (54.00%)	14 (14.00%)	1 (1.00%)	100 (100.0%)

In all age groups, the highest relative frequency was registered for the (b/b) genotype.

The absolute genotype frequency of the eNOS gene according to age groups and sex is shown in Table 4.

Table 4. Absolute genotype frequencies of eNOS gene according to age groups and sex

eNOS 4a/b	Age group								Total
	$\leq 44$		45-65		66-85		$\geq 86$		
	Female	Male	Female	Male	Female	Male	Female	Male	
Genotype (aa)	0	1	1	1	0	0	0	0	3
Genotype (ab)	1	6	9	4	2	2	0	0	24
Genotype (bb)	11	12	21	18	5	5	1	0	73
Total	12	19	31	23	7	7	1	0	100

Also, genotype frequency of the eNOS gene was analyzed according to sex, individually in each age group of the respondents. All age groups of the respondents according to sex indicate approximately the same frequencies for each genotype of the eNOS gene individually (Table 4).

## DISCUSSION

In this study, the VNTR polymorphism of the eNOS gene was genotyped in the sample of 100 respondents from Tuzla Canton. In the total sample, 3.0% of the respondents of the (a/a) genotype, 24.0% of the respondents of the (a/b) genotype and 73.0% of the (b/b) genotype were determined. Endothelial nitric oxide synthase (eNOS) is essential for maintaining vascular homeostasis and has a vital role in modulating vascular endothelial function. Therefore, if a polymorphism can impact gene expression or protein structure of eNOS, it is likely that this polymorphism may lead to severe vascular endothelial dysfunction and influence predisposition to cardiovascular diseases (CVD) (Yu et al., 2020). Afef et al. (2016) analyzed the genotype presence of the eNOS gene in the Tunisian population, according to sex and age of the respondents. In the group of the female respondents with CVD, the genotype (a/a) frequency was 2.8%, and in the control group it

was 7.6% OR (95% CI) = 7.19 (1.72-30.02). For the ab genotype in the group of the female respondents with CVD, the registered frequency was 69.8% and in the control group it was 26.1% OR (95% CI) = 1.1 (0.26-4.60). This study determined the frequency of 27.4% for the (b/b) genotype in the group of the female respondents with CVD, while in the control group it was 63.3% OR (95% CI) = 1. In the group of the male respondents with CVD the registered frequency for the (a/a) genotype was 2.1% and in the control group it was 4.5% OR (95% CI) = 3.54 (0.67-18.68). In the group of the male respondents with CVD, the frequency of the (a/b) genotype was 59.4% and it was 36.4% in the control group OR (95% CI) = 1.41 (0.27-7.35). The frequency of the (b/b) genotype in the group of the male respondents with CVD was 38.5% and in the control group it was 59.1% OR (95% CI) = 1.

Our study in the sample of 100 respondents from Tuzla Canton shows no statistically significant differences in the genotype distribution of the eNOS gene according to sex and age categories of the respondents ( $p > .05$ ).

Table 5 gives a comparative representation of eNOS gene genotype frequencies in human population from Tuzla Canton with literature data.

Table 5. Comparative representation of genotype frequencies of eNOS gene in human population of Tuzla Canton with literature data

Population	Reference	Control group of respondents	Genotype frequency of eNOS gene (4a/4b)		
			aa	ab	bb
Sudan	Gamil et al., 2017	(N=78)	3 (3.8%)	25 (32.1%)	50 (64.1%)
Turkey	Sezgin et al., 2017	(N=61)	1 (1.6%)	14 (23.0%)	46 (75.4%)
Tunisia	Afef et al., 2016	(N=162)	10 (6.3%)	48 (30.4%)	100 (63.3%)
India	Narne et al., 2013	(N=121)	2 (1.6%)	42 (34.7%)	77 (63.6%)
Tunisia	Kallel et al., 2013	(N=225)	3 (1.3%)	58 (25.8%)	164 (72.9%)
Italy	Fatin et al., 2013	(N)=544)	14 (3.0%)	138 (25.0%)	392 (72.0%)
Turkey	Mehmetoğlu et al., 2010	(N=75)	1 (1.3%)	16 (21.33%)	58 (77.33%)
Turkey	Agirbasil et al., 2006	(N=100)	0 (.0%)	21 (21.0%)	79 (79.0%)
Slovenia	Milutinovic et al., 2005	(N=188)	10 (5.3%)	58 (30.9%)	120 (63.8%)
Tuzla Canton	Results of this research	(N=100)	3 (3.0%)	24 (24.0%)	73 (73.0%)

Comparison of our results with data from relevant literature sources has determined that polymorphism frequencies of the eNOS gene in the sample of healthy respondents from Tuzla Canton is in the scope of variations of values for this parameter with the literature data.

## CONCLUSION

Preliminary results of the eNOS gene molecular genetic characterization in human population of Tuzla Canton as well as the Bosnian-Herzegovinian population are obtained by the realization of this study. The results represents a starting point for further research on the estimation of sensitivity and informativeness,

especially in terms of the relating the eNOS gene polymorphisms with cardiovascular diseases. Testing new DNA polymorphisms as potential new markers in molecular diagnostics as well as analyzing and extending the number of the selected sample should continue in the future.

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## DEVELOPMENT OF MACEDONIAN MONOSYLLABIC AND DISYLLABIC TESTS FOR SPEECH AUDIOMETRY

*Original scientific paper*

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### ABSTRACT

*The aim of the study was to develop Macedonian monosyllabic and disyllabic tests for speech audiometry, to record the speech materials, and to conduct clinical validation of the tests. The following criteria were applied: word familiarity, phonetic balance, and homogeneity of audibility. Clinical validation was conducted on a sample of 30 normal hearing subjects, aged 18 to 30 years. We developed four open-set tests for speech threshold and suprathreshold testing in quiet. The tests contain two word lists with 50 monosyllabic words and two word lists with 36 disyllabic words. Each word was introduced by a carrier phrase. Psychometric function slope from 20% to 80% correct recognition for all words was 5%/dB. The difference between the presentation levels at which the subjects repeated all the words was  $\leq 4$  dB. Developed phonetically balanced word lists have relatively steep psychometric function slope and they are homogeneous in terms of the audibility.*

**Keywords:** development, Macedonian word lists, speech audiometry

### INTRODUCTION

Speech audiometry is a method of evaluating how well a patient can hear and understand specific types of speech stimuli (Kramer & Brown, 2019). Speech materials are presented by monitored live voice or recorded speech materials are used (Lawson & Peterson, 2011). The words could be presented in an *open-set* format, which means that the patient must respond without any prior knowledge of what the possible alternatives might be, or a *closed-set* format, which means that the patient is provided with a choice of several possible response alternatives (Gelfand, 2016). It is common practice to utilize a carrier phrase such as “Say the word...” prior

to presentation of the word, although this is not always performed (DeRuiter & Ramachandran, 2017). The speech stimuli are presented in quiet or with addition of background noise (McArdle & Hnath-Chisolm, 2015). Many types of speech materials can be used to perform speech audiometry. The choice of materials depends on the type of the testing: threshold or suprathreshold testing. The speech detection threshold (SDT) is established by presenting familiar words, connected speech, spondaic words, or even repeated nonsense syllables (Stach, 2010). Spondaic words or *spondees* are also used for determining speech recognition threshold (SRT).

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Spondees are two syllable words that have equal stress on each syllable. Examples are words such as *baseball*, *sidewalk*, *hot dog* and *ice cream* (DeRuiter & Ramachandran, 2017). The most common way to describe suprathreshold hearing ability is with word recognition measures. Word recognition score (WRS) is determined by presenting monosyllable words at suprathreshold level (Stach, 2010). Sentences are also used for suprathreshold speech recognition testing (Bess & Humes, 2008).

In development of speech audiometry tests, the authors applied various criteria, such as: phonemic balance, balance of the number of syllables, use of disyllabic words in languages where there are no spondaic words, use of disyllabic words for suprathreshold testing instead of monosyllable words, introducing the words with and without carrier phrase, selection of the words depending on the density of lexical neighbourhood and other rules depending on the specifics of the language in which the test was developed. However, some criteria were considered essential in selecting test items for measuring speech recognition including word familiarity, phonetic balance, and homogeneity of audibility. The same criteria are applied in development of tests for adults and children (Diefendorf, 2015).

It is generally accepted that *word familiarity* increases test scores (Lawson & Peterson, 2011). Word familiarity ensures that we measure auditory threshold, not vocabulary knowledge (Ramkissoon, 2001). The authors could ask linguist for help to select familiar words, but, it can be done in another way, for example, with rating the word familiarity and selection of words that are more familiar. Word familiarity must be considered especially when testing children. There is a well-established effect of word frequency, with a significant bias favoring the recognition of words with a higher frequency of occurrence compared with lower-frequency words (Gelfand, 2016).

*Phonetic balance* means that the phonetic composition of the word lists is equivalent and representative of everyday speech in that language (Bess & Humes, 2008). The relative frequencies of the phonemes in the test list are as close as possible to the distribution of speech sounds used in that language. A phonetic balance of monosyllabic word materials is based on analysis of large number of words used in newspaper articles, words used in certain conversations or the most common words in the language (Gelfand, 2016).

*Homogeneity of audibility* refers to the presentation level at which the speech stimuli are heard. If the words are homogenous with respect to audibility, they all are just recognizable at about the same speech intensity level (Stach, 2010). If the word lists are not homogeneous in respect to audibility, homogeneity could be achieved by digital adjusting of the recorded speech materials (Gelfand, 2016).

The aim of the study was to develop Macedonian monosyllabic and disyllabic test for speech audiometry, to record the speech materials, and to conduct clinical validation in order to determine whether the word lists are homogeneous in terms of audibility.

## METHODS

In this prospective study we developed four tests for speech threshold and suprathreshold testing in quiet. The tests are in an open-set format. They contain two word lists with 50 Macedonian monosyllabic words and two word lists with 36 disyllabic words and are suitable for testing children and adults. The following criteria were applied during the test development: word familiarity, phonetic balance, and homogeneity of audibility. In the early stages of the research we performed acoustic analysis of Macedonian vowels and consonants in the computer program Praat and analysis of coarticulation in nonsense syllables and real words. These results are not presented in this paper.

The words were selected from the *Orthographic dictionary of the Macedonian standard language* (Koneski, 1999) and *Digital dictionary of the Macedonian language*. The final word lists were approved by two linguists. We calculated the frequency of occurrence of Macedonian phonemes in order to develop phonetically balanced word lists. For this purpose we used a corpus of 178 sentences containing the most frequent words in Macedonian language. The sentences were previously selected from about 2.5 million electronic articles from the Macedonian internet portals in study for development of Macedonian text-to-speech system (Peshanski, 2018).

Developed word lists were recorded in Macedonian Radio Television. Each word was presented with the carrier phrase: "Say the word..." recorded at the same intensity level as the words. There are eight recordings because all words in the four word lists were pronounced by a male and a female speaker. A Sennheiser e840 microphone (Sennheiser electronic, Germany) was used during the recording, placed at a distance of 5-10 cm from the mouth. Digital recording of the speech used a sampling frequency of 44,100 samples per second.

Homogeneity of audibility was determined during clinical validation of word lists conducted on a sample of 30 normal hearing subjects, 15 males and 15 females, aged 18 to 30 years (mean age of 24.3±3.6 years), examined at the Department of Otorhinolaryngology, Division of Audiology, City General Hospital "8<sup>th</sup> September" Skopje. Pure tone audiometry and speech audiometry were performed with MADSEN Astera<sup>2</sup> audiometer (GN Otometrics, Denmark) and Sennheiser HDA 300 (Sennheiser electronic, Germany) circumaural earphones in sound proof booth. Hearing threshold was obtained with modified Hughson-Westlake technique for frequencies from 125 to 8000 Hz. Speech detection threshold, speech recognition threshold, and word recognition score were determined in all participants. For this purpose we used recorded speech materials pronounced by a female speaker.

The study was approved by the Ethics committee of City General Hospital "8<sup>th</sup> September" Skopje. The Protocol number of Ethical approval is: 24/89-1/2019.

**RESULTS**

We calculated the frequency of occurrence of Macedonian phonemes in order to develop phonetically balanced word lists. The vowel /a/ (a) has the highest frequency of occurrence in Macedonian language, and the consonant /s/ (dz) has the lowest frequency.

Macedonian phonemes are given along with their transcription into International Phonetic Alphabet (IPA) symbols in parentheses. Phonemes in the tests have a similar frequency of occurrence as phonemes in the sentence corpus. Frequency of occurrence of Macedonian vowels in sentence corpus and four word lists is displayed in Table 1.

Table 1. Frequency of occurrence of Macedonian vowels in sentence corpus and four word lists

Vowels	Corpus	Test 1	Test 2	Test 3	Test 4
MKD (IPA)	No (%)	No (%)	No (%)	No (%)	No (%)
a (a)	1498 (12.9)	17 (10.1)	17 (9.9)	23 (13.5)	24 (13.5)
o (o)	1165 (10)	11 (6.5)	11 (6.4)	18 (10.5)	16 (9)
e (e)	1078 (9.3)	10 (5.9)	10 (5.8)	18 (10.5)	16 (9)
и (i)	1057 (9.1)	9 (5.3)	9 (5.2)	9 (5.3)	10 (5.6)
y (u)	287 (2.5)	3 (1.8)	3 (1.7)	4 (2.3)	6 (3.4)

The phonemes are displayed in order, starting with the most frequent sound and parallel to the phonemes in sentence corpus. The sentences contain 2439 words and 11629 phonemes, 5085 (43.7%) vowels and 6544

(56.3%) consonants. Frequency of occurrence of Macedonian consonants in sentence corpus and word lists is displayed in Table 2.

Table 2. Frequency of occurrence of Macedonian consonants in sentence corpus and four word lists

Consonants	Corpus	Test 1	Test 2	Test 3	Test 4
MKD (IPA)	No (%)	No (%)	No (%)	No (%)	No (%)
т (t)	816 (7)	13 (7.7)	14 (8.1)	13 (7.6)	12 (6.7)
н (n)	799 (6.9)	12 (7.1)	11 (6.4)	8 (4.7)	9 (5.1)
р (r)	588 (5.1)	10 (5.9)	11 (6.4)	8 (4.7)	9 (5.1)
с (s)	512 (4.4)	10 (5.9)	11 (6.4)	8 (4.7)	9 (5.1)
в (v)	475 (4.1)	9 (5.3)	10 (5.8)	8 (4.7)	8 (4.5)
д (d)	467 (4)	8 (4.7)	10 (5.8)	7 (4.1)	8 (4.5)
к (k)	419 (3.6)	8 (4.7)	9 (5.2)	7 (4.1)	8 (4.5)
л (l)	365 (3.1)	7 (4.1)	8 (4.7)	5 (2.9)	6 (3.4)
м (m)	321 (2.8)	4 (2.4)	5 (2.9)	5 (2.9)	6 (3.4)
п (p)	302 (2.6)	4 (2.4)	4 (2.3)	3 (1.8)	4 (2.2)
г (g)	211 (1.8)	4 (2.4)	4 (2.3)	3 (1.8)	3 (1.7)
б (b)	193 (1.7)	4 (2.4)	4 (2.3)	3 (1.8)	3 (1.7)
ј (j)	187 (1.6)	4 (2.4)	4 (2.3)	3 (1.8)	3 (1.7)
з (z)	171 (1.5)	4 (2.4)	3 (1.7)	2 (1.2)	2 (1.1)
ш (ʃ)	144 (1.2)	3 (1.8)	2 (1.2)	2 (1.2)	2 (1.1)
ч (tʃ)	111 (1)	3 (1.8)	2 (1.2)	2 (1.2)	2 (1.1)
ц (tʰ)	104 (.9)	2 (1.2)	1 (.6)	2 (1.2)	2 (1.1)
ж (ʒ)	64 (.6)	2 (1.2)	1 (.6)	2 (1.2)	2 (1.1)
ф (f)	60 (.5)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
ќ (c)	53 (.5)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
х (h)	52 (.4)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
њ (ɲ)	36 (.3)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
џ (dʒ)	31 (.3)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
ѓ (ɟ)	28 (.2)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
љ (ʎ)	21 (.2)	1 (.6)	1 (.6)	1 (.6)	1 (.6)
ѕ (dʒ)	14 (.1)	1 (.6)	1 (.6)	1 (.6)	1 (.6)

The consonant /t/ (t) has the highest frequency from all consonants. Test 1 contains 169 phonemes, 50 vowels (29.6%) and 119 consonants (70.4%). Test 2 contains 172 phonemes, 50 vowels (29.1%) and 122 consonants (70.9%). Test 3 contains 171 phonemes, 72 vowels (42.1%) and 99 consonants (57.9%). Test 4 contains 178 phonemes, 72 vowels (40.4%) and 126 consonants (59.6%). Test 3 and Test 4 are consisted of disyllabic words and each word contains two vowels as a nucleus of the syllables.

Syllable structure in monosyllabic tests and the number of words with that structure is displayed in Table 3. The syllables contain different combinations of consonants (C) and vowels (V). The CVC syllable structure was the most frequent.

Table 3. Syllable structure in monosyllabic tests

Syllable structure	Test 1	Test 2	Total
	No (%)	No (%)	No (%)
CVC	27 (27)	28 (10.1)	55 (55)
CCVC	12 (12)	14 (6.5)	26 (26)
CVCC	8 (8)	8 (8)	16 (16)
CCV	2 (2)	/ (0)	2 (2)
CV	1 (1)	/ (0)	1 (1)
Total	50 (50)	50 (50)	100 (100)

Syllable structure in disyllabic tests and number of words with that structure is displayed in Table 4.

Table 5. Frequency of the word classes in four word lists

Word classes	Test 1	Test 2	Test 3	Test 4	Total
	No (%)				
Nouns	38 (22.1)	37 (21.5)	27 (15.7)	27 (15.7)	129 (75)
Adjectives	7 (4.1)	13 (7.6)	2 (1.2)	4 (2.3)	26 (15.1)
Verbs	/ (0)	/ (0)	6 (3.5)	4 (2.3)	10 (5.8)
Numerals	2 (1.2)	/ (0)	/ (0)	/ (0)	2 (1.2)
Adverbs	/ (0)	/ (0)	1 (.6)	1(.6)	2 (1.2)
Pronouns	1 (.6)	/ (0)	/ (0)	/ (0)	1 (.6)
Prepositions	1 (.6)	/ (0)	/ (0)	/ (0)	1 (.6)
Particles	1 (.6)	/ (0)	/ (0)	/ (0)	1 (.6)
Total	50 (29.1)	50 (29.1)	36 (20.9)	36 (20.9)	172 (100)

All participants included in clinical validation of the tests had pure tone average (PTA) and SDT  $\leq$  10 dB HL. SRT was 16 dB HL. WRS was determined at starting level of 10 dB SL (re: SRT). Only the right ear was tested at three presentation levels in 2 dB increments. A total of 1500 words were repeated from the Test 1 and Test 2, and 1080 words from the Test 3 and Test 4. Percentage of repeated words at different presentation levels is displayed in Figure 1. Most of the words in all tests were repeated at the level of 26 dB. The difference between the presentation levels at which the subjects repeated all the words was  $\leq$  4 dB.

The CVCCV syllable structure was the most frequent, followed by CVCV, CVCVC, and CCVCV syllable structure. Other syllable structures were represented in a smaller percentage.

Table 4. Syllable structure in disyllabic tests

Syllable structure	Test 3	Test 4	Total
	No (%)	No (%)	No (%)
CVCCV	10 (13.9)	10 (13.9)	20 (27.8)
CVCV	11 (15.3)	8 (11.1)	19 (26.4)
CVCVC	5 (6.9)	9 (12.5)	14 (19.4)
CCVCV	5 (6.9)	3 (4.2)	8 (11.1)
CVCCVC	2 (2.8)	2 (2.8)	4 (5.6)
VCCVC	1 (1.4)	/ (0)	1 (1.4)
VCVC	1 (1.4)	/ (0)	1 (1.4)
CVCCCV	1 (1.4)	/ (0)	1 (1.4)
CVCCVCV	/ (0)	1 (1.4)	1 (1.4)
CCVCVC	/ (0)	1 (1.4)	1 (1.4)
CCVCCV	/ (0)	1 (1.4)	1 (1.4)
Total	36 (50)	36 (50)	72 (100)

Frequency of the word classes in four word lists is displayed in Table 5. The most frequent words in all tests were the nouns, followed by the adjectives, and the verbs. Other word classes were represented in a smaller percentage.

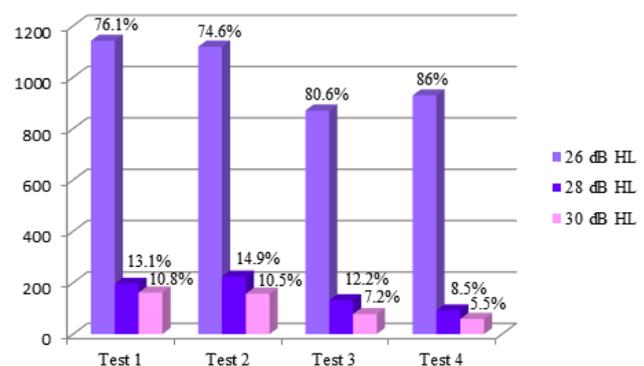


Figure 1. Percentage of repeated words at different presentation levels

Mean psychometric function for all monosyllabic and disyllabic words repeated from 30 normal hearing subjects is displayed in Figure 2.

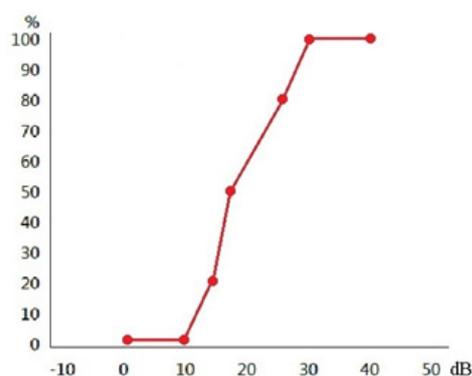


Figure 2. Mean psychometric function for monosyllabic and disyllabic words

We obtained 100% word recognition at the level 30 dB HL in all subjects. Psychometric function slope from 20% to 80% correct recognition was calculated manually and the value was 5%/dB. The slope of a word recognition function expresses the relation between the change in correct recognition performance ( $\Delta y$ ) and the change in the presentation level of the speech signal ( $\Delta x$ ) that is expressed as  $\Delta y/\Delta x$ . The performance 80% is obtained at 26 dB HL, and the performance 20% is obtained at 14 dB HL. According to the form  $\Delta y/\Delta x$ ,  $60\%/12 \text{ dB} = 5\%/dB$ .

## DISCUSSION

We developed Macedonian monosyllabic and disyllabic tests for speech audiometry by applying the following criteria: word familiarity, phonetic balance, and homogeneity of audibility. Two linguists confirmed that the words in the tests are familiar for children and adults. The word familiarity could be ensured at different ways. Garadat, Abdulbaqi & Haj-Tas (2017) presented an initial list of speech stimuli to a sampled population in a form of survey to rate their familiarity with these words. Stimuli that were selected to be included in the final lists had a high familiarity index. Development of the tests was preceded by an acoustic analysis of Macedonian vowels and consonants, as well as, analysis of coarticulation in nonsense syllables and real words. Two sets of acoustic measurements were made in analysis of vowels: fundamental frequency ( $F_0$ ) and formant frequencies from  $F_1$  to  $F_5$ . Spectral characteristics of the consonants were analyzed by determining the spectral moments: center of gravity, spectral standard deviation, skewness and kurtosis. Formant frequencies and  $F_0$  in children were higher than formant frequencies and  $F_0$  in men and women. The consonants as isolated phonemes had concentration of acoustic energy in lower frequencies in comparison to consonants in vowel context.  $F_2$  transition is an acoustic cue for the place of articulation in speech perception (Ristovska et al., 2018; Ristovska et al., 2019; Jachova, Ristovska & Spasov, 2021).

The frequency of occurrence of Macedonian phonemes was calculated from the corpus of sentences containing the most frequent words in order to develop phonetic

balanced word lists. There was no Macedonian word frequency dictionary. Frequency of occurrence of the phonemes could be calculated from word frequency dictionary or by selecting several articles. Sagon & Uchanski (2006) calculated the frequency of the phonemes and the most frequent syllable structure with analysis of about 3000 words from three articles in weekly newspaper.

Our monosyllabic tests (Appendix A) contain 50 words presented in quiet background. The most frequent syllable structure is CVC. The initial use of monosyllabic words for speech recognition testing is attributed to Egan who worked in the Psychoacoustics Laboratory at Harvard University in 1948. His original pool of 1000 words was divided into 20 lists of 50 words, which collectively are known as the *PAL PB-50* word lists. Each list was considered to be phonetically balanced. Ira Hirsh and the colleagues from the Central Institute for the Deaf, in 1952 selected 120 very common words of the initial *PAL PB-50* along with 80 other words to compose new phonetically balanced four 50-word lists known as *CID W-22*. They used the carrier phrase "You will say..." (McArdle & Hnath-Chisolm, 2015). We avoided this phrase because the acoustic analysis of coarticulation showed that this phrase (In Macedonian: „Ќе кажеш...“) is not suitable. There is a long duration of the noise of the fricative /ʃ/ (ʃ) as a last phoneme in the phrase (Ristovska et al., 2019). The pause between the phrase and the word from the test is very short, about 300-450 ms, and some influence of the final phoneme of the phrase on the phoneme in the initial position of the word is possible. We took into account possible effects of coarticulatory factors during test development. We used the carrier phrase: "Say the word..." (In Macedonian: „Кажи го зборот...“). Lehiste and Peterson in 1959 developed lists of CNCs (consonant-syllable nucleus [vowel]-consonant) that were phonemically balanced versus phonetically balanced. Phonetically balanced lists did not take into account the position of the sound in a word and how that acoustic realization of the sound would be affected by coarticulatory factors. Lehiste and Peterson argued that phonemic balancing could be accomplished by allowing for the frequency of occurrence of each initial consonant, vowel nucleus, and final consonant to be similar across CNC word lists. Their lists were condensed into four lists of 50 words known today as the Northwestern University Auditory Test Number 6 (*NU No. 6*) (McArdle & Hnath-Chisolm, 2015). The *Maryland CNC Test* also used phonemic balanced word lists developed by Lehiste and Peterson. Each word lists contains CNC monosyllabic words (Mendel, Mustain & Magro, 2014).

The words in our tests are familiar to adults and children as well. The *CNC test* was originally developed for assessment of the word recognition of adults, and many children with a language age of 5 to 6 years will find many of the words to be unfamiliar (Wolfe, 2020). The measurement of speech recognition with the pediatric population must consider the selection of test materials within a child's receptive vocabulary competency.

Haskins in 1949 developed *Phonetically Balanced Kindergarten (PBK) Test* composed of monosyllabic words selected from the spoken vocabulary of kindergartens. The test could be administered if the receptive vocabulary age of the child approaches at least that of a normal hearing 6 years old child or older (Diefendorf, 2015). *PBK* have remained one of the most important outcome measures for assessing speech recognition in children with hearing impairment using cochlear implants. However, a number of studies have reported poor performance on *PBK* word list by children using cochlear implants (Kant & Banik, 2017).

Developed tests are in an open-set format and the children can only hear the words without picture identification. To avoid the possibility the words to be unfamiliar to children, Ross and Lerman in 1970 developed the *Word Intelligibility by Picture Identification (WIPI) Test*. The *WIPI* test is a closed-set test and includes picture plates with six illustrations per plate. The use of *WIPI* materials is appropriate for those children with receptive vocabulary ages of 4 years and greater. For younger children, Eliot and Katz developed the *Northwestern University-Children's Perception of Speech (NU-CHIPS)*. The words are documented to be in the vocabulary of children with normal hearing as young as age 3 years (Diefendorf, 2015).

First tests for speech audiometry were developed in English. Every language has the specifics and the authors must take them into account during the test development. Durankaya et al. (2014) developed a Turkish speech recognition test, considering phonemic balance, homogeneity, and familiarity criteria. The most frequently used Turkish monosyllabic words were selected from the corpus and three word lists were developed, each composed of 50 words. Rathna Kumar et al. (2016) developed speech identification test in Marathi for assessing adults by considering word frequency, familiarity, words in common use, and phonemic balancing. They developed four word lists, each containing of 25 words.

We used disyllabic phonetically balanced words for development of disyllabic tests (Appendix B). Usually, spondaic words are used for determining SRT. Spondaic words are disyllabic words that have equal stress on each syllable. There are no spondaic words in Macedonian. In Macedonian disyllabic words, the first syllable is stressed. There are words from foreign origin such as: *laptop, smartphone, facebook, you tube, hot spot, hot dog* etc. Some of them have translation in Macedonian. Recorded 42-word spondee tests were originally developed at the Harvard Psychoacoustics Laboratory by Hudgins, Hawkins, Karlin, and Stevens in 1947. They tried to use phonetically dissimilar words from a familiar vocabulary that were as homogeneous as possible with respect to their audibility. Subsequently, Hirsh and colleagues from the Central Institute for the Deaf improved the original spondaic materials by reducing the list to the 36 most familiar spondees and by recording the words in a way that made them homogeneous with respect to their audibility. Each test word in their *CID W-1 Test* and *CID W-2 Test*

was preceded by the carrier phrase “Say the word ...” which was recorded at a level 10 dB higher than the test word itself (Gelfand, 2016). We also used the carrier phrase “Say the word ...” in our disyllabic tests, but it was recorded at the same intensity level as the words. Many authors developed speech recognition test according to specifics of the language. Trimmis et al. (2006) developed phonemically balanced word lists for suprathreshold word recognition testing. The test material consisted of 4 lists, each containing 50 open-set disyllabic words. Monosyllabic words were not included because few exist in the Modern Greek language. Harris et al. (2007) developed speech audiometry materials for word recognition and SRT testing in quiet for native speakers of Russian. SRT materials were developed by selecting 25 disyllabic words. The recordings were digitally adjusted to match the mean PTA of the native listeners.

Homogeneity of audibility was examined during the clinical validation of the tests. Recorded speech material was installed in OTOsuite software of the audiometer MADSEN Astera<sup>2</sup>. We obtained word recognition score 100% at maximum 30 dB HL in all subjects. Psychometric function slope from 20% to 80% correct recognition for all words was 5%/dB, which is relatively steep slope and the word lists are homogeneous with respect to audibility. Wilson & Carter (2001) examined the relation between the slope of a mean word recognition function and the homogeneity or variability (with respect to recognition) of the individual stimulus items that compose the test materials. They concluded that the more homogeneous performance is on the individual test items with respect to both location and slope, the steeper the slope of the mean psychometric function. Harris et al. (2004) developed Polish disyllabic test for SRT testing. The mean slopes from 20 to 80% were 10.1%/dB for male speaker and 9.8%/dB for female speaker. Ji et al. (2011) developed Chinese Mandarin monosyllable test material with homogenous items. The mean slope of eight equivalent lists was 5.0±.29%/dB.

After the confirmation that the tests are homogeneous in terms of the audibility, the next step in the clinical validation of the tests was analysis of correlation between pure tone thresholds and speech thresholds in patients with hearing loss. We found high correlation between hearing thresholds and speech thresholds: SDT and SRT (Ristovska & Jachova, 2021; Ristovska et al., 2021).

## CONCLUSION

Developed phonetically balanced word lists have relatively steep psychometric function slope and they are homogeneous in terms of the audibility. The word lists are suitable for speech threshold and suprathreshold testing for children and adults with hearing loss who are native speakers of Macedonian. Using these tests, speech audiometry can be performed with recorded speech materials as a preferred method for presentation of speech stimuli as opposed to presentation with monitored live voice.

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**APPENDIX A**  
*Ristovska and Jachova Monosyllabic Tests*

Test 1		Test 2	
Macedonian	English	Macedonian	English
парк	park	лист	leaf
цвет	flower	знак	sign
град	city	ден	day
стан	apartment	воз	train
збор	word	март	march
шал	scarf	сад	bowl
лав	lion	час	hour
дожд	rain	југ	south
рид	hill	мед	honey
чај	tea	туѓ	foreign
пат	road	нов	new
бик	bull	кат	floor
жед	thirst	свет	world
кит	whale	свон	bell
јас	I	сам	alone
два	two	фин	fine
чист	clean	раст	growth
не	no	тап	blunt
влез	entrance	брат	brother
камп	camp	даб	oak
фен	hair dryer	кељ	wild cabbage
наш	our	кош	corner
ноќ	night	под	floor
број	number	кран	crane
век	century	хит	hit
мост	bridge	клас	class
син	son	вид	type
план	plan	рис	lynx
танц	dance	џип	jeep
рез	cut	јак	strong
хор	choir	вест	news
сид	wall	плин	gas
три	three	брег	coast
нов	new	жолт	yellow
клуч	key	маст	ointment
снег	snow	бенд	band
коњ	horse	наш	our
ваш	your	драг	dear
кељ	wild cabbage	тен	complexion
тост	toast	волк	wolf
рој	swarm	цел	whole
џин	giant	вир	puddle
глас	voice	дом	home
ѓон	sole	коњ	horse
тим	team	зрел	mature
врат	neck	твој	your
без	without	слон	elephant
сув	dry	крив	bent
млад	young	чај	tea
густ	thick	друг	other

**APPENDIX B**  
*Ristovska and Jachova Disyllabic Tests*

Test 3		Test 4	
Macedonian	English	Macedonian	English
дете	child	книга	book
топка	ball	време	time
сонце	sun	мисли	think
зебра	zebra	денес	today
трева	grass	песок	sand
мајка	mother	точка	dot
песна	song	шета	walk
своно	bell	пингвин	penguin
топло	warm	клуча	bench
куќа	house	десно	right
татко	father	ноти	notes
чита	read	љубов	love
јаде	eat	цвеќар	florist
играч	player	зајак	rabbit
љубов	love	тостер	toaster
вода	water	шепот	whisper
сусам	sesame	хуман	humane
носи	wear	џудо	judo
шума	forest	слика	picture
лови	hunt	свезда	star
домат	tomato	табла	board
млеко	milk	јајце	egg
храна	food	сиво	gray
цреша	cherry	тигар	tiger
тенис	tennis	води	lead
ѓеврек	bagel	тажно	sad
дедо	grandfather	доктор	doctor
јагне	lamb	фарма	farm
жолти	yellow	тесто	dough
вози	drive	руда	ore
жеден	thirsty	чувар	guard
готви	cook	меѓа	borderline
оџак	chimney	желба	wish
сестра	sister	роден	born
филтер	filter	молња	lightning
бања	bath	саќа	love



## USING ICT TO SUPPORT STUDENTS WITH DYSLEXIA

*Original scientific paper*

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### ABSTRACT

*Dyslexic students often have the excellent joint capability, yet many fail to get the mastery of reading. The signs of dyslexia may affect many fields of learning and activities. They may be characterized as a combination of difficulties that influence the learning process in reading, spelling, or writing. It is mainly connected with mastering written language, although spoken language may also be affected. The application of information and communications technology (ICT) is a vital tool to rectify gaps and weaknesses for students who have difficulties spelling and writing and can be highly favorable to dyslexic students. Developing word processing skills allows people with dyslexia, particularly those with scanty motor skills, to better present their work and frees them from the process of writing. Mastering typing and word processing skills are life skills, and the struggle taken up in learning to type will be well recompensed (Beveridge, 1999). In this paper, We will examine the characteristics of dyslexic children and how ICT can facilitate some of their weaknesses and enable them to succeed in taking more control over their learning. We also consider what the advantage and disadvantages to children with dyslexia of using a computer are.*

**Keywords:** *Dyslexia, Using ICT, Special Education, learning difficulties*

### INTRODUCTION

Dyslexia is one of several distinct learning disabilities. A specific language-based disorder of constitutional origin is characterized by difficulties in single-word decoding, usually reflecting insufficient phonological processing (Beveridge, 1999). People with dyslexia are liable—more than others—to mispronounce words. The following mispronunciations are typical for people with dyslexia. Arbitration for reiteration, more straightforward for similar, relief for belief, and up the ball’ instead of up the wall. Unless one is primarily on the lookout for them, errors of this kind are not always noticed in ordinary conversation. However, they may have repercussions on spelling and, in some cases, may give rise to confusion. Planning and structuring essays is often a problem. Indeed, because the dyslexic student has too little to say—

usually quite the opposite is the case—but because of a limitation of the amount of material that he can ‘hold in mind’ without writing it down. Even though he is fully capable of logical reasoning, he may fail to appreciate that what has found its way to the paper does not adequately represent what he wanted to say. Essays are written by dyslexic students, even though they may be full of good ideas, sometimes give the impression of a lack of planning and structure.

It is now almost certain that the dyslexic’s unusual balance of skills has a physiological basis. Difficulties are related to mastering phonics (the ability to sound out words fluently), sound blending, and to analyzing sounds in words. Problems frequently occur at the word level rather than text level and interfere with the progress of accurate and fluent word reading abilities.

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The word identification problems lead to slower read rates and mistakes that hurt comprehension.

Researchers investigated the phonological deficits of children with dyslexia. Reid (1998) states that dyslexic children usually perform poorly on a wide range of measures of phonological awareness, verbal short-term memory, and quick naming and speech appreciation tasks. Reid (1998) presents the following as the areas where dyslexic children have difficulty: Speed of processing, short-term memory, Long-term memory, Auditory and visual discrimination, Spoken language, Motor skills, Right and left, Organization, Pronunciation, especially of words of three or more syllables, Orthography, Logicity.

However, this list does not mean that all children showing these problems have dyslexia. There are a variety of tools available for individuals with reading difficulties to use to access print. These tools are called "reading machines." As disability service providers become familiar with "reading machines," some devices initially designed to meet the needs of a specific disability are being used with dyslexia. It helps children with low speed of processing and visual discrimination (Abbott, 2002). Integral controls are available for image size, focus, and various black/white and color video monitors. Also, users can change print contrast. Peculiar skills work, such as spelling models and Tactile Image Enhancer presents a hand-drawn or printed picture from a computer and raises the lines to create a tactile image.

Such programs benefit people with dyslexia with short-term memory (Dyslexia Teacher, 2005). Voice Recognition Software helps children with pronunciation, especially of words of three or more syllables. Words are correctly spelled. The user's flow does not interrupt to stop and worry about spelling (Dyslexia Teacher, 2005). The need to type or handwrite is removed. Some dyslexic users with poor organization skills will benefit from organizing and planning their "writing" before dictating, so planning tools may be helpful. With software and hardware help, learners can organize their thoughts, develop their memory skills, and improve their creative writing and produce work, reflecting their ability (Dyslexia Teacher, 2005). Standard word processors can offer much of the support needed to help dyslexic children with orthography difficulties. Spell checkers are a feature of most standard word processors. For some, word prediction can be helpful. Packages now exist for all computer systems - a trial with known words may help. With both spell checkers and predictors, attention to the setup and dictionary used may help individual users (Nelson, 2003).

Children with dyslexia find verbal explanations confusing as they may have logical memory difficulties and motor skills. ICT can assist in this area with such products as Numbershark (available from White Space Ltd), which has 30 games designed for learners with poor logicity, attention span, and sequencing skills (Bearne, 2002). Children with this condition often have difficulties with right and left reversing letters

within words when reading or writing (b/d; bird/bird; left/felt). Starspell can help with a wide range of spelling difficulties. It includes learning activities based on the well-tryed Look-Cover-Write-Check approach to spelling (Bearne, 2002). Word-processors can help children write by offering help with finding and spelling words and checking the completed text. When not available as standard, speech output can be added to programs to help by reading words back to the user (Nelson, 2003).

### **ACCESSIBILITY GUIDELINES FOR WEB-BASED AND E-LEARNING MATERIALS FOR CHILDREN WITH DYSLEXIA**

In the UK, the Special Education Needs and Disability Act (SENDA) 2001 has brought education under the regulation of the Disability Discrimination Act 1995. It describes dyslexia under the term "disability." Shortly, an institution has to treat a student with dyslexia not less favorably than one who does not have disabilities. Institutions must also make "reasonable adjustments" to enable children with disabilities to carry out all aspects of their academic and personal lives while at school or university.

In order to review teaching and learning methods and see in what way the needs of the student and children with special needs are addressed, we should include general aspects, such as the accessible provision of e-resources and programming.

The UK Learning and Teaching Support Network have created a guide to working with children with disabilities, which outlines the implications of act 2 (UK Education Raising Standards, 2005). Institutions are required to take reasonable steps to make their education and other connected services accessible to disabled children. Especially there is a requirement to be "anticipatory" with attention to the needs of disabled children. It means that a school or institution should be continually reviewing its policies, methods, and practices to ensure that the needs of a disabled person can be satisfied if and when they apply. Instances of this would be to ensure that course materials are in the electronic form to be quickly transcribed should this be required and ensure that web-based materials are accessible to students and children who use screen readers. Default to anticipate the needs of a disabled student may harm a defense against any allegations of discrimination. A school is required to both anticipated the needs of a disabled student and to "sensible regulations" to ensure that disabled children do not meet discrimination. Seeking to protect the equity in the treatment of all students with disabilities, departments must ensure that changes in practice and supply are applied uniformly to all children, including those already registered.

The following three leading standard providers in the area of web accessibility that the headteachers and SENCO need to aware of it, IMS Global Learning Consortium has developed guidelines for accessible learning system software.

The Web Accessibility Initiative (WAI) has developed Web Content Accessibility Guidelines. United States accessibility law provides standards for accessibility for electronic products, comprising software and Web resources.

These allow the user to control the background and text's font sizes, styles, and colors. It is significant since, for example, Serif fonts can be difficult for dyslexic users, whereas some combinations of contrasting colors can help read the text. Such preferences are personal and hence cannot easily be catered for by the author of the material. However, it may be possible to cater for them within some scopes, at least by allowing the end-user to configure the default interface. In a Web context, the use of Cascading Style Sheets may be used to assist. The user customization of the Webpage's appearance Guidelines that particularly beneficial to children with dyslexia was selected from the generic accessibility guidelines, which made against known problems connected with dyslexia and those that the guideline provider specifically recommended for dyslexia or particular learning difficulties. Eleven germane, recurrent themes that arose from the standards and guidelines described above are (Beveridge, 1999): Avoid heavily colored or figured backgrounds, as these can instead outshine the text. The precise structure of the text into left-justified paragraphs. Use plain and compact language and easy to understand graphical cues.

Plan pages so that they can be read by helping technology, including text readers and screen readers. A student with dyslexia may use a screen reader to hear elements or significant parts of the text. It circumvents the requirement of reading and provides the same information in a more plain circuit. Allow the user to turn off any timed elements. Blinking or scrolling text could be hard to read. Any assumed timing in a text could be inexact for someone having difficulty reading the text or taking longer than anticipated by the planner to digest the information. These elements that are not textual may simply be diverting, making reading any text difficult. Use steadfast layouts and formats. It lessens cognitive overload and allows the content to be the center of attention. Suggest context and orientation information. Front-load the information to give as much orientation and content information as possible at the beginning of any section. It enables the user to realize what they are reading and why without committing themselves to read a lengthy text and the danger of losing the thread. Use sensible white space, so the text was not cluttered. Place backlinks at the end of a piece of text rather than defuse. Use front-loaded hyperlink sentences, which produce a short description of where a link will lead and why it is there. These guidelines will help create movable and accessible Web pages with improved clearness, allowing the user to focus on the content.

## **METHODS**

Systematic Reviews of Observational Studies have carried out this review. Eligibility criteria for inclusion were original articles based on observational studies regarding genetic causes of dyslexia and early identification. Articles excluded if they did not meet all the criteria for inclusion. Three different electronic databases were searched. The initial search was performed on September 26th, 2020, and encompassed all original articles published in English. In order to minimize the risk of missing potentially relevant articles, only "dyslexia" terms were used in the initial search. The screening process was carried out in October 2020. Initially, all articles were screened by heading and abstract, followed by a full-text screening of the remaining articles. A final hand search through the reference list of the included articles done on October 28th, 2020, in order to locate additional articles missed by the initial search.

## **ICT HELP TO IDENTIFY AND ASSESS CHILDREN WITH DYSLEXIA**

A formal evaluation is needed to identify dyslexia. The evaluation assesses mental ability, information processing, psych-linguistic processing, and academic skills. It determines if a student is reading at the expected level and considers the individual's family background and general school performance. Trained schools or outside specialists can conduct the testing. The use of information and communications technology (ICT) can help the learning of dyslexic children. It can be employed in diagnosing children with dyslexia, and it can help them in mastering particular skills for reading, spelling, and writing.

Many people have some doubts if they might have dyslexia. There are some ways of acquiring an assessment: we can contact the British Dyslexia Association (BDA), Dyslexia Institute, or Adult Dyslexia Organisation for Information on local opportunities (The British Dyslexia Association, 2005). Schools can now profile children's strengths and weaknesses to find the best ways to teach them and try and discontinue failure before it begins.

One computer system for cognitive assessment is called "CoPS" (Cognitive Profiling System) (Abbott, 2002). Cognitive Profiling Systems Baseline Assessment is a piece of software intended to assess children when they first enter a school that creates reports showing a child's strengths and learning needs. The cognitive capabilities of a child even before they learn to read, make it probable to foretell those who will have reading problems in the future. The CoPS (4-8 years) results are shown as a graphic profile for speedy interpretation, but a detailed analysis of all results is also provided. The graphical profile gives the teacher essential insights into children's learning styles, essential pointers for curriculum development, differentiation within the classroom, and more appropriate teaching techniques.

It is valuable for early identification of potential difficulties, its appeal to children, and its ease of use. CoPS is increasingly recognized as a diagnostic and assessment tool with broad applicability for children who have various difficulties, including dyslexia (The Dyslexia Centre 2005). It tests working memory. Visual memory. Short-term recall of particular and temporal positions. Moreover, visual sequential memory—two tests of phonological abilities. one that assesses phonological awareness.

Moreover, the other that assess phoneme differentiation are also used. Speech is included in these tests so that children could readily engage with them. In these tests, each object is named aurally as well as introduced by pictures. These tests are swift and easy to administer, making the assessment more exact. Early identification can be implemented much earlier than currently, and a child's interest will not be harmed by disappointment and failure.

SNAP is another computer-aided diagnostic assessment (5-14 years) that helps map each child's mix of problems onto an overall matrix of learning, social and personal difficulties (Nelson, 2003). From this, clusters and patterns of weaknesses and strengths help identify the child's difficulties' central features. SNAP involves four steps (Nelson, 2003): Structured questionnaire checklists for conclusion by class teachers and parents give an initial "outline" map of the child's difficulties. The Learning Support teacher collates the parent and teacher responses onto the CD-ROM, pinpointing any diagnostic follow-up assessments, which may be needed as step 3. Complete assessments from a photocopiable resource bank of quick diagnostic "probes" yield a detailed and textured understanding of the child's difficulties. The computer-generated profile yields individual guidance on support (including personalized information sheets for parents) and practical follow-up. The computer is a crucial tool to rectify gaps and weaknesses for students with spelling and writing problems. Poor writers may be restrained in their constructive writing efforts and have low self-esteem, influencing their performances in other curriculum fields (Abbott, 2002).

Many dyslexic children have a powerful visual strength and can benefit from the multisensory approach of spelling software. One such package is Superspell, which produces good learning, enlarges the student's concentration, affords a chance for permanent strengthening of spelling patterns, and increases over study. The computer has immense patience and can be used to practice tasks, which would thwart the teacher. Programs that are directed to intensify spelling by games and exercises have the potential to bring pleasure to the task. Cooke claimed that children working with a computer often concentrated better and used more time to exercise than in a habitual setting.

Dyslexia can now be assessed by classroom teachers using Dyslexia Screener from NFER-Nelson (The British Dyslexia Association, 2005). It is computer-based and takes about an hour to administer. Dyslexia Screener helps the teacher guide children through

and make sure they are seriously working and not just clicking the mouse by guesswork. It is a modern, computer-based assessment created to help the teacher to recognize children with dyslexia. With the help of this diagnostic tool, the teacher can distinguish between poor reading ability and dyslexia and have advice on the next steps.

Identification is a crucial area and one that needs to be a priority in the early years. Nationally there has been considerable interest in early identification. Several specific dyslexia-focussed assessment procedures have been commercially available for some time now, particularly the Dyslexia Screener from NFER-Nelson and the CoPs computerized assessment procedures. Some authorities indicated that they were currently looking at the recently published Special Needs Assessment Profile (SNAP) as it involves parents and incorporates a broader range of SpLD's.

### CAN ICT SUPPORT DYSLEXIC LEARNERS?

Information and communications technology (ICT) can motivate learners with specific learning problems. ICT assists pupils to muster reading, spelling, writing, and mathematics and provides more effectual support across the curriculum. ICT offers a whole toolkit of methods from simple word processors to speech recognition, CD-ROMs, and the Internet (Abbott, 2002).

A line of software and hardware now exists to help learners organize their thoughts, unfold their memory skills, expand their imaginative writing, and produce work, reflecting their ability. However, as with other strategies, software needs to be chosen with care.

The artifact called Working with Words is a CD-ROM, which contains various activities to support the current needs and learning of a group of dyslexic children. It allows them to succeed at their rate and enables them to control some of their learning.

The children participating in the study are at different stages of development in learning to read; therefore, the activities selected have been tailored to meet their individual needs and enable them to progress at their speed. As the children are currently following an organized phonics program, the material selected for the artifact shows their current needs. A multisensory approach is used to enable the child to hear, see and manipulate the words.

According to Alessi and Trollip (Macdonald & Wisdom, 2002), Constructivism sees learners as active others of knowledge who learn by noticing, handling, and interpreting the world around them. The cognitive approach places expressiveness on active learning because it assumes people learn by observing and making.

Many technologies can help, but there is no magic solution. Teachers must keep trying various approaches and listening to the children to find out what works for them. Above all, it is significant to keep things in perspective for dyslexic learners. It is too easy to fall into the deficit trap and see their work as a sequence of defects.

Computers can minimize the problems of spelling and handwriting, and they can improve planning and composition. Once dyslexic children have conquered these obstacles, we will be free to appreciate the rich vocabulary, line of ideas, and vivacity of their writing. We need to inquire from the learner. What can he/she do well? In what way did he/she learn to do that? Can the methods he/she used to learn that be used to a new topic or range of skills? We need to talk to our students and work jointly to intend a learning program – they are the dyslexia specialists. Progress may become slower, but together we can overcome many of the difficulties. For those who are still slowly deciphering every word and whose progress is slow, the computer proposes personal reading help. We can buy many specialist programs, but many schools and colleges are mainly using programs from TextHelp! There is also a spellchecker intended to cope with the line of mistakes dyslexic learners make. Nowadays, learners can transcribe text from the web or a CD-ROM into Word and have the program to read it aloud. Few children will require the whole text to read aloud, but many will need to find unique words. All they have to do is choose the word and click on the reproducer icon to hear its pronunciation.

#### **ADVANTAGES AND DISADVANTAGES TO CHILDREN WITH DYSLEXIA FOR USING A COMPUTER**

A computer with a word processing application appears to be very helpful for a person with dyslexia. The possibility of editing and spellchecking can make a massive difference to the capabilities of writing. Many children with dyslexia say that the word processor with Spell and grammar check has cardinally changed their lives (The Dyslexia Centre, 2005). It takes the worry out of writing letters, reports, or homework and permits even poor spellers to be independent. It is easy for them to run a spellcheck on material and so much quicker than checking with a dictionary or asking for assistance. Scanners, which allow material to be put straight onto a computer, and screen reading software that reads this material aloud, are very helpful to people who find reading tiresome or difficult. Voice-operated software allows the person with dyslexia to pronounce directly onto the computer without worrying about spelling, making producing written work much easier and quicker.

Learners with dyslexia can benefit significantly from computer-based learning programs. While there is no substitute for individual teaching from a trained teacher, computer programs provide valuable reinforcement, variety and take the boredom out of repetitious drills. The computer industry has also opened up a whole new area of using a computer for children with dyslexia. In the developing fields of visualization technology, computer graphics, calculating science, web design, Etc., some people with dyslexia have a particular advantage. These new developments in computer technology mark a significant move toward increased

visual approaches to information analysis. Children with dyslexia who are inventive, visual thinkers are very well suited to these work areas (Abbott, 2002).

The main advantage of using computers for dyslexic children is that it presents reinforcement and practice, instruction for individuals, and immediate feedback, which are essential in teaching these children (The Dyslexia Centre, 2005). Due to its organization, frame, and pleasant interface, the computer-based methodology is a valuable procedure for motivating and strengthening practice to help reach auto immunization of basic subskills such as recognizing and writing words.

However, the skills required in analysis, breaking down the problem or system into its component sections, and viewing them in a systematic, logical succession are processes that people with dyslexia may tend to find more difficult (Bearne, 2002). In addition, remember the minute details included in the program, such as the name and purpose of variables declared. What changes have been fulfilled to the code? What has yet to be implemented places a considerable load on the short-term memory and could prove to be additionally taxing to a learner with dyslexia? Similarly, keeping track of the developing structure of the program and what stage in the implementation has been achieved, also ensuring items are carried out at an appropriate time; all seem to require organizational skills that may put a learner with dyslexia at a disadvantage.

#### **DISCUSSION**

Some resources are of particular use when working with children with dyslexia or specific learning difficulties: Sometimes people can also suffer from the ‘Meares-Irlen Syndrome.’ In the early 1980s, Helen Irlen found light sensitivity where the complete spectrum of light effects distortions with print and the environment. She discovered that this could be alleviated with the application of colored filters used as glasses. It is possible to change the color combinations on a computer and, via Asfedic tuning (as prepared by expert companies such as Tintavision), to identify and assess the most effective use of the best color background.

Dyslexic people may be unable to process fast-incoming sensory information adequately. It could explain visual distinction such as unstable binocular vision and unsteady fixation when reading, hence visual confusion of letter order, leading to poor memory of the visual form of words.

Bearne (2002) has indicated that black print on white paper is hard to focus on for a long time, and some learners tell that the words “jump” on the page. With many packages, children can experiment with the background and colors of text or exchange the type and character size to suit their wishes. Using double spacing can also make the text more definite.

It is difficult for dyslexic children to plan essays, particularly with many headings or paragraphs. The effective use of such planning tools helps pupils to organize their ideas. Dyslexic students will benefit

from organizing and planning their work before starting to write. The child has problems with identifying words that instead block his work. In this case, a plan can be produced by using Outline in Word (available from Microsoft), Inspiration or Draft: Builder, a planning tool with spoken language support, and switch access (available from Don Johnston Special Needs Ltd). The learner begins in "Outline," where he writes the headings and then expands these in the "Notes" area. The teacher can also use this to create a writing plan. These planning packages are a perfect way of conquering the "blank page" syndrome (Abbott, 2002). Practical problem solving depends on recruiting and organizing one's resources for attacking problems. Planning tools help students in the process of ranging from goal analysis to strategy identification. Appropriately designed computer systems could provide much help by supplying various organizing devices for people and hints and coaching systems that individuals can call on as needed. These programs function as planning tools for students at many levels of their work.

Spellcheckers check words phonetically. Text-to-speech spellcheckers can speak the text that has been written and spell check orally. For some children, spelling is even more difficult than reading (Macdonald & Wisdom, 2002). Many people are critical of spellcheckers and consider they encourage idleness. However, children learn to spell by having their work highlight "indicated" by the machine and see the possible alternatives (The Dyslexia Centre, 2005). It makes them cognizant of their errors and helps them concentrate on general words that they are getting wrong. They learn their mistakes while they are composing, or as soon as they have completed a part of work, it makes it more significant than red pen corrections some days later.

While it is unnecessary to use a word processor or other software package, increased pace and fluency can motivate and make composition a less arduous task. Learners can look and prefer creating letter sequences and words rather than bothering about the orientation of letters. In such a way, they are developing and applying skills while composing.

There is substantial evidence that children learn finger models on the computer, strengthening accurate spellings (The Dyslexia Centre, 2005). instance, the letters w, a, and s are situated in a triangle on the left-hand side of the keyboard. After some time, children automatically achieve those keys without thinking about which three letters they are typing.

Type to Learn (available from TAG Learning Ltd) instructs children to type while strengthening spelling, grammar, and composition and punctuation skills. Touch-type, Read and Spell (from Philip Alexandre) is a computer program based on the Hornsby "Alpha to Omega" mechanism, which has prepared a breakthrough for many children with specific learning problems. First, children are learning all the vowels so that they are typing actual words from the beginning. The screen can be altered to suit personal needs.

There is no negative response, and nothing wrong appears on the screen. Touch-type, Read, and Spell has over 600 short modules, and some children can control ten modules in a session timeout (Macdonald & Wisdom, 2002).

The majority of dyslexic students nowadays use a computer or word processor of some kind. Some students, however, particularly mature students, still feel frightened of word processing. The position of word processors has changed considerably in the interim. Spell-checks on word processors are, of course, useful, but they have their difficulties, which can sometimes contribute to extra stress. For example, they are of value only if they know the approximate spelling; they may throw up a bewildering list of alternatives. Also, they cannot detect a correctly spelled word used in the wrong situation, such as 'there' in place of 'their' or 'they're.' Word processing machines offer several technical advantages over handwritten and typewritten methods of communication for people with dyslexia.

Unlike standard typewritten text, mistakes can be corrected immediately and will never be seen by the outside world. In regular typing, the paper becomes messy with correcting fluid. Allows the WP revision of ideas via an 'editing' mode. Whole pages can be seen and revised. It includes not just retyping words but moving sentences and paragraphs about the document. It is handy to a person with dyslexia who may initially put down ideas out of order, and upon re-reading, may wish to change the sequence. The student does not have to 'print out' until he is satisfied with his 'input.' Some microcomputer WP software packages contain a spelling checker that corrects spelling mistakes. Some programs have a glossary of words that computer users commonly use. It is activated by using a code; for example, instead of typing the word 'statistical' during input, the operator would use a code such as Control key plus the letters STA. The computer will always print the word 'statistical' when it encounters that code.

Learners with disabilities are also often more able and willing to edit work using voice recognition and speech technology (Abbott 2002). When children use a word processor, they are inclined to write more because it is less of an exertion. They can change a part of text time and again without having to type the correct parts. The word processor decreases spelling and handwriting troubles, helping children focus on ideas and how they want to express them. It emboldens them to be more daring in their application of language and syntax (Abbott, 2002).

There are more sophisticated predictive word processors: Co: Writer (from Don Johnson Special Needs Ltd), Predict IT (Granada Learning), our Prophet (ACE Centre, Oxford) (Dyslexia Centre, 2005). Initially developed for physically disabled children who can type only ten letters a minute, they have become greatly popular with many dyslexic writers (Macdonald & Wisdom, 2002). The learner must know the first letter or sound, and then the computer suggests a list of the most probable words.

We can choose a word with one keypress or go on to write from the keyboard. These packages are especially appropriate for children who have reading skills far more successful than their writing or spelling.

Voice Recognition Software is consistently suggested as a perfect tool to help those with dyslexia to get the most from their computers. With dyslexia, significant issues are coming to light with attention to the use of speech input tools. Teachers consider this software is helpful for children working at home. A microphone bears the spoken word into written text on the screen and can read it back to a child and fulfill different instructions. A spellchecker is very helpful for people with dyslexia, where they can find help in correcting spelling errors. According to Nelson (2003), more research needs to be done in this area alone to recognize why some dyslexic children produce such good results with voice dictation, while others, with the same reading age, produce such scanty results. In his research, Nelson (2003) reported that only 20% of the 220 respondents had used Voice Recognition Software. Nelson also states that the most modern versions help the user to speak naturally and quickly. For a child with dyslexia, though, their reading can be rapid and their tone uneven. Therefore this could arise in a substantial amount of errors, leading to demotivation, and subsequently, the child is giving up.

Children can get information through listening to digitized or synthesized speech in exchange for trying to make meaning of the printed text. They can create, plan, change and edit without the disgrace of illegible handwriting. Their work will carry the examination of the most critical spectator because, one time, it will be assessed on meaning instead of appearance.

With dyslexia, significant issues are coming to light with attention to the use of speech input tools. From one view of point, teachers consider these packages are helpful for adults working in noiseless settings such as the office or home. From another view, however, some learners have main difficulties working with the software. Sometimes they cannot read the sentences fluently because of the high reading level. In order to better exactness, specifically in the early stages, users need good proofreading skills, which can be one of the fields that dyslexic learners find hard. Voice identification software is improbably to be a panacea for all the difficulties experienced by dyslexic children. Software should be able to offer the dyslexic learner a practical learning input. Interactive teaching programs are being developed by the National Numeracy Strategy to support mathematics teaching in the daily mathematics lesson. National Numeracy Strategy presents sample lessons using ICT to support mathematics for children with dyslexia (The British Dyslexia Association, 2005). Voice output, graphics, symbols, and text can all be included to provide a multisensory experience to the learner, and, where appropriate, a diagnostic element can be incorporated. A calculator can encourage the estimation of answers, and a product such as the Interactive Calculator (available from Inclusive Technology Ltd), which has

ear feedback, physical manipulation, can be beneficial. Spreadsheets can help children to record their work and provide good examples of layouts.

All dyslexic children should have the right to experience the use of ICT in the field of mathematics. Teachers of mathematics must ensure that they gain such experience. The use of ICT in mathematics teaching can allow children to work at much higher levels. Using ICT can enhance the teaching of mathematics; Recognizing opportunities to use ICT in mathematics is a part of ICT capability; ICT can remove drudgery and scaffold pupils to higher levels of attainment; ICT can provide an effective tool for thinking.

## CONCLUSION

It is almost certain that there will be dyslexic children in every teaching group. Dyslexic children have some learning difficulties but are generally of average or above-average intellect. It is evident from their conversation. However, they will have difficulty with reading big text, with essay-writing and spelling. A common finding among relevant studies is that computer use has positive effects on pupils with dyslexia.

Today, technology is incorporated into everyday life, and computers could be seen as a valuable educational tool in school settings to help pupils with attention deficits—the development of software applications that will meet the needs of pupils with various kinds of disabilities. Computers can positively affect “non-traditional” pupils, meaning all those labeled as learning disabled, low achieving, educationally disadvantaged, and forth.

Many aspects of technology appear to assist pupils with dyslexia in overcoming their academic problems. In particular, it was found that computers allow pupils to learn at their own pace. have infinite patience, and provide privacy. Promote discovery learning and help them develop problem-solving skills. Can excite and motivate pupils, provide instant reinforcement, corrective feedback, and immediate praise. Furthermore, the way information is presented on the computer (graphic objects, colors, sound, animation) can be highly stimulating for individuals with reading problems.

Developing word processing skills allows dyslexic children, particularly those with lousy motor skills, to make their work better and exempt them from the depressing mechanics of writing. Software that includes multiple Media of text, graphics, animation, video, and sound can strengthen learning. Providing suitable software for dyslexic children allows them to work at their rate on material made to their needs. We believe that specific characteristics of the educational software used by the pupils with dyslexia stimulate their attention more than others did. Pupils with dyslexia appear to prefer reading short texts, watching short videos, and listening to short narration items when they work on the computer.

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## PERFORMANCE OF ISLAMIC BANKING AND CONVENTIONAL BANKING IN BOSNIA AND HERZEGOVINA – A COMPARATIVE STUDY

*Original scientific paper*

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### ABSTRACT

*The main objective of this study is to compare the performance of two areas of banking in Bosnia and Herzegovina, that is, Islamic and conventional banking. In order to measure the performance of two banking sectors, profitability, efficiency and liquidity measures are implemented. For the purpose of the study secondary data from both banking sectors is used. The time interval covered in the study spans from 2008 to 2020. Ratio analysis and independent sample t-test is applied in order to check the characteristics of two banking sectors. Currently, studies investigating comparative performance of these two banking sectors in BiH are rare, therefore theoretical contribution will be evident. Practically, it will help bank customers to understand how Islamic banking sector performs relative to the conventional banking sector. Also, bank managers of selected banks will be able to compare performance of their banks relative to the other banks in terms of the ratios used in the study. The limitation of the study is that in Bosnia and Herzegovina there is only one bank that operates according to Islamic banking principles, which will represent Islamic banking sector in this study.*

**Keywords:** Islamic banking, conventional banking, performance, profitability, efficiency, liquidity, BiH

### INTRODUCTION

Islamic Banking alludes to a strategy for banking that depends on Islamic Law (Shariah) which restricts revenue based banking and allows just benefit sharing based banking. The idea depends on a section of the Holy Quran that says “Allah has permitted just authentic exchange and denies interest” (Ahmad & Haron, 2002).

Islamic model follows a different model of financial intermediation. Concept of Islamic banking is old, while Islamic banking system has been introduced in the last quarter of the 20<sup>th</sup> century. Some of the modes of Islamic banking/finance include *Mudarabah* (profit-sharing and loss-bearing), *Wadiah* (safekeeping), *Musharaka* (joint-venture), *Murabahah* (cost-plus) and *Ijara* (leasing). Beginning in the 1960s, Islamic

banking resurfaced in the modern world, and since 1975, many new interest-free banks have opened.

While the majority of these institutions were founded in Muslim countries, Islamic banks also opened in Western Europe during the early 1980s. In addition, national interest-free banking systems have been developed by the governments of Iran, Sudan, and Pakistan. There are more than 300 banks and 250 mutual funds around the world that comply with Islamic principles. Between 2000 and 2016, Islamic banks’ capital grew from \$200 billion to close to \$3 trillion in 2016. This growth is largely due to the rising economies of Muslim countries (especially those that have benefited from the rising price of oil).

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One of the primary differences between conventional banking systems and Islamic banking is that Islamic banking prohibits *usury* and *speculation*. Shariah strictly prohibits any form of speculation or gambling, which is referred to as *maisir*. Shariah also prohibits taking interest on loans. The practices of Islamic banking are usually traced back to businesspeople in the Middle East who started engaging in financial transactions with businesspeople in Europe during the Medieval era (Ahmed et al., 2010).

In general, Islamic banking institutions tend to be more risk averse in their investment practices. At the same time, Eastern countries, despite numerous political turmoils and vicissitudes, have managed to maintain economic growth, which is why in recent years the global economic trend is Islamic banking - a quality alternative to the modern financial system. Namely, the conventional financial system recognizes debt contracts, ie. gains and losses are divided asymmetrically. Thus, the borrower bears a higher risk when taking a loan (liquidity risk of the economy, economic cycle, etc.), and the state provides instruments of coercion or deposit insurance that encourages financial institutions to be exposed to excessive risks. Such a system also encourages the creation of moral hazard, the emergence of a multitude of asymmetric information in all participants, and insufficient quality control of all participants in the financial system. On the other hand, the concept of Islamic banking is based on the so-called Islamic savings where the saver is the investor. At the end of the business year the depositor receives a profit as a percentage of the invested funds in proportion to the percentage of the bank's profit. In case the bank makes a loss - the saver makes a proportional percentage loss. Thus, Islamic banking gives at least equal (if not greater) importance to the ethical-moral and even social dimension within the religiously acceptable dimension in order to achieve a socially acceptable distribution of wealth (ie equality), and in the spirit of solidarity.

Justice and fairness are built into the fundamental principles of Islamic banking, and the proclaimed goal is to achieve equality in society, for the benefit of society as a whole, in the spirit of teaching the Islamic religion (as well as other monotheistic religions) according to which achieving "higher goals" is above any material benefits (Haron et al., 1994).

However, Islamic banks face a number of challenges and problems in their operations - from not understanding the nature and essence of this concept, to the risk of establishing it, but probably the biggest problem is the lack of adequate legislation to support the concept of Islamic banking. It is particularly pronounced for the countries of the European continental circle, with the exception of Bosnia and Herzegovina. There are certain initiatives to change the regulations governing the functioning of the banking sector as a whole, but it remains to be seen in which direction this activity will take place.

## ISLAMIC BANKING IN BOSNIA AND HERZEGOVINA

Bosnia and Herzegovina is a transitional country trying to get back on tracks after the aggression of 1990th (Smolo, 2011). Bosnia and Herzegovina emerged from the former republic of Yugoslavia as Europe's smallest economy with a gross national income of just over \$8 billion and a per capita income of around \$2,000 (Wilson, 2006).

According to the official statistical data in 2013, the number of Muslim population in Bosnia and Herzegovina was 1.790.454. This means the size of the Muslim community is much smaller than that of France or Germany, and at the same time larger than the Muslim community in the United Kingdom. However it is much less affluent.

As a state with a Muslim majority, the potential for Islamic banking and finance development in Bosnia and Herzegovina would appear promising. In practice, the spread of Islamic banking has been limited. Some of the reasons are found in the fact that the economic, legal and financial systems are all relatively complex and rigid. Also, there are some political obstacles that are additionally slowing down or sometimes even stopping this process. All in all, given the small size of the economy, the existing banking law, uncertainties over property rights and the fragmented nature of the financial system the process of developing Islamic banking and finance will be slow and hard. However, there is the enthusiasm of the Muslim community to undertake their financial transactions in a *Shari'ah* compliant manner.

In October 2000 Bosna Bank International d.d. (BBI) was established in Sarajevo. Until now, it is the only bank in Bosnia and Herzegovina that is to operate in accordance to Islamic financial principles. The founders of the bank are Islamic Development Bank 45,46%, Dubai Islamic Bank 27.27% and Abu Dhabi Islamic Bank 27.27%. The domestic *Law on banks* brought in accordance to conventional banks does not respect the attributes of Islamic *interest-free* model of functioning. Nevertheless, the existing law frame is not an obstacle for forming Islamic banks.

Islamic banks can provide efficient banking services to the nation if they are supported with appropriate banking laws, and regulations (Sarker, 1999). Unfortunately, since there is no law regulating Islamic banking and finance, even BBI is regulated according to the laws applied to the conventional banks (Smolo, 2011). Therefore, the local *Law on Banks* does not respect specificities of Islamic interest-free model of business activities, since it was adopted at the time in which only conventional banks existed. Due to this fact BBI faced some difficulties in getting a license. But on 13 March 2002 it received a permit from the Banking Agency of the Federation of Bosnia and Herzegovina to participate in internal payments operations, which meant its cheques and electronic payments were accepted by other local banks. In November 2002 BBI received a deposit insurance license from the Deposit Insurance Agency of Bosnia and Herzegovina (Wilson, 2006).

Currently, based on the researched literature it can be stated that the studies focusing on the performance of Islamic banking in BiH are rare. Efendic (2011; 2017) conducted studies about the efficiency of Islamic banks in BiH. Therefore, this study will make a huge contribution to the literature regarding banking sector in BiH, with emphasis on Islamic banking. It will contribute to the current rare existing literature. Furthermore, it will contribute to the users of banking services in BiH to better understand Islamic banking performance relative to the conventional banking sector in BiH.

## **RESEARCH OBJECTIVES**

Based on the above paragraphs, it can be stated that the main objective of the study is to compare the performance of two areas of banking in Bosnia and Herzegovina, that is, Islamic and conventional banking. In order to measure the performance of two banking sectors profitability, liquidity and efficiency measures are implemented. Another objective of the study is to bring closer Islamic banking and performance of the Islamic bank in Bosnia and Herzegovina to bank customers in general.

## **LITERATURE REVIEW**

There are many studies investigating the differences between the performance of Islamic and conventional banking in different parts of the world. Different studies used different techniques to measure the variables. The most frequently used technique in this area is ratio analysis. There are different results found in the previous studies and in the next paragraphs there is a review of various studies.

How can we measure bank's performance? There are many ways to measure bank's performance for example using financial ratios and advanced statistical method such as Stochastic Frontier Approach (SFA) and Data Envelopment Analysis (DEA).

The easiest and popular method in assessing the performance of Islamic banks is using financial ratios, e.g.; (Samad & Hassan, 1999; Samad, 2004; Olson & Zoubi, 2008).

Various indexes have been provided by financial management theories for measuring bank's performance. Using accounting ratios is one of them. To measure performance, financial ratios have been used quite commonly and extensively in the literature. For example, bank regulators use financial ratios to evaluate bank's performance Samad and Hassan (2000), Sabi (1996), and Samad (1999), gave employed ratios for evaluating a bank's performance.

Furthermore, bank liquidity is influenced by many internal and external factors. Unlike conventional literature, there are limited empirical studies devoted to the liquidity of Islamic bank.

Liquidity is an important factor in the banking industry to increase public trust. Liquidity describes the ability of banks to accommodate withdrawal of deposits and

other liabilities efficiently and to cover the increase in loan funds and investment portfolios. Banks that have an adequate level of liquidity can obtain the necessary funds (by increasing liabilities, securing, or sell assets) immediately and at a reasonable cost (Van Greuning & Brajovic, 2011).

Only a few studies have aimed to identify determinants of liquidity.

## **PERFORMANCE OF ISLAMIC VS CONVENTIONAL BANKS**

Performance of Islamic versus conventional banks is widely explored in the literature. However, literature exploring performance of Islamic bank in BiH compared to conventional banks in BiH is very rare.

The market share of Islamic banking is still small in the global financial sector; however, it is growing fast in many countries, especially in the Middle East and Asian regions (International Monetary Fund, 2015). In theory, there are many differences between Islamic and conventional banks. Nonetheless, these two types of institutions compete in the same banking arena, and some claim that the Islamic ones showed stronger resilience, on average, during the global financial crisis e.g. (Hasan & Dridi, 2010). Therefore, it is not surprising that Islamic banks have attracted considerable attention by academics, policy makers, and other market practitioners.

A growing number of studies investigate the differences in the performance between the two types of banks. A number of recent studies compare the performance of Islamic and conventional banks with the use of individual financial ratios.

The findings of these studies are mixed. For instance, Srairi (2010) conclude that Islamic banks are, on average, less cost and profit efficient than conventional banks. Bader et al. (2008) conclude that there are no significant differences. Johnes et al. (2014) find that Islamic banks are typically on a par with conventional ones in terms of gross efficiency, significantly higher on net efficiency and significantly lower on type efficiency. Second, an important drawback is that while these indicators capture adequately the efficiency of banks in terms of transforming their inputs into outputs, they usually fail to take into account other aspects like risk and liquidity.

Other studies compare the financial ratios of the banks, focusing on individual aspects like capital adequacy (Beck et al., 2013), deposits and loans growth Karim et al. (2014), credit risk Kabir et al. (2015), bank insolvency risk Bourkhis and Nabi (2013), and profitability Beck et al. (2013). The conclusions of these studies, as for the relative performance of the two groups across different dimensions, are often conflicting. For example, Beck et al. (2013) find that Islamic banks are less cost-effective, but have a higher intermediation ratio, higher asset quality and are better capitalized, whereas at the same time there are no differences in terms of insolvency risk and profitability.

In addition, there are several more studies that are exploring comparative performance between Islamic and conventional banks.

Study done by Ramlan and Adnan (2016) analyzes the profitability in Islamic Banks and Conventional Banks in Malaysia. This study finds that Islamic Banks are more profitable than Conventional Banks whereas Total Loan to Total Asset for Islamic bank is higher than Conventional bank.

Study conducted by Aziz et al. (2016) investigates financial performance of Islamic and conventional banks operating in Pakistan for the year 2006-2014. For comparison purpose five Islamic and five similar sized conventional banks have been selected. The comparison has been made on average values of different ratios of both Islamic and conventional banks. The comparison shows that Islamic banks performance has been better in terms of efficiency, return and asset quality. However Islamic banks are struggling in terms of advances, investment, liquidity, deposits and capital as conventional banks performance is better in these areas.

Similar studies were also conducted in the Middle East countries. It is evident in the research of Kader, et al. (2007), where comparative financial performance of Islamic banks and conventional banks in the UAE has been examined. The findings indicated that there were no major difference between Islamic banks and conventional banks with respect to profitability and liquidity.

Samad (2004) examined the comparative performance of Bahrain's interest-free Islamic banks and the interest-based conventional commercial banks during 1991-2001. It has been realized that there exists a significant difference in credit performance between the two sets of banks. However, the study finds no major difference in profitability and liquidity performances between Islamic banks and conventional banks.

Efendic (2011) investigated the efficiency of banking sector in BiH with special reference to relative efficiency of the existing Islamic bank. According to majority of indicators, Islamic bank has lower efficiency comparing to their conventional counterparts.

Comparative analysis is often used in literature to measure performance of similar organizations. Financial ratio analysis is one of the tools which have been used extensively in literature to measure and compare performance of banks (Elyasiani et al., 1994; Sabi, 1996; Saleh & Zeitun, 2006; Samad, 1999; Samad & Hassan, 2000).

## HYPOTHESES OF THE STUDY

According to the main objectives and presented literature review of the studies regarding performance of Islamic and conventional banking systems, following research hypotheses are developed.

**H<sub>1</sub>:** "There is no statistically significant difference in profitability of Islamic banking compared to conventional banking in BiH".

**H<sub>2</sub>:** "There is no statistically significant difference in liquidity of Islamic banking compared to conventional banking in BiH"

**H<sub>3</sub>:** "There is no statistically significant difference in efficiency of Islamic banking compared to conventional banking in BiH"

## DATA AND METHODOLOGY

For the purpose of this study secondary data of Islamic bank in BiH and four conventional banks, are used. These conventional banks are selected since their relative market share was relatively close to the market share of the Islamic bank in Bosnia and Herzegovina at the time when the research was conducted.

Therefore, comparing these banks with the Islamic bank has been considered as suitable. The data is collected from the financial statements of the banks that are publicly available, ranging from 2008 to 2020. Ratio analysis is used for comparison between two types of banking systems. Furthermore, additional statistical test used for this purpose is independent samples t-test to test the difference. Microsoft Excel is used to calculate ratios, while SPSS software is used to analyze the data.

Three different aspects are analysed, including bank profitability, efficiency and liquidity. In order to perform the analysis, financial ratios that represent the aspects of banking sector performance were used, including Return on Asset (ROA) ( $\text{Net Income} / \text{Average Total Assets}$ ); Return on Equity (ROE) ( $\text{Net Income} / \text{Average Shareholder's Equity}$ ); Loan to Deposit Ratio (LDR) ( $\text{Total Loans} / \text{Total Deposits}$ ); Current Ratio (CR) ( $\text{Current Assets} / \text{Current Liabilities}$ ); Asset Utilization Ratio (AU) ( $\text{Revenue} / \text{Total Assets}$ ) and Operating Efficiency Ratio (OE) ( $\text{Operating Expenses} / \text{Operating Revenue}$ ).

For the conventional banks the averages of the four banks are taken into consideration, which represent the conventional banking sector results.

## EMPIRICAL ANALYSIS AND RESULTS

In this section the results of the ratio analysis and independent sample t-test will be presented. Confidence interval used to explain the results of the independent samples t test analysis is 95%.

### Profitability

#### Ratio analysis

In order to measure and compare profitability of the banking sectors in BiH two ratios are used, namely Return on Assets (ROA) and Return on Equity (ROE). In the following Tables results of the ratio analysis are presented.

Table 1. ROA and ROE results for conventional banks and Islamic bank in BiH

Return on Assets (ROA)			Return on Equity (ROE)		
YEAR	CONVENTIONAL BANKS (AVERAGE)	ISLAMIC BANK	YEAR	CONVENTIONAL BANKS (AVERAGE)	ISLAMIC BANK
2008	.2%	.1%	2008	5.6%	3.6%
2009	.0%	.2%	2009	9.8%	7.5%
2010	.2%	.1%	2010	9.5%	6.8%
2011	.6%	.6%	2011	8.8%	6.1%
2012	.6%	.6%	2012	9.0%	4.8%
2013	.7%	.5%	2013	8.2%	5.8%
2014	.9%	.6%	2014	6.8%	4.4%
2015	1.1%	.8%	2015	5.6%	3.4%
2016	1.3%	.8%	2016	5.5%	4.8%
2017	1.1%	.9%	2017	5.3%	4.0%
2018	1.2%	1.0%	2018	2.3%	.8%
2019	1.3%	.9%	2019	.4%	.9%
2020	.7%	.4%	2020	3.2%	.3%

Based on the results of ratio analysis it can be stated that return on assets (ROA) for conventional banks and Islamic bank are almost similar in the period from 2008 to 2012. After 2012 it can be stated that conventional banking sector has slightly higher Return on assets compared to the Islamic bank.

Furthermore, the results of return on equity (ROE) analysis show that conventional banking sector showed slightly better results than the Islamic bank for the all period observed in the study.

### Independent Samples T test

In order to check whether the scores of the financial ratios related to the profitability of banking sectors are significantly different, Independent Sample t test is used. In the following Tables results of the Independent Samples t test and group statistics results are presented.

Table 2. Group Statistics for ROA

Bank	N	Mean	Std. Deviation
Conventional banks	13	.007643	.004289008
Islamic bank	13	.005873	.003080972

Table 3. Independent Samples Test for ROA

	t	df	Sig. (2-tailed)
Equal variances assumed	-1.368	24	.184

Note: 95% confidence interval

The results of the analysis presented in Table 3 show the significance value of .184 which is higher than the level of significance level used in the test (.05). It suggests that mean scores among conventional banking sector and the Islamic bank are not significantly different.

Therefore, we can assume that mean scores of ROA ratio among the groups are not significantly different.

Table 4. Group Statistics for ROE

Bank	N	Mean	Std. Deviation
Conventional banks (Average)	13	.061604	.029279632
Islamic bank	13	.041101	.022793306

Table 5. Independent Samples t Test for ROE

	t	df	Sig. (2-tailed)
Equal variances assumed	1.992	24	.058

Note: 95% confidence interval

The results of the analysis presented in Table 5 show the significance value of .058 which is higher than the level of significance level used in the test (.05). It suggests that mean scores among conventional banking sector and the Islamic bank are not significantly different. Therefore, we can assume that mean scores of ROE ratio among the groups are not significantly different.

Based on the overall results of the independent samples t test for the profitability ratios used in the study, it can be stated that there is no statistically significant difference among two banking sectors in terms of profitability for the observed period.

### Liquidity

#### Ratio analysis

In order to measure and compare liquidity of the banking sectors in BiH two ratios are used, namely Loan to Deposit Ratio (LDR), Current Ratio (CR).

In the following Table results of the ratio analysis are presented.

Table 6. LDR and CR results for conventional banks and Islamic bank in BiH

Loan to Deposit Ratio (LDR)			Current Ratio (CR)		
YEAR	CONVENTIONAL BANKS (AVERAGE)	ISLAMIC BANK	YEAR	CONVENTIONAL BANKS (AVERAGE)	ISLAMIC BANK
2008	91%	105%	2008	112%	133%
2009	99%	85%	2009	112%	125%
2010	97%	93%	2010	111%	119%
2011	95%	90%	2011	113%	118%
2012	97%	95%	2012	110%	100%
2013	98%	94%	2013	114%	118%
2014	95%	105%	2014	113%	117%
2015	91%	103%	2015	116%	116%
2016	89%	100%	2016	112%	120%
2017	84%	93%	2017	120%	118%
2018	85%	99%	2018	120%	117%
2019	84%	91%	2019	115%	114%
2020	80%	82%	2020	115%	113%

Based on the results of the ratio analysis for Loan to Deposit Ratio (LDR) for the period from 2009 to 2013 conventional banking sector shows slightly higher results, while for the period from 2014 to 2020 the Islamic bank shows slightly higher results, as well as for the year 2008. In general it can be stated in general the results are quite similar over the observed time period. Furthermore, based on the results for current ratio (CR) analysis it can be stated that the results for the observed period are quite similar, with slight differences. The difference is slightly higher for 2008, 2009 and 2012.

### Independent Samples T Test

In order to check whether the scores of the financial ratios related to the liquidity of banking sectors are significantly different, Independent Sample t test is used.

In the following Tables results of the Independent Samples t test and group statistics results are presented.

Table 7. Group Statistics for LDR

Bank	N	Mean	Std. Deviation
Conventional banks (Average)	13	.910752	.063294379
Islamic bank	13	.950919	.071415714

Table 8. Independent Samples t Test for LDR

	t	df	Sig. (2-tailed)
Equal variances assumed	-1.518	24	.142

Note: 95% confidence interval

The results of the analysis presented in Table 8 show the significance value of .142 which is higher than the level of significance level used in the test (.05). It suggests that mean scores among conventional banking sector and the Islamic bank are not significantly different.

Therefore, we can assume that mean scores of LDR ratio among the groups are not significantly different.

Table 9. Group Statistics for CR

Bank	N	Mean	Std. Deviation
Conventional banks (Average)	13	1.139368	.032829633
Islamic bank	13	1.17482	.073105337

Table 10. Independent Samples t Test for CR

	t	df	Sig. (2-tailed)
Equal variances assumed	-1.595	24	.142

Note: 95% confidence interval

The results of the analysis presented in Table 10 show the significance value of .124 which is higher than the level of significance level used in the test (.05). It suggests that mean scores among conventional banking sector and the Islamic bank are not significantly different. Therefore, we can assume that mean scores of CR ratio among the groups are not significantly different.

Based on the overall results of the independent samples t test for the liquidity ratios used in the study, it can be stated that there is no statistically significant difference among two banking sectors in terms of liquidity for the observed period.

### Efficiency

#### Ratio analysis

In order to measure and compare efficiency of the banking sectors in BiH two ratios are used, namely Operating efficiency (OE), Asset Utilization (AU). In the following Table results of the ratio analysis are presented.

Table 11. OE and AU results for conventional banks and Islamic bank in BiH

YEAR	Operating Efficiency (OE)		YEAR	Asset Utilization (AU)	
	CONVENTIONAL BANKS (AVERAGE)	ISLAMIC BANK		CONVENTIONAL BANKS (AVERAGE)	ISLAMIC BANK
2008	39%	39%	2008	7%	8%
2009	38%	56%	2009	7%	7%
2010	33%	40%	2010	7%	7%
2011	32%	37%	2011	7%	7%
2012	32%	36%	2012	8%	6%
2013	31%	38%	2013	7%	5%
2014	30%	36%	2014	7%	5%
2015	27%	31%	2015	7%	5%
2016	23%	27%	2016	7%	5%
2017	22%	24%	2017	6%	5%
2018	18%	15%	2018	5%	5%
2019	21%	24%	2019	5%	4%
2020	21%	24%	2020	5%	4%

Based on the results of the ratio analysis it can be stated that operating efficiency (OE) of the Islamic bank is slightly higher than conventional banking sector operating efficiency, except for year 2018. However, the differences are very low.

Furthermore, the results of ratio analysis for asset utilization (AU) ratio show almost similar results for both banking sectors, with slightly higher results for conventional banking sector for the period from 2012 to 2017.

### Independent Samples T test

In order to check whether the scores of the financial ratios related to the efficiency of banking sectors are significantly different, Independent Sample t test is used. In the following Tables results of the Independent Samples t test and group statistics for OE and AU results are presented.

Table 12. Group Statistics for OE

Bank	N	Mean	Std. Deviation
Conventional banks (Average)	13	.282031	.067076373
Islamic bank	13	.329537	.103444205

Table 13. Independent Samples t Test for OE

	t	df	Sig. (2-tailed)
Equal variances assumed	-1.389	24	.177

Note: 95% confidence interval

The results of the analysis presented in Table 13 show the significance value of .177 which is higher than the level of significance level used in the test (.05). It suggests that mean scores among conventional banking sector and the Islamic bank are not significantly different. Therefore, we can assume that mean scores of OE ratio among the groups are not significantly different.

Table 14. Group Statistics for AU

Bank	N	Mean	Std. Deviation
Conventional banks (Average)	13	.064714	.009449788
Islamic bank	13	.055364	.011889425

Table 15. Independent Samples t Test for AU

	t	df	Sig. (2-tailed)
Equal variances assumed	2.22	24	.036

Note: 95% confidence interval

The results of the analysis presented in Table 15 show the significance value of .036 which is lower than the level of significance level used in the test (.05). It suggests that mean scores among conventional banking sector and the Islamic bank are significantly different. Therefore, we can assume that mean scores of AU ratio among the groups are significantly different.

Based on the overall results of the independent samples t test for the efficiency ratios used in the study, it can be stated that there is no statistically significant difference among two banking sectors in terms of liquidity measured through OE ratio for the observed period. However, from the perspective of AU ratio, it can be stated that there is a statistically significant difference between the two banking sectors for the observed period in terms of efficiency.

## DISCUSSION

The main objective of this study was to compare the performance of two areas of banking in Bosnia and Herzegovina, that is, Islamic and conventional banking. According to the literature reviewed, it was expected that the research hypotheses developed for this study will be supported. Based on the results, the first hypothesis of the study: *There is no statistically significant difference in profitability of Islamic banking*

compared to conventional banking in BiH" is fully supported, since both of the financial ratios including Return to Assets (ROA) and Return on Equity (ROE) showed that there is no statistically significant difference between two banking sectors in terms of profitability. Furthermore, the second research hypothesis developed for this study: "There is no statistically significant difference in liquidity of Islamic banking compared to conventional banking in BiH" is fully supported, since both of the financial ratios including Loan to Deposit Ratio (LDR) and Current Ratio (CR) showed that there is no statistically significant difference between two banking sectors in terms of liquidity. The third research hypothesis developed for this study: "There is no statistically significant difference in efficiency of Islamic banking compared to conventional banking in BiH" is partially supported since one of the two ratios, namely Operating Efficiency Ratio (OE) showed that there is no statistically significant difference between two banking sectors in terms of efficiency.

However, the second ratio used to investigate the third hypothesis of the study, namely Asset Utilization Ratio (AU) showed that there is a statistically significant difference among two banking sectors. This shows that conventional banks are comparatively more efficient in utilization of the assets in generating total income (revenue) than that of Islamic bank from the perspective of this ratio. This is in line with the study conducted by Efendic (2011), which also focused on comparison of efficiency of two banking sectors in Bosnia and Herzegovina. However, the results for the other financial ratios used in the study, namely ROA, ROE, LDR, CR and OE are in line with the prevailing literature.

Theoretical contribution of the study is that this is one of the pioneer studies that empirically compares financial performance of the two banking sectors in BiH. Therefore, this study fills the gap and opens space for the further studies for the banking sectors in Bosnia and Herzegovina. Furthermore, practical implication of the study is twofold. Firstly, this can be a good indicator for bank managers to evaluate the position of the banks in terms of financial ratios. Secondly, the results can show the Islamic bank customers that even though Islamic bank follows specific rules while operating, the financial results presented in the study show that Islamic bank is performing in an almost similar way. Therefore, being an Islamic bank customer in Bosnia and Herzegovina does not bring any additional risk. Furthermore, the results show that Islamic bank can be an option for all the customers regardless of their religious beliefs, since it operates similarly to the conventional banks in Bosnia and Herzegovina in terms of the empirical ratios.

## CONCLUSION

The main objective of this study is to compare the performance of two areas of banking in Bosnia and Herzegovina, that is, Islamic and conventional banking. In order to measure the performance of two banking sectors profitability, efficiency and liquidity measures are implemented. For the purpose of the study

secondary data from both banking sectors is used. Ratio analysis and two sample t test were applied in order to check the characteristics of two banking sectors.

The results of the study showed that conventional banking sector and Islamic banking sector perform very similar in terms of profitability, liquidity and efficiency, represented through the financial ratios examined in the study, including Return on Assets (ROA), Return on Equity (ROE), Loan to Deposit Ratio (LDR), Current ratio (CR) and Operating Efficiency (OE). However, the results showed statistically significant difference in terms of Asset Utilization (AU), where conventional banking sector showed slightly better results.

Currently, studies investigating the comparative performance of these two banking sectors in BiH are rare, therefore theoretical contribution is evident.

Practically, it helped bank customers to understand how Islamic banking sector performs relative to the conventional. Also, bank managers of selected banks will be able to compare performance of their banks relative to the other banks in terms of the ratios used in the study. The limitation of the study is that in Bosnia and Herzegovina there is only one bank that operates according to Islamic banking principles, which represented Islamic banking sector in this study.

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## THE IMPORTANCE OF LANGUAGE MANAGEMENT: IMPLICATIONS IN THE INTERNATIONAL BUSINESS ENVIRONMENT

*Original scientific paper*

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### ABSTRACT

*Starting from the concept where language in human communication is the primary means and key communication mechanism in achieving what is real, it is obvious that today it is a kind of phenomenon in all forms of business. This research aims to identify the role of language strategy in international business relations in order to better understand the importance of knowing the most pronounced and influential languages in trade in goods and services in all business segments. Despite recognizing the importance of English language skills and their role in international business relations, there is still room for further research on this issue. Of course, there are studies on the relationship between language and international business, but little has been elaborated on the impact of language on international business relations.*

*In order to assess the current situation, initial dedicated sampling was conducted with the aim of collecting and generating data. The goal, however, is to clarify and confirm explanatory analyzes that reveal the process inherent in the material area of research. Qualitative and quantitative data of analogous research in the environment and beyond were used for generating, i.e. collecting and analyzing data. For simplicity and clarity of results, the theoretical sample collected from different sources was processed by IBM SPSS Statistics. All the above indicators take as a starting point the language and competencies in this area, and therefore a clear possibility has been created for the data to be presented quantitatively on a predominantly qualitative basis. Our research shows that, since language barriers have a profound impact on international business, successfully adapting to the new language(s) yields positive results. For these reasons, we advocate more multidisciplinary studies that require in-depth research at different levels in the field, with a proposal to pay more attention to field theorizing and means of analysis.*

**Keywords:** *International business, communication, language management, language strategy, business relations*

### INTRODUCTION

Language is the primary means of communication. There are different types of communication. Throughout human historical, social, and economic evolution, members of different language communities have had a need to communicate, and due to the flow of people and information, different languages have come into contact with each other. Language is the primary means of communication. There are different types of communication. Throughout human historical, social, and economic evolution, members of different

language communities have had a need to communicate, and due to the flow of people and information, different languages have come into contact with each other. Thus, even today, due to changed communication, political and globalization events, the processes of language contact are taking place, and this is especially emphasized in business communication.

In business communication, economic, trade, political or technological prosperity and profit are the main drivers. In human communication, language is the

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primary means and key communicative mechanism in knowing what is real. Language with its words (signs) and grammar allows users many combinations with which they can exchange countless different meanings or messages (Samarzija, 2021). According to Cerepinko (2012) without language as an instrument of communication, there would be almost no man or human society as we know it.

The communicative function of language is the primary linguistic function because the use of language enabled man, as a social being, to communicate with other people, and thus facilitate his survival and progress. Language is a cultural construct. “The cultural diversity of the world and the linguistic diversity of the world are interrelated - all languages are constantly changing” (Samarzija, 2021, p. 3).

“The modification of language over time is a natural phenomenon that is inscribed in their very nature” (Hagege, 2005, p. 72). Every day in the world a part of the language disappears, but new languages are created. The future of all languages in interaction with each other lies in respecting linguistic and cultural differences and respecting them in business communication processes.

Verbal communication takes place through language and can be written or oral. Business communication through verbal communication is a vital part of the business. Due to the process of globalization, English occupies a prominent place in the modern world - as one of the “great” world languages. “In the world, human activity prevails in many fields, so it is increasingly represented in business communication and our organizations” (Samarzija, 2021, p. 3). The language is inevitably dynamic and constantly changing, which is briefly and clearly presented by Wright (2010): “New facts, ideas, and events need a new language” (Wright, 2010, p. 3).

Throughout human historical, social, or economic evolution, members of different speech communities have had a need to communicate. This is how the languages of contact (Lingua franca, pidgin) with all their characteristics were created. Even today, due to the increased flow of people and information, languages come into contact with each other, and this is where the processes of language acquisition, language borrowing, or even language loss take place. Similar processes take place in the contact of our language and English and open the possibility of using English (Anglicism). In business communication, economic, trade, political or technological prosperity and profit are its main drivers. “That’s why it’s important to use business English in our business in the last two decades is one of the most important economic, social, linguistic and media phenomena” (Samarzija, 2021, p. 3).

### **ANALYSIS OF THE INFLUENCE OF LANGUAGES ON INTERNATIONAL BUSINESS AND ECONOMIC ACTIVITIES**

Just over 30 years ago, an insight into several dozen texts on writing in English showed that at that time very few authors considered it a language, “and those who considered it very quickly got over it, not taking

in consideration its complexity” (Holden, 1987, p. 240). However, today’s international business experts treat language as a central theme (see: Brannen et al., 2014; Mughan, 2015), because language determines organizational communication and forms the basis of knowledge creation (Piekkari et al., 2005). Also, Piekkari et al. (2014) believe that language permeates every aspect of international business, especially those involved in global activities (Piekkari et al., 2014).

Scholars approach language issues in business from many different perspectives (Brannen et al., 2014). Among the various conceptualizations of the languages they use, the three most prominent are: national languages are spoken in multinational corporations (MNCs), officially compulsory corporate languages, and English as the language of global business. Many scholars focus on the national languages of company headquarters and globally dispersed subsidiaries (Angouri, 2014), and employees themselves intervene (Janssens & Steyaert, 2014), creating “language landscapes” (Steyaert et al., 2011), which are very often spoken. Others deal with the notion of a common corporate language, which is generally defined as an “administrative management tool” (Latukha et al., 2016) that acts as a mediator or barrier to internal and external communication (Piekkari et al., 2005). In addition to the frequent but simplistic understanding of top management requiring that one must always choose a particular national language (mostly English) (Berthoud et al., 2015), scholars have begun to recognize the complexity of common corporate languages, which “often reflect industrial context and national language environment in the country of origin” (Brannen et al., 2014; Brannen & Doz, 2012).

The role of the English language is the third aspect of the language that is often studied in business. Depending on their disciplinary socialization, international business experts differently conceptualize English as a hegemonic force (Tietze & Dick, 2013), re-creating postcolonial power structures (Boussebaa et al., 2014) or as a more neutral communication tool in the form of business English as BELF [English as Business Lingua Franca] (Kankaanranta & Planken, 2010). However, other scholars are investigating the interaction between national and corporate languages and English (Kuznetsov & Kuznetsova, 2014).

While economic approaches seek to make the characteristics of certain languages measurable, business studies are divided into conceptualizing languages as static and discrete entities as opposed to hybrid, fluid, and situational codes. Also, while some business studies perpetuate the notion of language as an easily accessible management instrument or tool, an increasing number of publications on multilingual business phenomena rely on translation studies, sociolinguistics, and psycholinguistics to embrace language as an ambiguous, complex, and dynamic notion. Only by integrating concepts and methods from different academic disciplines, the complexity of language influences on international business can be properly understood.

The early marginalization of language research in international business is also becoming evident in publishing houses. Until fifteen years ago, most language research appeared in fairly specialized journals, and occasionally it was published in more popular International Business journals, such as the *International Business Review*, the *Journal of World Business*, and the *Management International Review*. Most of the early research originates outside the United States. Although ten of the seventeen authors out of 14 articles published between 1987 and 1999 were from American business schools, this is due only to their large author team. Language scholars from Finnish and Norwegian institutions have become much more prominent, producing several papers per author. The United Kingdom is the most frequently studied country in these early works. This strong representation of European countries is quite atypical for otherwise very extensive international business research focused on the United States.

Harzing & Feely (2008) explain this phenomenon by the fact that “American researchers (...), due to the dominance of the English language, have a reduced perception of the importance of language” (Harzing & Feely, 2008, p. 51). Although American scholars have also grappled with this topic in recent years, the origins of the authors and the target regions for empirical language studies are even more diverse than other areas in the broader thematic area of international business. Depending on their disciplined socialization, international business professionals interested in language rely on a variety of theories from organizational behavior, economics, and strategy. Scholars on organizational behavior and intercultural management approach language with cultural theories (i.e. Harzing & Maznevski, 2002; Henderson Kassis, 2005), social identity (i.e. Groot, 2012), power relations (e.g. Neeley, 2013), emotion (i.e. Neeley et al., 2012; Tenzer & Pudelko, 2015) and a number of other phenomena. Those with economic experience apply, among other things, the gravitational trade model (i.e. Melitz & Toubal, 2014; Sauter, 2012), transaction cost economics (i.e. Selmier & Oh, 2013) or linguistic relativity (i.e. Chen, 2013)

Research strategies mainly focus on explanations based on resources for the internationalization of multinational companies and new ventures (i.e.

Fernandez-Ortiz & Lombardo, 2009; Hurmerinta et al., 2015). Despite the common goal - to explain the impact of language on international business and economic activities - this has been discussed to a very limited extent in most literature so far.

## THE IMPORTANCE OF FOREIGN LANGUAGE KNOWLEDGE IN INTERNATIONAL BUSINESS

This part of the paper will be devoted to the analysis of the advantages of knowing one or more foreign languages, such as the level of monthly income, employment/unemployment rate, and career advancement opportunities. Mann, Brassel and Bevanuin their work “The economic case for language learning and the role of employer engagement” give an overview of literature from the academic, economic and educational fields, and finally the advantages of economic nature, all related to foreign language learning, in this case in the UK and America. “Research has shown that language competencies in the British population are one of the lowest in Europe. This is shown by the fact that as many as 61% of Britons do not speak a single foreign language” (European Commission, 2012, p. 16). Perhaps one of the reasons for this is the situation that English is considered the dominant language in the world. We can say that this level of knowledge has huge consequences for both employers and employees. What is important to emphasize is the high level of dissatisfaction with the level of language competencies of high school and university graduates. This was confirmed by a 2010 survey conducted by the CBI [Confederation of British Industry]. Hundreds of employers, who employ more than one billion people, gave the opinion that the different skills of the candidates based on previous experience, including knowledge of foreign languages and cultures, are at the mentioned level. A number of employers required a high level of knowledge of a foreign language, but still, 65% of respondents required only “ability to communicate”, in order to better organize business, better communicate with customers and other participants in the business chain. Only 3% of respondents were satisfied with the level of knowledge of a foreign language, which is clearly seen in Figure 1 below.



Figure 1. Employers' satisfaction with employee skills (in percent). Source: Mann et al., 2011, p. 8.

The results shown in Figure 1 point out that the knowledge acquired in primary and secondary education, provided that it is acquired in full or at least in large part, is quite sufficient to meet the criteria of employers.

A 2017 UK Ministry of Education survey, conducted on the required skills and knowledge in the labor market involving 87,430 employers, showed very interesting results.

Deficient skills according to the statements of employers are as follows, i.e. they can be divided into two groups:

- *professional knowledge*;

- *practical skills*.

They are very important because they involve communication and organizational skills. Skills such as *hard skills* are expertise in a particular field, ability to make effective decisions and solve problems, knowledge in the field of information technology, writing reports, speed of adaptation to new equipment/materials, etc. The vacancy rate of as many as 16% of jobs is correlated with the inability to communicate in a foreign language. There is a great demand for employees who speak one or more foreign languages, which is recognized as one of the basic priorities of most employers, as shown in the survey. In addition to the skills and knowledge that can be said to be a prerequisite for employment, respondents and employers also listed those competencies that employees acquire during business training, and which are necessary for work and career advancement.

They are also grouped into two categories:

- *Professional skills and*

- *“Soft skills”*.

The importance of communication in a foreign language of as much as 11% is something that is very important to employers, which indicates the fact that the lack of language skills not only negatively affects employment opportunities, but also furthers business development and progress. It is important to mention that most of the “soft” skills mentioned by employers can be related to learning foreign languages, if we take into account the knowledge we gained in the previous section. Some of these personal skills are time management and prioritization, teamwork, business communication, improving customer relationships, etc.

Some research has shown that learning a foreign language also has a positive effect on income. “Two longitudinal studies conducted in the United States have shown that two years of language learning during high school has a positive effect on later income - school knowledge results in salary increases of up to 4%, and that graduates with basic communicative language skills in a foreign language have 2-3% higher incomes compared to those without them” (Mann et al., 2011, p. 10).

Thus, a certain level of knowledge of foreign languages will be rewarded in the American labor market - high school students learning languages and graduates who speak another language will, in later life, earn more than those with similar characteristics (quality of education, parental education, race, and sex) but do not speak another language.

Donald Williams has published his paper on “*The Economic Returns to Multiple Language Usage in Western Europe*”. In this scientific-professional paper, he analyzed the relationship between the level of income and the use of another language at work in Western European countries. Taking into account a large number of socio-economic factors, Williams came to the conclusion that the use of another language has a positive effect on earnings in as many as fourteen countries, but not in the UK where the language of business is mostly English. In several European countries, for example, Germany, the Netherlands, Belgium, Italy, Spain, and Austria, employees who use a second language earn 8-12% more than those who do not, while in Denmark, Ireland, Greece, and Portugal 15-22%, and in Luxembourg as much as 30% (Williams, 2006, p. 11).

We see that Europe itself, as a very similar market, is very different in all this. The percentage depends on several factors, including workplace, gender, level and frequency of language use. In accordance with the above, we can systematize that the business benefits of knowing foreign languages are very great for an individual. Linguistic competencies represent a significant advantage in the labor market, given that there is a great need for candidates who can communicate in a foreign language. The required level of language proficiency is not high, which further contributes to the importance of acquiring these skills during secondary education. In addition to faster employment, these competencies also affect the possibility and speed of career advancement, as well as the level of income. Knowledge of foreign languages of employees certainly has multiple benefits for the company itself, which we will discuss in the next chapter.

## **THE INFLUENCE OF FOREIGN LANGUAGES ON SUCCESSFUL BUSINESS IN THE INTERNATIONAL ENVIRONMENT**

Again, through research, we will be based on the impact of foreign languages on the economic profit of the company, which is very important to emphasize. Recently, it has become apparent that the dominance of the English language is declining, and other languages are beginning to occupy an important place in the business world. In all this, it is certainly indisputable that English is still important and dominant, but it is necessary to keep in mind the importance and prevalence of other leading world languages for business, given that many companies want to find attractive markets and new consumers for goods and services. In one of her papers, Ingela Bel Habib (2011) has analyzed the impact of employees’ language skills on the export performance of German, French, and Swedish SMEs. Namely, these countries have a similar industrial structure, but their language policy and strategy differ - for example, Sweden, where only three languages are used for business communication, while the Germans and French use as many as 12 and 8 languages for communication.

Bel Habib claims that knowledge of one or more foreign languages is the basis of successful business in an international environment. Along with some of the variables that affect companies' exports, such as exchange rate differences, macroeconomic conditions, corporate structures, size and location of companies, communication in a foreign language is certainly one of them. It is important to mention that the export successes of many German companies are related to the Asian market - as many as 43% of German SMEs export goods to Central Asia, compared to 10% of French and 8% of Swedish. "South America is one of the neglected areas for the sale of Swedish products, while foreign trade relations with Germany and France are much better (30% Germany and 13% France)" (Bel Habib, 2011, p. 3).

An extremely large number of German companies have recognized the growing markets of the BRIC countries as an opportunity to expand their business - German share in the Chinese market is 5.5%, in India 5.9%, in Brazil 10.4% and in Russia 16.8%, while these numbers are much lower for Sweden. Major socio-political and economic reforms are largely creating a new business environment and market opportunities, and in order to achieve maximum international business results, it is important to formulate and implement a strategy for learning foreign languages within the company. Bel Habib states that "63% of German SMEs do business with over 50 foreign clients, compared to 15% in France, and only 1% of them have less than 5 foreign clients" (Bel Habib 2011, p. 4). Language knowledge is a hidden resource that needs to be exploited. The reason for this is that there is a high correlation between investing in language strategies and growth in exports and productivity. A survey conducted by the European Commission and the National Center for Languages CILT in 2006 in 29 European Union countries involved 2,000 small and medium-sized enterprises engaged in exports. "As many as 11% of respondents cited a lack of knowledge of foreign languages as one of the reasons for missed business opportunities, and at least 10 companies lost contracts worth over 1 million euros" (European Commission, 2005, p. 5).

It is estimated that the consequences of these losses are huge for the economy of the European Union, between 8,100,015 and 13,500,004 euros. It is also stated that investing in the development of a language strategy for the successful placement of products on foreign markets could lead to an increase in exports by 44.5% compared to those small and medium enterprises that do not invest in it. Lack of knowledge of English for negotiation is the most common situation cited by companies as the cause of losing export contracts for EU SMEs (11%), followed by business correspondence in German (11%) and English (8%), as well as knowledge of French when negotiating (8%). Respondents cited lack of cultural awareness, translation errors, lack of self-confidence, problems with distributors, "insufficient follow-up of requests or failure to answer questions, inability to take advantage of the opportunity" (European Commission, 2005, p. 18).

Also, as many as 18% of companies confirmed that they had difficulties in communicating with clients from abroad due to cultural barriers, especially when it comes to China and the Middle East. The lower percentage of British SME exports (37%) compared to the rest of Europe (45%) is due to lower investment in the language skills business. The percentage of companies that require language skills, engage in language policy and planning, and use translators to do business in other parts of Europe is three times higher than in the UK. The reason for this is certainly the dominance of the English language in business and its use around the world. However, one should not ignore the fact that Chinese is the most represented language in the world with about 1.5 billion native speakers, while Spanish is spoken by over 400 million people in about 30 countries. The development of the BRIC market will determine that these languages are to a large extent the future of the world language space. The fact that the lack of investment in the language skills of employees in the UK is equal to an export tax of 3% to as much as 7% is worrying. When we take into account that exports represent a quarter of GDP, the consequences are very significant - which means that in 2005 they would be equal to a loss of at least 9 billion pounds, i.e. .5-1.2% of GDP. Based on these data, we can conclude that the impact of foreign language knowledge on business performance is very significant. Companies, whether small or medium, that have developed a language strategy and that employ native speakers and translators have a great advantage over those companies that do not invest in language strategy management techniques. The quality of understanding and responding to market information is key to establishing business relations.

## RESEARCH RESULTS

In the continuation of the paper, a statistical presentation of data from the previous lines is given, presented first through theoretical bases, and then comparisons from different sources by the method of synthesis. All the above indicators take as a starting point the language and competencies in this area, and accordingly, a clear possibility has been created for the data to be presented quantitatively on a predominantly qualitative basis.

First of all, independent variables are considered, such as government, then GDP, exchange rate differences, macroeconomic conditions, corporate structures, size and location of enterprises, and essentially investing in the development of language competencies as dependent variables.

The presented results are only a picture and a clear indicator through statistics, specifically inferential statistics, less descriptive statistics, the state of our society, but also the societies of other countries.

Due to the simplicity and clarity of the results obtained, the IBM SPSS Statistics program was used on this occasion. It is important to emphasize that the data had to go through the process of so-called. Finding and removing incorrect results due to irregular or atypical points, because some results may be sensitive to the stated points.

Examination of the normality of the distribution

Table 1. Descriptive indicators

Descriptive statistics		
sum_lang_business		
N	Valid	101
	Missing	0
Mean		4.6419
Std. Error of Mean		.10902
Median		6.0000
Mode		9.00
Std. Deviation		1.12473
Variance		1.329
Skewness		-.321
Std. Error of Skewness		.092
Kurtosis		.823
Std. Error of Kurtosis		.224

In Table 1. Descriptive indicators, the values of arithmetic mean, standard deviation, median, mode, and some other parameters are obtained, the most important of which are Skewness and Kurtosis, because they can be used to check the deviation of the empirical from the normal distribution. The value of Skewness  $-.321$  and a statistical error of  $.092$ , and certainly in Kurtosis  $.823$  and a statistical error of  $.224$  indicate that the distribution does not deviate from the normal curve.

Table 1 basically shows what kind of distribution we have in our case (whether the distribution is normal or not). In the above Table Descriptive Indicators, arithmetic mean values of  $4.6419$  were obtained, which is essentially a good indicator given the range of results - the standard deviation of  $1.12473$  indicates a deviation around the arithmetic mean that is not large at all, median  $6.0000$ , mod  $9.000$  and more some parameters, the most important of which are Skewness and Kurtosis, because they can be used to check the deviation of the empirical from the normal distribution. The value of Skjunis  $-.321$  and the statistical error of  $.092$ , and certainly the courtesy of  $.823$  and the statistical error of  $.224$  indicate that the distribution does not deviate from the normal curve.

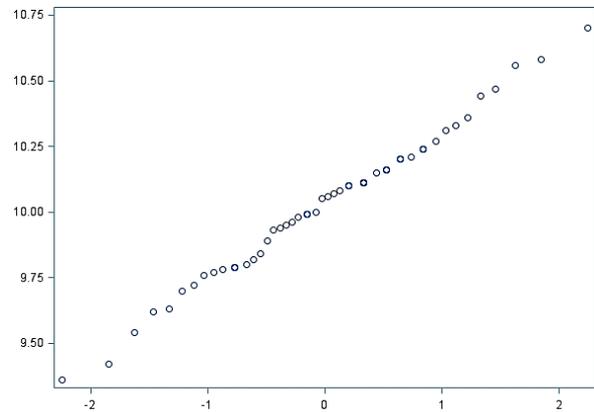
Table 2. Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Stat.	df	Sig.	Stat.	df	Sig.
sum_lang	.189	121	.000	.189	121	.000

a. Lilliefors Significance Correction

The variable *sum\_lang* represents the aggregate variable of all variables on the basis of which the normality of the distribution was examined. Table 2 of the Normality Tests gives the results of the distribution normality tests invented by Kolmogorov and Smirnov. The Statistic column provides information on the extent

of the distribution deviation from normal. In our case  $0.189$ , and the column Sig. speaks of the significance of the established deviation of  $.00$ . Since Sig. in SPSS is less than  $.01$ , it can be concluded that the distribution does not deviate statistically from the normal curve at the significance level of  $0.01$ . Result 121 represents the total number of results obtained by the research, which characterizes the representativeness of the sample.



Histogram 1. Normal Q-Q Plot

The appearance of a normal probability curve, Normal Q-Q Plot, indicates that the observed values are close to a straight line, i.e. the expected values that a normal distribution would give.

*Subhypothesis 1:* Knowledge of one or more foreign languages is assumed to be the basis of successful business in an international environment.

Table 3. Correlation-Pearson Correlation

Correlation			
		for_lang	succ_bus
for_lang	Pearson Correlation	1	.904**
	Sig. (2-tailed)		.000
succ_bus	Pearson Correlation	.904**	1
	Sig. (2-tailed)	.000	

The variable *for\_lang* represents precisely the variable which, according to the sub-hypothesis, is in relation to or potentially in correlation with the variable *succ\_bus*.

Statistical processing of data in the SPSS package resulted in Table 3, which represents the correlation between the two variables. The above table represents the direction and strength of the connection. The amount of Pearson's correlation is  $r = .904$ , which is primarily a positive correlation, because the plus sign is in front of the value of the correlation coefficient. The amount of the  $.904$  correlation itself is, according to Cohen (who gave guidelines for the size of the correlation) of high value, because he classifies the value in the range of  $.50$  to  $1.0$  as large, which means that in this case there is a large correlation between these two variables. We come to the conclusion that there is a connection between knowing one or more foreign languages with a successful business in an

international environment. Significance Sig. = .000 represents the statistical significance of correlation as a test by which we examine the relationship between the two variables shown in Table 3.

Table 4. Correlation coefficient and coefficient of determination

Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.904 <sup>a</sup>	.610	.481	14.33056

In Table 4, the result R (correlation coefficient) and R<sup>2</sup> (coefficient of determination) are very important. This table shows that R = .904. The value of R<sup>2</sup> (R Square) is R<sup>2</sup> = .610. Therefore, a successful business environment with 61% can be explained by knowledge of one or more foreign languages. The error in estimation or Std. Error of the Estimate is 14.33056, which is a very small error, and the results of R and R<sup>2</sup> can be taken as credible, but certainly taking into account the data of Adjusted R Square which confirms the above.

Table 5. ANOVA

Model		Sum of Squares	Mean Square	F	Sig.
1	Regress.	23471.044	23251.1	29.12	.000
	Residual	12595.026	741.898		
Total		36066.070			

Table 5. ANOVA shows what the F coefficient is and its significance. Its value is F = 29.12, and it is statistically significant at the level of inference  $p < .01$ , because its value is Sig. = .000. It also says that the overall regression is significant. The Sum of Squares respectively the sum of squares together with Mean Square represent results that do not ultimately affect the conclusion whether the regression itself is significant or not. Mentioned data in Table 5. F and Sig. represent the basis for the stated conclusion.

Table 6. Beta coefficient

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Stand Coeff	t	Sig.
		B	Std. Error			
1	Const	1121.535	110.56		16.22	.000
	foreign_lang	12.484	4.095	.724	12.449	.000

The variable *foreign\_lang* is the tested variable or predictor variable in this test and confirms whether the regression itself has its meaning during the test. Table 6. Coefficients gives the variable Beta (Beta coefficient), which indicates the size of the predictor variable. The Beta coefficient value of .724 and the t value for these coefficients show statistical significance (at the level of  $p < .001$ ).

The value of Std. Error in its amount of 4.095 is in this case statistically insignificant, together with the value of B which is 12.484. Therefore, the final discourse from the previous paragraph can be reaffirmed.

*Subhypothesis 2:* It is assumed that there is a large correlation between investment in language strategies and growth in exports and productivity.

Table 7. Correlation - Pearson Correlation

Correlation			
		for_lang	export_prod
for_lang	Pearson Correlation	1	.876**
	Sig. (2-tailed)		.000
export_prod	Pearson Correlation	.876**	1
	Sig. (2-tailed)	.000	

The connection between investment in language strategies and growth in exports and productivity is shown by crossing the variable *for\_lang*, which is ultimately investment in language strategies, and exports and productivity are expressed through the variable *export\_prod*. By crossing them, Table 7 was obtained, which represents the Correlation - Pearson Correlation. Statistical processing of data in the SPSS package resulted in Table 7, which represents the correlation between the two variables. The given table represents the direction and strength of the connection. The amount of Pearson's correlation is  $r = .876$ , which is primarily a positive correlation, because the plus sign is in front of the value of the correlation coefficient. The amount of the .876 correlation itself is of great value according to Cohen's interpretation, because he classifies the value in the range of .50 to 1.0 as large, which means that in this case there is a large correlation between these two variables. We conclude that there is a link between investing in language strategies and export and productivity growth.

## CONCLUSION

It is clear, as we have confirmed on the basis of the presented content, that language is the primary means and key communication mechanism in understanding what is real. The importance of knowing the language justifies the need for scientific analysis of relationships between language and international business. Although economic, trade, political or technological prosperity and profit are the drivers of business communication, language certainly determines organizational communication and forms the basis for knowledge creation. Emphasizing the importance of knowing a foreign language in the business environment, as well as the level of knowledge in this area, we can say that both components have huge consequences for both employers and employees. What is also important to point out is the high degree of dissatisfaction with the language competencies of high school and university students, which can have negative implications for the international business environment.

Observing the first sub-hypothesis, based on the amount of Pearson's correlation  $r = .904$  (which is primarily a positive correlation, because the plus sign is in front of the correlation coefficient) it is evident that there is a connection between knowledge of one or more foreign languages and successful business in an international environment. Furthermore,  $R$  (correlation coefficient) and  $R^2$  (determination coefficient) with their values  $R = .904$  and  $R^2$  (R Square)  $R^2 = .610$  indicate that a successful business environment with 61% can be explained by knowledge of one or more foreign languages.

A large correlation was also observed between investment in language strategies and growth in exports and productivity with the amount of Pearson's correlation  $r = .876$ . Pointing to all the above, it can be concluded that language competencies are at the heart of the international business and that the development of language strategies and language management have very large implications for the international business environment.

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## QUALITY OF LIFE OF ELDERLY PEOPLE WITH VISUAL IMPAIRMENT IN RELATION TO THE DEGREE OF VISUAL IMPAIRMENT

*Original scientific paper*

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### ABSTRACT

*The main goal of this study was to examine the differences in the quality of life of the elderly with impaired vision in relation to the degree of visual impairment. The research included a total of 40 elder respondents, visually impaired, both genders, located and accommodated in the Public Institution “Retirement Home” in Tuzla and the retirement home “Vita Nostra” in Bihac. The analysis of the obtained results indicates that the degree of visual impairment has an impact on the quality of life of the elderly with impaired vision, people with severe visual impairment have the poorest quality of life.*

**Keywords:** *quality of life, visually impaired elders, degree of visual impairment*

### INTRODUCTION

Senility is often referred to in the literature as the third age. The third age includes the last third or quarter of life, depending on where the limit is set (Radzo Alibegovic and Kuduzovic, 2018).

In the literature on quality of life we find about a hundred definitions and models. The World Health Organization defines quality of life as a personal perception of a position in a specific cultural, social, and environmental context (World Health Organization, 1997).

Vuletic and Mujkic (2002), based on the definition of the World Health Organization, came to the conclusion that quality of life is primarily a psychological category, and that it does not automatically arise from meeting some basic needs, but from the overall psychological structure of the individual interacting with physical and the social environment in which he/she lives.

One of the most comprehensive definitions of quality of life is given by Felce and Perry (1993). They define quality of life as an overall, general well-being that includes objective factors and subjective evaluation of physical, material, social and emotional well-being,

including personal development and purposeful activity. Every aspect of this definition is observed through a personal value system of the individual. Health plays a very important role in the quality of life. The term health most often implies the absence of disease. An integral part of an individual's quality of life related to health is the quality of their vision (Brown, 1999).

Thus, it was confirmed that the visual impairment has a markedly negative effect on the functioning of persons with visual impairment (Kuyk et al., 2008), reducing the quality of daily life activities (Brenner et al., 1993; Stelmack, 2001), affecting the level of independence and movement (Esteban et al., 2008; Kuyk et al., 2008; Nutheti et al., 2006), thus causing a decline in physical and mental functioning with an increased risk of depression (Brenner et al., 1993; Stelmack, 2001). It can be concluded that visual impairment generally has a negative effect on an individual's quality of life (Kuyk et al., 2008).

The main goal of this study was to examine the differences in the quality of life of the elderly with impaired vision in relation to the degree of visual impairment.

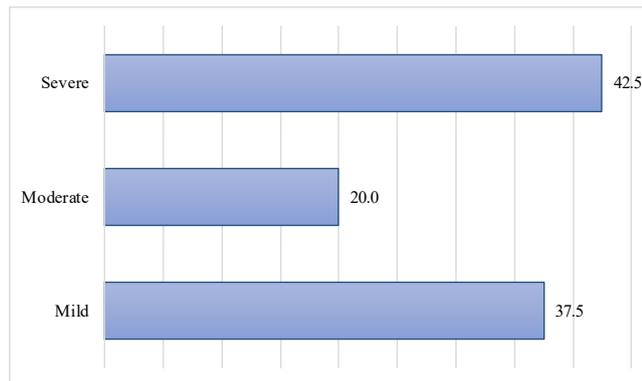
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## METHODOLOGY

The research included a total of 40 elderly respondents, visually impaired, both genders, located and accommodated in the Public Institution “Retirement Home” in Tuzla and the retirement home “Vita Nostra” in Bihać.

Graph 1 shows the distribution of respondents in relation to the degree of visual impairment. The results show that 15 or 37.5% respondents have a mild degree of visual impairment, 8 or 20% respondents have a moderate degree of visual impairment and 17 or 42.5% respondents have a severe degree of visual impairment.



Graph 1. Distribution of respondents in relation to the degree of visual impairment

## Variables

There are two groups of variables: anamnestic variables and quality of life testing variables.

## METHODS

The research was conducted in the Public Institution “Retirement Home” in Tuzla and the retirement home “Vita Nostra” in Bihać, with the prior consent of the institutions in which the research was conducted. Respondents were previously acquainted with the method of research, where the method of examination was presented in detail. All respondents joined the research voluntarily. The examination was conducted

individually with each respondent in a separate room and in a pleasant environment, in accordance with the propositions of the test. The surveying was anonymous.

## Measuring instruments

The quality of life assessment was performed using the Visual Functioning Assessment Questionnaire, National Eye Institute Visual Functioning Questionnaire 25 (NEI-VFQ 25).

The NEI-VFQ-25 questionnaire contains 25 questions related to vision-related quality of life. The questions were divided into 12 subgroups. The score for each subgroup is converted to a score between 0 and 100, with higher values meaning better quality of life associated with vision (Mangione et al., 1998).

The analysis of medical documentation was used to collect data on age, gender and the degree of visual impairment.

## Data processing methods

The obtained results were processed by descriptive analysis, t-test, Univariate analysis of variance, and Scheffe-Test in the statistical package SPSS 20. for Windows.

## RESULTS

In order to determine significant differences in relation to the degree of visual impairment and quality of life in the elderly, the Univariate analysis of variance was applied. Table 1 shows the results of descriptive statistics, i.e. measures of central tendency and dispersion of quality of life in relation to the degree of visual impairment. The highest arithmetic mean of quality of life is in respondents with mild visual impairment ( $61.85 \pm 19.77$ ), where the minimum and maximum results range from 21.91 to 86.27. The lowest values of the arithmetic mean are in respondents with severe visual impairment ( $21.65 \pm 9.50$ ) where the minimum and maximum results range from 8.8 to 43.55.

Table 1. Descriptive indicators of quality of life according to the degree of visual impairment

Degree of visual impairment	M	SD	SE	MIN	MAX
Mild	61.85	19.77	5.11	21.91	86.27
Moderate	58.76	9.77	3.45	47.27	69.00
Severe	21.65	9.50	2.30	8.18	43.55

Table 2 shows the results of the Univariate analysis of variance. Based on the obtained results of Fisher’s test (F), it can be concluded that at the level of statistical significance of 0.05 there is a difference in relation to the quality of life and the degree of visual impairment.

Since the results of the Univariate analysis of variance showed that there are statistically significant differences, and in order to see where these differences are most pronounced, the Scheffe-Test was applied and the results are shown in Table 3.

Table 2. F-Test results in relation to quality of life

Group	SK	Df	PSK	F	p
Between groups	15010.10	2.00	7505.05	36.61	.000
Within the groups	7585.73	37.00	205.02		
Total	22595.83	39.00			

Table 3. Results of the Scheffe-Test

(I) Degree of visual impairment	(J) Degree of visual impairment	Difference	SE	p
Mild	Moderate	3.08	6.26	.886
	Severe	40.19*	5.07	.000
Moderate	Mild	-3.08	6.26	.886
	Severe	37.10*	6.13	.000
Severe	Mild	-40.19*	5.07	.000
	Moderate	-37.10*	6.13	.000

Based on the obtained results shown in Table 3, it can be concluded that at the level of statistical significance of .01, quality of life is worse in respondents with severe visual impairment compared to respondents with mild and moderate visual impairment.

## DISCUSSION

The analysis of the results of this paper indicates that the degree of visual impairment has an impact on the quality of life, i.e. that people with severe visual impairment have the poorest quality of life. A similar conclusion was reached by Jablan and associates in 2016, who examined the quality of life of visually impaired adults. The sample included 44 respondents divided into two age groups: respondents aged 18 to 35 and respondents aged 35 to 60. Data on the quality of life of persons with visual impairments were collected using the National Eye Institute Visual Functioning Questionnaire-25 (VFQ-25). The results of the research showed that a statistically significant difference was found between the degree of visual impairment and the quality of life. It was also concluded that blind adults are more dissatisfied with the quality of life than the adults with mild visual impairments.

Sarlija (2012) came to the same results, examining indicators of the quality of life of blind and partially sighted people. The sample included 142 adults. Based on the data collected by the Questionnaire Personal Wellbeing Index - Adult or Personal Quality of Life Index - for adults, it was concluded that there is a difference in quality of life with regard to vision status, i.e. that blind people have lower subjective quality of life compared to people with milder visual impairments.

Nutheti et al. (2006) examined a sample of 7.398 respondents, aged 16 and above, examining the impact of impaired vision and eye disease on quality of life, using the World Health Organization's QOL (WHOQOL) instrument adapted to the instrument (HRQOL) assessing quality of life related to health,

came to the conclusion that there is a difference in quality of life in relation to the degree of visual impairment, i.e. blind people had worse quality of life. Also, Crewe et al. (2011), examining the quality of life of visually impaired people, on a sample of 156 respondents, aged 19 to 97, came to the conclusion that there is a statistically clear difference between the quality of life of blind respondents and respondents with mild visual impairments, that is, that the degree of visual impairment is associated with the better or worse quality of life.

Quality of life decreases with declining visual acuity and quality of other visual functions (Jablan et al., 2016). The same statement is made by Brown, who in his research on the relation between visual functioning and quality of life, found that poorer quality of life is directly affected by a decrease in the degree of visual function in the eye with better visual acuity (Brown, 1999). In further determining the relationship between quality of life and refractive state, Vitale et al. (2000) proved that the quality of functioning decreases with the increase of diopter.

Research conducted in Spain, included respondents over the age of 64, concluded that deteriorating quality of life is associated with visual function and the degree of visual impairment (Esteban et al., 2008).

## CONCLUSIONS

Examining the differences in the quality of life of the elderly with impaired vision in relation to the degree of visual impairment, it was determined that there is a difference in relation to the quality of life and the degree of visual impairment. At the level of statistical significance, the quality of life is poorer in respondents with severe visual impairment, compared to respondents with mild and moderate visual impairment.

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## ILLEGAL CANNABIS GROWERS IN SERBIA\*

*Original scientific paper*

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### ABSTRACT

*The subject of this paper is the indoor cultivation of marijuana in laboratory conditions in Serbia. The sample included 138 illegal laboratories discovered in Serbia in the period from 1 January 2013 to 30 June 2019. In 51 (37%) of the laboratories discovered, marijuana was detected at various stages of the production process, from stems of very low height to the final product ready for distribution to the illegal drug market. This result points to the conclusion that the producers took care to have a certain amount of “the goods” ready for the illegal drug market at all times. In 136 laboratories discovered (for the two remaining laboratories there were no data available), the total of 196 persons were deprived of liberty, whose average age was 38 (+/- 10). Out of that number, only one person in each of the 96 (68.4%) laboratories discovered was arrested. The number of the arrested persons is very small, which leads us to a conclusion that the criminal investigations do not sufficiently determine the connection between the illegal producers and the rest of the criminal organization.*

**Key words:** cannabis, indoor cultivation, commercial growers, clandestine laboratories

### INTRODUCTION

Cannabis or hemp (Lat. *Cannabis sativa*) is one of the oldest plant crops with a multiple purpose. It is used as an industrial raw material, for medical purposes, but also as a drug. The presence of the psychoactive cannabinoid tetrahydrocannabinol ( $\Delta^9$ -THC) classifies this plant as a psychoactive substance. According to the Law on Psychoactive Controlled Substances of the Republic of Serbia, the possession, cultivation and trafficking of cannabis varieties containing more than .3% of substances from the tetrahydrocannabinol group is prohibited (Article 58). However, as hemp is a useful industrial raw material, it is important to determine the concentration and ratio of the main cannabinoids  $\Delta^9$ -THC and cannabidiol (CBD) and based on that to distinguish between industrial hemp and drug as a psychoactive substance (Koturevic & Brankovic, 2014), which is determined by appropriate expertise.

Marijuana, hashish and hash oil are three products made from the cannabis plant, which are on the list of narcotic drugs due to their psychoactive effect. One of the important differences between these psychoactive substances is in the concentration of THC. For example, marijuana contains the lowest percentage of THC - up to 5%, and when consumed it has the mildest effect, hashish contains 5 - 12%, and hash oil 15 - 70% THC (Gazdek, 2014). In the last 20 years, production processes, usually in laboratory conditions, have managed to increase the concentration of THC in marijuana, and its concentration can be 6% or even more. The percentage of THC in cannabis indica depends on the part of the plant which is used for drug production, but also on the characteristics of the plant itself, fertilizer type, processing method, the time of harvest and the geographical location where this plant grows (Otasevic, Atanasov, & Labovic, 2020).

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Cannabis is an annual unisexual plant which is pollinated by wind in natural conditions. However, for the needs of indoor cultivation, the naturally unisexual plants are turned into monogamous plants, the so-called hermaphrodites. For commercial production purposes, cannabis growers now only produce female hemp seeds by chemically inducing female hemp plants to produce pollen themselves. The height of the stem can vary between 20 cm and 6 m, or even more, although the most common plants are those from 1 to 3 m tall (UNODC, 2009). Specifically constructed laboratories or greenhouses are used for the illegal production of marijuana in these cultivating conditions. The flower of the female plant is used in the production of marijuana. Despite the fact that it has its application in both industry and medicine, due to its psychoactive properties, cannabis is on the list of prohibited substances in most countries of the world, and its production and use are legally prohibited. According to the 2016 World Drug Report drawn up by the United Nations Office on Drugs and Crime (UNODC, 2016), cannabis is the world's leading illegal substance in terms of cultivation, production, resale and the number of users. Cannabis is grown illegally outdoors, in soils of varying quality and in almost all parts of the world except in the polar regions. Due to the reduced risk of detection, the possibility of controlling the cultivation conditions, the possibility of obtaining higher yields and the possibility of obtaining the final product with a higher percentage of THC (Leggett & Pietschmann, 2008), the illegal producers more often opt for cultivating cannabis indoors or in laboratories rather than outdoors on plantations.

## **METHODOLOGY**

This research is exploratory in its character. The general hypothesis is as follows: A significant number of illegal laboratories for the commercial production of marijuana has been discovered in the Republic of Serbia. A significant number means that more than a hundred of them were discovered in the observed period.

In accordance with the aims of this research, specific hypotheses have also been made:

1. Illegal laboratories for indoor marijuana cultivation are most often installed in residential premises and in urban areas.
2. Illegal marijuana production is dominated by individual producers whose primary goal is to make a profit.

The research included 138 illegal laboratories for the production of marijuana (indoor cultivation of marijuana in laboratory conditions), which is the number of all the discovered laboratories for the production of marijuana in the territory of the Republic of Serbia (excluding Kosovo and Metohija) in the period from 1 January 2013 to 30 June 2019 (data from 2019 were incomplete). Data from the Department of Analytics of the Ministry of the Interior of the Republic of Serbia were used.

This Department records all cases of discovered clandestine laboratories on the territory of Serbia, regardless of whether they had produced natural or synthetic drugs.

For the purposes of this paper, a part of the research that was conducted during 2019 will be presented. It analyzed the following: the distribution of detected laboratories by cities, the location of clandestine laboratories, the amount of seized stems, the amount of seized drugs in the drying phase, the amount of dried drugs (final product) and the number of arrested persons in laboratories.

Based on the obtained data, we will point to the main characteristics of illegal cannabis producers in our country.

IBM SPSS Advanced Statistics 20.0 package was used for the statistical data analysis.

## **RESULTS**

In the period from 1 January 2013 to 30 June 2019, 138 illegal laboratories for the production of marijuana (indoor cultivation) were discovered. Most laboratories were detected in urban areas (80.9%), while 19.1% were detected in rural or suburban areas. Most laboratories were discovered in Belgrade (37). The result has been expected and it is in line with the Public Security Strategic Assessment drawn up by the Ministry of the Interior in 2017. The abovementioned assessment states the following: "Most organized criminal groups operate in Belgrade, the dominant criminal activity of these groups is illegal production and trafficking of narcotic drugs, which is carried out by 86.2% of the registered organized criminal groups (Public Security Strategic Assessment – public version, 2017). In addition to Belgrade, a significant number of these laboratories were discovered in Novi Sad (12) and Subotica (12), followed by other major cities in Serbia (Figure 1). These data also unequivocally confirm the practice of laboratories being installed by producers near consumers in order to reduce the risk of detection in the case of smuggling of products to end consumers.



Figure 1. Number of clandestine laboratories in the Republic of Serbia (excluding Kosovo and Metohija) per locations where they were discovered

There are different locations where illegal laboratories are installed and then discovered. Having used and analyzed the data obtained from the Department of Analytics of the Ministry of the Interior of the Republic of Serbia, we reached a conclusion that residential areas are the most common places where illegal laboratories for marijuana production are discovered - 123 (89.1%) (Table 1). However, criminal practice, both in Serbia and in other European countries, shows that laboratories can also be found in utility rooms, sheds, garages, motels, halls, office spaces, car repair garages, camper trailers and the like (Otasevic & Atanasov, 2018).

Table 1. Locations where clandestine laboratories were discovered

	f	%
Houses, appartments, holiday homes	123	89.1
Basements and utility rooms	10	7.2
Office spaces, halls	4	2.9
Car repair garages	1	.7
Total	138	100.0

The locations where illegal laboratories were discovered in most cases were owned by illegal producers - 132 (97.1%), while only four illegal laboratories were installed in rented spaces. This statistic confirms the claim that growers usually keep the laboratory close to themselves in order to control it more easily, i.e. to protect it (Otasevic, Kolarevic, & Radovanovic, 2019). In 51 (37%) of the discovered laboratories, marijuana was found at different stages of the production process: stems of different heights, marijuana at different stages of the drying process, dried and packaged marijuana ready for distribution on the illegal drug market. In 42 (30.4%) of the laboratories, only marijuana stems were detected, while drying marijuana or dried marijuana was detected in 40 laboratories (29%). In 5 laboratories only, the installed equipment was discovered and no drugs were seized, which most likely indicates good preventive work of the police. We assume that in these cases the illegal producers procured the equipment with the intention of starting illegal drug production, but they were discovered before the illegal laboratory started production (Table 2).

Table 2. Different stages of the production process

	f	%
The amount of seized marijuana at the drying stage or already dried (final product)	40	29.0
Marijuana stems	42	30.4
Final product and stems	51	37.0
Equipment only	5	3.6
Total	138	100.0

Police administrations report on the seized amounts of marijuana in the following various ways: by the number of seized plants (where there is no data on the size or at least an attempt to ascertain whether the seized stems are of the same or similar height, in order to at least partially determine the cultivation stage); by total weight in the raw state; by total weight after drying; and by the amount of seized dried marijuana ready for illegal distribution. Due to the heterogeneity of reporting, it is not possible to accurately convert the data from one measure to another for practical purposes. As a result, for the purposes of this paper, two sets of data (the number of stems detected and the amount of dried marijuana ready for further distribution) will be analyzed separately. If we add to these data the data on the amount of seized marijuana in the raw state expressed in kilograms and at different stages of the drying process, we can conclude that this would prevent additional analysis and reliable estimates of the extent of domestic marijuana cultivation on a yearly basis in our country.

In the observed period, marijuana stems of different heights were detected in 78 (56.5%) laboratories, i.e. at different stages of the production process. Up to 10 stems were detected only in 10 (7.2%) laboratories.

In other laboratories, more than 10 stems were detected, while in 8 (5.8%) laboratories, plantations of over 1000 seedlings were detected (Table 3). These data unequivocally show that indoor marijuana cultivation is dominated by commercial producers. Unlike unauthorized production for personal use, which involves meeting one's own needs or the needs of the household, the goal of commercial production is not the direct use of the product, but its further distribution, unauthorized sale and thus making a large profit.

Table 3. Number of cannabis seedlings discovered

Stems	f	%	Valid Percent	Cumulative Percent
From 1 to 10	10	7.2	12.8	12.8
From 11 to 100	31	22.5	39.7	52.6
From 101 to 500	19	13.8	24.4	76.9
From 501 to 1000	10	7.2	12.8	89.7
Over 1000	8	5.8	10.3	100.0
Total	78	56.5	100.0	
No stems	60	43.5		
Total	138	100.0		

For comparative purposes, Uruguay was the first country in the world to adopt Law No 19,172 in 2013, which prescribes recreational cultivation, production, sale and use of cannabis. Thus, in fact, Uruguay became the first country to legalize marijuana. In accordance with the valid legal regulations, during registration, the user of marijuana is obliged to opt for one of the three permitted methods of supply: through pharmacies, through cannabis clubs or through home production (Stojic, 2018). The main restriction on the production of cannabis at home refers to a maximum of six permitted plants, and a limit of a maximum of 480 grams of final product a year (UN Office on Drugs and Crime, 2017). In 74 (53.6%) laboratories, marijuana was found ready for further distribution and street sale. The amount of up to 100 grams of marijuana was found in only one laboratory, the amount of between 100 grams to 1 kilogram was found in 27 (19.6%) laboratories, while in 8 laboratories the amount of over 20 (5.8%) kilograms was found (Table 4). The data related to the amount of seized stems (Table 3), as well as data related to the amount of seized marijuana in laboratories throughout Serbia, confirm the hypothesis that the indoor cultivation of marijuana is dominated by commercial producers. This hypothesis is also confirmed by the fact that in the fifty-first (37%) laboratory discovered, during the incursion, seedlings of different sizes were seized, as well as a certain amount of the final product. In these cases, illegal producers had ensured that there was a certain amount of drugs ready for the illegal drug market at all times. In a study conducted in the Netherlands, Spence and co-authors concluded that the main motive for this group of growers is financial gain. Compared to non-commercial growers, commercial growers pay less attention to product quality, focusing on cannabis varieties that grow faster and give higher yields (EMCDDA Insights, 2012).

Table 4. Quantity of seized marijuana (final product) prepared for further distribution

	f	%
Up to 100 g	1	.7
From 100 g to 1 kg	27	19.6
From 1 kg to 5 kg	22	15.9
From 5 kg to 10 kg	10	7.2
From 10 kg to 20 kg	6	4.3
Over 20 kg	8	5.8
No quantity was discovered	64	46.4
Total	138	100.0

In 136 laboratories discovered (there were no data for two laboratories), 196 persons were deprived of liberty, whose average age was 38 (+/- 10). Out of that number, one person was arrested in each of the 96 (68.4%) laboratories discovered, no person was found in 7 laboratories at the time of the police incursion, in 6 laboratories more than 5 persons were arrested, and in two laboratories more than ten persons were arrested (Table 5).

Table 5. Number of arrested persons per laboratories

Number of persons	Number of laboratories	%	Total number of perpetrators
1.00	93	68.4	93
2.00	25	18.4	50
3.00	5	3.7	15
4.00	3	2.2	12
6.00	1	.7	6
10.00	2	1.5	20
Total	129	94.9	196
No arrests	7	5.1	
	136	100.0	

## DISCUSSION

The results of the conducted research have indicated that the illegal production of cannabis in laboratory conditions in our country can no longer be considered marginal, because 138 illegal laboratories for the production of marijuana were discovered in the observed period of 5.5 years. The increase in domestic production may be due to the increased risk of detection in cases of marijuana smuggling from neighbouring countries such as Albania or Montenegro, in our case. However, the number of laboratories discovered and the amount of seized drugs unequivocally indicate that illegal production is simple and easy to organize at home. Indoor cultivation can be organized wherever there is access to electricity and water. Also, information on marijuana cultivation is easily available and can be found on the Internet. Some presentations provide procedures (step by step) for successful cultivation.

There you can also find advice on agricultural measures necessary for good yields, including procedures and pesticides for plant protection, which are used in this production (Otasevic, Kolarevic, & Radovanovic, 2019). Recently, cannabis grow journals and instructions on how to keep them can be found on the Internet. The components of these journals are photographs of high-quality equipment, the type of lighting used, as well as photographs of the different stages of the production process.

The main precondition for successful indoor cultivation of cannabis is the use of extraordinary high-quality lighting systems. Cannabis growth is strongly associated with light intensity (Chandra et al., 2008), and in order to maximize yields, illegal producers must create light indoors, which is similar to that in the natural environment.

The equipment used to grow plants indoors (plants such as flowers or vegetables) can also be used in the illegal production of cannabis. This practically means that permitted products can be used for prohibited purposes. In this regard, some authors (Jansen, 2002) claim that the increase in the number of shops and online shops which sell all types of equipment necessary for growing plants, the so-called "Growshops", have contributed to the spread of cannabis cultivation in the Netherlands, emphasizing that cannabis production requires knowledge that can be acquired in such shops. In their opinion, information is more important than the equipment itself, referring to "Growshops" as "the centers of knowledge".

The results of research conducted in Europe also indicate that the total amount of electricity used in cannabis production, from the day of planting to the day of harvest, is approximately 1 kw per gram of dried flower material produced. Where energy consumption data are available, they can be useful indicators of the likelihood of illegal cannabis yields; but also, in criminal investigations, they can be indicators that illegal marijuana production is taking place (EMCDDA Insights, 2012).

The volume of illegal production of marijuana and other cannabis products in our country is currently impossible to be estimated. The available data on marijuana seizures are fragmented, non-standardized, and largely scientifically unfounded. One of the problems with estimating the production volume is the great diversity in cultivation methods that can be applied, but also the lack of standardized reporting forms at the national level. However, it should be noted that Serbia is no exception in this regard, because due to the different methods used in cultivation, it is almost impossible to estimate global cannabis production with precision that would be satisfactory for practical needs. Police practice across Europe shows us that the areas where cannabis is grown are very diverse, from home growers who grow cannabis for personal use to large commercial plantations that can produce huge amounts of drugs. UNODC has estimated that the annual income can be from 5 kilograms per hectare in cases of wild cannabis growth, to 40 tons per hectare in the case of hydroponically grown plants.

In the observed period, seizures of over 100 cannabis stems were most frequently detected in our country, while up to 10 stems were detected only in 10 (7.2%) laboratories. If we take into account the fact that in one laboratory the amount of dried marijuana (final product) of up to 100 grams was seized, as well as the fact that seizures ranging from 5 to over 20 kilograms are most dominant, then it is clear that laboratory production of marijuana is not intended to meet personal needs, but it is commercial production that aims to further sell the final product. As we have already mentioned, commercial growers do not take care of the quality of the product, and therefore the health of consumers, but their goal is to make a profit. This is confirmed by the results of previous research which showed that a large number of cannabis samples confirmed contamination, meaning the existence of fungi and bacteria that are harmful to health (Hazekamp, 2006, 4). The harvested material (flower of the female plant) must be dried immediately after harvesting, in order to avoid spoilage and contamination, various bacteria, mould and the like. This process takes one to two weeks, and the instructions found online suggest that slower drying in the production process improves the final taste.

A study conducted in 2006 in the Netherlands showed that the average number in one Dutch indoor laboratory amounts to 259 plants. The authors estimated the average yield of female flower buds per plant at 33.7 grams and the average yield per square meter at 505 grams. The Dutch Bureau for Confiscation of Criminal Assets proposed the application of a lower limit of the simple 95% confidence interval, which, in this case was 28.1 g/plants, or 399 g/m<sup>2</sup> (Toonen, Ribot, & Thissen, 2006).

Recent studies on indoor cannabis production conducted in Belgium have shown that the type of cannabis used is the main factor which determines the yield, although light intensity and plant density are also important factors (Vanhove, Van Damme, & Meert, 2011, p. 160). In one of their indoor cannabis cultivation experiments, Vanhove and colleagues found that cannabis yields differed significantly for different plant varieties, and suggested that the lower limit of the unilateral 95% confidence interval in indoor cannabis plantations be set at 575 g/m<sup>2</sup> (Vanhove et al., 2012). These results are applicable only to the Belgian-Dutch area, which is in many ways unique, and cannot be applied in the wider European context. However, it should be emphasized that these studies provide insight into the otherwise relatively unknown drug market and give some indications of possible production capacities of the closed plantations.

One person was arrested in each of the 96 (68.4%) detected laboratories. It is our opinion that independent growers are dominant in Serbia and they are independently engaged in the production of cannabis in private houses and apartments and usually grow between 100 and 1000 plants in one harvest. Those who are "more successful" among them invest a part of their profits into expanding the production. This is achieved by providing additional locations (buying or renting) in order to grow more plantations.

These growers usually choose the variety of cannabis that will have the most harvests a year. Their primary motive is profit and if it were not for the financial gain, they would not be engaged in illegal production. Some of them may have non-financial motives, such as product quality, but they are certainly not primary.

The fact that two persons were arrested in each of the 25 (18.4%) laboratories and the fact that 3 or more persons were arrested in each of the 11 (14.2%) laboratories indicate a trend of organized criminal groups taking part in marijuana production. In the criminal legislation of the Republic of Serbia, a group means at least 3 persons who are connected for the purpose of permanent or occasional committing of criminal offences, who do not have to have defined roles of their members, continuity of membership or a developed structure (CC Article 112). These groups own large plantations of over 1000 stems and quantities of over 10 kilograms of the finished product.

An outstanding example from 2019 refers to the agricultural estate "Jovanjica" where illegal marijuana production was discovered at several locations. On that occasion, 9 members of an organized criminal group were deprived of liberty, and as many as 649.9 kilograms of marijuana and 65,581 raw cannabis stems, weighing 3,954 kilograms, were seized.

In the Republic of Serbia, there are 58 organized crime groups (OCGs) of high (8.6%), medium (44.9%) and low (46.5%) levels of organization. The dominant criminal activities of these groups are drug smuggling and illegal drug production and trafficking, in which 86.2% of OCGs are involved in. Some of these groups are involved in the illegal production of marijuana (Public Security Strategic Assessment - public version 2017). These groups have several cultivation sites at the same time, where they produce serious amounts of cannabis simultaneously. As in other areas of crime, so in the illegal production of cannabis, OCGs are hierarchically organized, there is a strict division of labour and numerous specializations that some members of these groups have. Specialists are in charge of performing very specific tasks in the chain of illegal cannabis production, from the selection of lighting and cannabis varieties, through the cultivation and stimulation of plant growth to the preparation of final products (flower cutting, drying, pressing and packaging). These allegations have been practically confirmed in the police practice in Serbia.

An interesting criminal investigation took place in April 2014 when employees of the Service for Combating Organized Crime in a joint action with the police officers of the Special Anti-Terrorist Unit deprived of liberty a nine-member OCG which, in the period from October 2013 to April 2014 was engaged in illegal production of marijuana in artificial conditions. The leader of this criminal group financed and organized the production and distribution of marijuana, he looked for facilities, bought equipment, cannabis seeds and substances necessary for growing cannabis. The other two members, brothers, were in charge of installing the technical equipment.

The fourth was in charge of transporting saplings and storing marijuana in his house. The fifth member was in charge of transporting equipment, cannabis seeds and chemicals used for the care, nutrition and growth stimulation of plants from EU countries. Some members of the group bought houses in which they installed new laboratories for the illegal production of marijuana. In this police action, 2.154 cannabis plants and 800 grams of dried marijuana ready for further sale were seized (Data provided by the Department of Analytics of the Ministry of the Interior of the Republic of Serbia).

Considering the fact that the illegal production took place in several locations, the quality of the equipment, especially the lighting, the number of stems of different heights and the production capacities of the laboratory, it can be concluded that it was a highly profitable laboratory. A small amount of seized drugs means that the producers did not leave “the goods” on the shelves for a long time, indicating a high level of trafficking.

In the fight against this type of drug crime, modernly equipped police boasts using thermal imaging cameras that record heat emission, turning infrared radiation into radiation that is visible to the naked eye (Otasevic & Kolarevic, 2020, p. 18). The information obtained in this way is the starting point for further operational work in order to detect and uncover cannabis cultivation laboratories. Finally, we can conclude that the proactive work of the police and the prosecution contributes to increasing the efficiency of the preliminary investigation procedure for criminal offences in the field of drug crime; and the efficiency of the criminal procedure depends on the efficiency of the preliminary investigation procedure.

## CONCLUSIONS

The results of the conducted research confirmed all three hypotheses. The number of laboratories discovered (138) in the observed period indicates that laboratory cannabis cultivation in our country cannot be considered marginal. However, the true extent of illegal production of marijuana and other cannabis products is impossible to be estimated due to the lack of serious scientific research in this area, but also due to the lack of a solid database and standardized reporting forms at the national level. The available data on marijuana seizures are fragmented, non-standardized, and largely scientifically unfounded. A well-designed database with quality software is a must-have in the modern time, and it would be a very significant resource. For the comprehensive use of this resource it would be necessary for it to be handled by qualified analysts.

A quality search could lead to information that is not visible at first glance, and which could be the key for undertaking proactive criminal investigations. Such information would also provide a good foundation for scientific research whose results would be useful for practical purposes.

The amount of seized drugs and the number of arrested persons in laboratories indicate that individual cannabis growers are dominant in Serbia, whose main goal is to expand production and make a profit. However, the fact that in each of the 11 (14.2%) laboratories, 3 or more persons were arrested indicates a trend that organized crime groups take part in this field of crime. This was confirmed by the case of the agricultural estate “Jovanjica”, where a mega cannabis plantation was discovered at the end of 2019 and whose production capacities had exceeded the needs of the local drug market. The abovementioned case points to the conclusion that the work of the police and prosecutor’s offices should be directed towards larger criminal organizations, and not towards individual cannabis producers. The fact that illegal consumption is more and more getting financed from domestic illegal production will affect the fact that in the future marijuana and other cannabis products will continue to be easily available on the local drug market at an extremely low price. Such trends in marijuana production will directly affect the increase in consumption and greater accessibility, especially to minors who are seen as a particularly vulnerable category in terms of marijuana consumption.

With regard to the drug market in Serbia, we believe that seizures in our country represent a negligible part of national consumption. However, due to the lack of an adequate methodology, it is not possible to assess national consumption with a degree of precision that would be significant for practical needs. Based on the presented data, it is not possible to perceive the scale of the problem, nor can adequate prevention measures be planned.

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## DEPRESSION IN ELDERLY WITH IMPAIRED VISION

*Original scientific paper*

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### ABSTRACT

*The aim of this study was to examine the influence of the degree of visual impairment on the presence of depression in visually impaired persons in the elderly age placed in institutional accommodation. The study included a total of 40 elderly respondents, both genders. The variables were divided into two groups: anamnestic variables and variables of depression testing. The results were processed by descriptive statistics, and analysis of variance. The obtained results showed that the degree of visual impairment has a statistically significant effect on the presence of depression in visually impaired persons in elderly age.*

**Keywords:** depression, visual impairment, elderly age

### INTRODUCTION

Aging is a progressive process of reducing the structure and function of the organism, while age is a period of life associated with chronological age. There are three basic types of aging: biological aging - slowing down and declining functions of the body over time; psychological side - changes in mental functions and personality adaptation to aging; social aging - changes in the relationship between the aging individual and the society in which he/she lives (Brajkovic, 2010). Old age or elderly age marks the last period in a person's life, which is characterized by the deterioration of the human body and abilities (Leutar & Lovrekovic, 2010). It can be assessed according to the chronological age (Havelka & Despot-Lucanin, 2007). Therefore, it is difficult to determine with certainty when the old age begins (Bara & Podgorelec, 2015). Stosljevic and Adamovic (2010) define age as a state that in its totality means the disintegration of a human as a social being due to mental and physical disorders, impairments, disturbances or deficiencies caused by age itself. Depression is one of the mental disorders that were first described in the history of medicine, and

in modern times it is one of the most common mental disorders (Filipic, 2008). In literature, depression is defined as a multi-factorial mental disorder that is manifested by a distorted perception of reality, where positive stimuli from the environment are interpreted negatively, and negative stimuli are exaggerated. First of all, it is important to distinguish depression from physiological sadness and anxiety, which occasionally occur in the life of every person. People in such conditions are capable of normal functioning and can find a source of happiness in their environment. Their daily mood oscillates, and during the day it increases, and decreases as night comes, that is, as fatigue increases. On the other hand, people who suffer from depression are depressed throughout the day and do not see positive things around them. More precisely, they see them but cannot enjoy them, which causes these people to feel guilty, irritated and worthless. Despite all this, their mood does not oscillate and remains constant. Such a mood lasts for days, and after it is present for two weeks, it leads to a diagnosis of depression (Filipovic-Grcic, 2014).

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Depression is a mental disorder characterized by mood swings, lethargy, sadness, lack of joy, emotional emptiness, loss of interest, and a range of physical ailments (Hautzinger, 2009). Depression is characterized by a number of heterogeneous symptoms and the simultaneous appearance of physical and mental symptoms during a depressive episode (Hautzinger, 2009). Visual impairment is among the most common chronic conditions associated with depression in elderly age (Zhang et al., 2013). People with visual impairment spend a lot of time thinking about their state of vision and life situation, which easily leads to depression (Garnefski et al., 2010). This is confirmed by Hayman et al. (2007) stating that symptoms of depression occur most and most intensely in the initial stages after visual impairment, while Horowitz (2003) suggests that the initial state after visual impairment may be a trigger for depression. Persistence of depression in people with visual impairment is correlated with the severity of visual impairment (Noran et al., 2009). Most research suggests an association between depression and visual impairment (Zheng et al., 2017). The prevalence of depression in adults diagnosed with glaucoma, cataracts, senile macular degeneration, and corneal dystrophy is significantly higher than in the general population of the same age, without diagnosed visual impairments (Popescu et al., 2012).

## AIM OF THE RESEARCH

To examine the influence of the degree of visual impairment on the presence of depression in visually impaired elderly persons.

## METHODS

### Sample of respondents

The sample consisted of 40 respondents with visual impairments in the elderly age, both genders, housed in the Public Institution "Dom penzionera" Tuzla and the nursing home "Vita Nostra" Bihac, of which 13 respondents are male and 27 respondents are female.

### Sample variables

The variables used in this study can be divided into two groups: anamnestic variables and variables for depression testing.

### Method of conducting research and measuring instruments

The research was conducted in the Public Institution "Dom penzionera" Tuzla and the nursing home "Vita Nostra" Bihac, after obtaining the consent of the managers of these institutions to conduct the research. Previously, preparations were made, which consisted of detailed explanation to the respondents how to conduct the examination. The method of examination was also explained to the managers and staff.

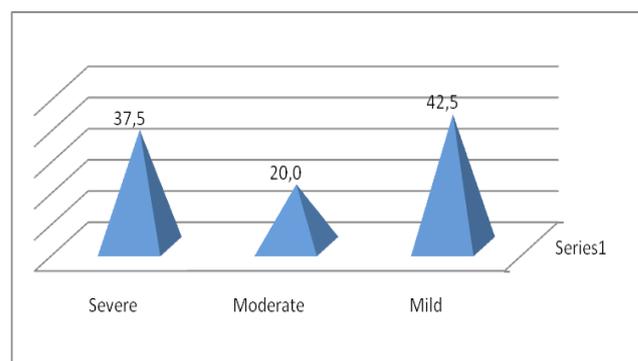
The following data collection instruments were used in the examination of depression in visually impaired persons: anamnestic data, analysis of medical records (visual acuity, age, gender, time of onset of damage, level of education, previous rehabilitation coverage), and the geriatric depression scale (GDS) was used to examine the prevalence of depression (Yesavage et al., 1982), which was conducted individually with each respondent, in accordance with the propositions of the test. The test completion time was about 45 minutes.

## Statistical data processing

Data was processed using the statistical program SPSS 20.0. Statistical significance is taken into account for  $p < .05$ . In the statistical data processing for each variable, the basic statistical parameters were calculated: arithmetic mean, standard deviation, minimum and maximum result. Variance analysis was used to examine differences in individual variables.

## RESULTS

The results of statistical data processing, shown in Graph 1, show that 37.5% of respondents have mild visual impairment, 20% of respondents have moderate visual impairment, and 42.5% of respondents have severe visual impairment.



Graph 1. Degree of visual impairment

Insight into Table 1 shows that the highest arithmetic mean of depression is in respondents with severe visual impairment ( $19.94 \pm 3.61$ ), where the minimum and maximum scores range from 11 to 25. The lowest values of the arithmetic mean are in respondents with mild visual impairment ( $13.80 \pm 5.88$ ), where the minimum and maximum scores range from 5 to 22.

Table 1. Descriptive indicators of depression according to the degree of visual impairment

Degree of visual impairment	M	SD	SE	MIN	MAX
Mild	13.80	5.88	1.51	5.00	22.00
Moderate	16.25	4.06	1.43	10.00	21.00
Severe	19.94	3.61	.87	11.00	25.00

In order to determine significant differences in the degree of visual impairment and the presence of depression in the elderly, the Univariate analysis of variance was applied in this research. Based on the obtained results of Fisher’s test (F) shown in table 2, it can be concluded that at the level of statistical significance of .05 there is a difference in relation to the level of depression and the degree of visual impairment.

Table 2. F-test results in relation to the level of depression

Group	SK	df	PSK	F	p
Between groups	304.75	2	152.37	6.97	.003
Within the groups	808.84	37	21.86		
Total	1113.60	39			

Considering that the results of the Univariate analysis of variance showed that there are statistically significant differences, and to in order to conclude where these differences are most pronounced, the Scheffe-Test was applied and the results are shown in table 3. Based on the obtained results, it can be concluded that at the statistical significance level of 0.01, the level of depression is higher in respondents with severe visual impairment compared to respondents with mild visual impairment.

Table 3. Scheffe-Test results

(I) Degree of visual impairment	(J) Degree of visual impairment	Difference	SE	p
Mild	Moderate	-2.45	2.04	.495
	Severe	-6.14*	1.65	<b>.003</b>
Moderate	Mild	2.45	2.04	.495
	Severe	-3.69	2.00	.197
Severe	Mild	6.14*	1.65	<b>.003</b>
	Moderate	3.69	2.00	.197

## DISCUSSION

The number of people suffering from depressive disorders has been steadily growing since the beginning of the last century in all industrialized countries of the world - 20% of women and 10% of men develop at least one depressive episode during their lifetime (Maj & Sartorius, 1999). Research to date shows that one in five women and one in ten men experience at least one major depressive episode during their lifetime (WHO, 2001). The prevalence of depression in the world is 12-20% in the female population and 5-12% in the male population (Christodoulou, 1999; Sadock B. J. & Sadock, 2003), while in Europe between 3 and 10% of the general population suffers from depression annually (Wittchen & Jacobi, 2005). The fact is that people over the age of 65 are at particular risk of developing severe depression associated with visual impairment.

It is estimated that 29-58% of those suffering from significant visual impairment have major depressive disorder a year later, and generally people with visual impairment are twice as likely to be depressed as people with intact vision (National Eye Institute, 2015). Based on research, studies show that approximately one in three elderly people with visual impairments (ranging from 22 to 42%) experience mild but clinically significant symptoms of depression, which is twice the frequency in the general population (10-15%) (Casten & Rovner, 2008; Tabrett & Latham, 2009). Choi et al. (2018) conducted a study with people over the age of 70 and obtained results that showed that the prevalence of depression was significantly higher in visually impaired people than in people with intact vision, and that the risk of depression in blind people was significantly increased. Research has shown that unilateral blindness can psychologically affect the occurrence of depression. People with visual impairment on one eye due to diagnosed senile macular degeneration are more likely to suffer from depression than those who have lost eyesight on both eyes (Casten & Rovner, 2008; Tabrett & Latham, 2009). Through their studies, the authors point out the relation between depression and visual impairment. The prevalence of depression in adults diagnosed with glaucoma, cataracts, senile macular degeneration, corneal dystrophy is significantly higher than in the general population of the same age, without diagnosed visual impairments (Popescu et al., 2012). Visual impairment in the elderly is often associated with mobility difficulties, physical and social functioning, decreased well-being, and ultimately depression (Griffin-Shirley & Bozeman, 2016). The presence and severity of these difficulties depends on the degree of visual impairment. So, the more severe the visual impairment is, the greater the difficulties in everyday life are - as well as the higher the level of depression. Previous research has shown that loss of visual acuity and depressive symptoms are associated with visual function status in people over 65 (Hidalgo et al., 2009), and that these people are at particular risk for developing severe depression associated with visual impairment. Similar results were obtained by Casten and Rovner (2008), Tabrett and Latham (2009), Noran et al. (2009) and Choi et al. (2018) who state that the incidence of depression is higher in severe visual impairment. Also, Tabrett and Latham (2009) state that in people with retinal disease, the clinical picture associated with depression is more severe. The authors estimate that 29–58% of those suffering from significant visual impairment have major depressive disorder a year later (Discovery Eye Foundation, 2015). Also, Zhang et al. (2013) in their study found a strong association between loss of visual function instead of visual acuity and the presence of depressive symptoms in adults in the United States.

## CONCLUSION

Based on the results of the research, we can see that depression is present in people with visual impairment in the elderly age in institutional accommodation. The obtained results showed that the degree of visual impairment has an impact on the presence of depression in visually impaired persons of the elderly age, and accordingly the level of depression is higher in respondents with severe visual impairment compared to respondents with mild visual impairment.

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## INTERNALIZED AND EXTERNALIZED BEHAVIORAL PROBLEMS IN YOUNG ADOLESCENTS WITH REGARD TO GENDER

*Original scientific paper*

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### ABSTRACT

*The aim of this paper is to determine the differences between externalized and internalized behavioral problems in the population of young adolescents in the city of Tuzla on eight different scales of syndromes (anxiety/depression, reticence, physical difficulties, aggression, rules violation, social problems, thinking problems, and attention problems). The paper starts from the assumption that there are differences between younger adolescents with internalized and externalized behavioral problems with regard to gender in such a way that externalized problems will be more frequent in male adolescents and internalized behavioral problems in female adolescents. The sample of respondents in this study consists of 587 young adolescents of both genders. The research was conducted in fifteen primary schools in the city of Tuzla. The Achenbach dimensional classification of behavioral disorders was used for assessment (Achenbach & Rescorla, 2001). The results show higher scores for internalized behavioral problems. Female adolescents had statistically significantly higher scores on the Anxiety/Depression, Somatic Problems, and Thought Problems subscales.*

**Keywords:** internalized and externalized problems, gender, elementary school students.

### INTRODUCTION

Adolescence is a period of human development that is associated with numerous changes in behavior, cognitive, emotional and ideological spheres. These changes occur and at the same time often coexist with intense self-searching, emotional instability, persistent issues such as e.g. Who am I? Where am I going? It is a period in which new challenges arise and new research begins, as well as conflicts and misunderstandings in the family (Lubenko, 2009). Adolescence is a period of increased risk for the development of externalized behavioral problems and related disorders (Steinberg, 2008). The results of longitudinal research show the long-term consequences of child and adolescent problem behaviors (especially externalized problems) that include a wide range of social maladaptive behaviors later in adulthood, including addictions,

disrupted family relationships, criminal activities, and many others (Henderson et al., 2008).

#### **Prevalence of internalized and externalized behavioral problems**

The phenomenology of behavioral disorders in adolescents is almost impossible to enumerate, because it depends on the norms of the environment, the extent and intensity of the phenomenon and the subjective assessment of assessors. The symptomatology is very different. These are behaviors that are considered unusual for the environment and which are assumed to be detrimental to the further development of the minor's personality or the environment in which such behavior manifests itself (Basic, Koller-Trbovic, & Uzelac, 2004).

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Furthermore, a juvenile who exhibits such behavior, or his/her environment, needs to be provided with some protection, but such phenomenology of behavior does not mean a violation of criminal law, although it is etiologically associated with delinquent behavior. Risky behaviors of young people, as well as behavioral problems can be observed with regard to their phenomenology, but also through intensity, i.e. risk/danger (Basic, Koller-Trbovic, & Uzelac, 2004).

In modern dimensional systems, the division into externalized and internalized behavioral problems has been accepted (Achenbach & Rescorla, 2001), and it is Achenbach's dimensional classification of behavioral disorders that we have chosen in this paper. Dimensional classification systems assume that behavior is not dichotomized but continuous. Achenbach and his colleagues identified a total of eight syndromes that presuppose a set of symptoms of emotional, social, and behavioral problems. Using factor and cluster analysis, patterns of grouping symptoms or forms of problematic behavior were observed, and based on that, the following syndromes were identified: Anxiety-Depression, Recitence-Depression, Somatic Complaints, Social Problems, Thinking Problems, Attention Problems, Rule Violation Behavior, and Aggressive Behavior.

Achenbach and Rescorla (2001) point out that when sorting out the syndrome, on the one hand, they singled out anxiety-depression, recitence-depression and somatic complaints, and while on the other hand, they singled out rules-violating behavior and aggressive behavior. They have placed social problems, thinking problems and attention problems in the middle, i.e. they are at the transition between internalized and externalized behaviors and do not belong to either group, i.e. factor analysis shows that they belong equally to internalized and externalized behaviors. Internalized syndromes refer to problems with oneself such as anxiety, depression, somatic complaints without a clear medical cause, and recitence from social contacts. Mood disorders and anxiety are often referred to as internalized disorders, because they result in emotional anxiety and depression. During adolescence, when self-awareness grows and social pressure becomes more important, the lack of social incentives is responsible for increasing feelings of social isolation, helplessness and depression (Heiman, 2001, according to Brojcin & Glumbic, 2012). Early adolescence is the period during which the risk of developing depressive disorders increases (Oland & Shaw, 2005). Many depressive symptoms are related to the way we see ourselves and our understanding of ourselves (Kovacs & Devlin, 1998).

Externalized syndromes refer to conflicts with others and their expectations, i.e. externalized behaviors refer to those types of behaviors that are directed towards the outside world, and there are two externalized syndromes: aggressive behavior and rules violation behavior. Aggressive behaviors cover a wide range of behaviors. Aggression is a behavior intentionally aimed at harming others (Parke & Slaby, 1983, according to Matthys & Lochman, 2010).

In essence, both internalized and externalized behavioral problems are viewed through the prism of the outcomes of interactions between adolescents' risk characteristics and risk factors in their environment, of which the most important are: family risk factor, school risk factor, and peer risk factor.

Epidemiological studies point out that internalized problems, primarily anxiety and depression, are a major public health problem present in 20% of children in the community (Sawyer et al., 2011). Stephens et al., (1999, according to Basic, 2009), state a high prevalence of mental health problems in the youth population (20-30%), and many of them have experience of multiple problems. The Center for Disease Control and Prevention (2000), in a study aimed at assessing the level of risk of mental disorders in young people, states that 28% of young people in high school have the feeling of hopelessness, 19% try to commit suicide, and 8% commit suicide. According to Werner & Silbereisen (2003) two groups of behavioral disorders in adolescents are the result of cluster analysis, which singled out two behavioral clusters. The first includes fights, disobedience, outbursts of anger, destructiveness, non-cooperation, insolence and restlessness and is called aggressive behavior with less socialization or just aggressive behavior. The second cluster includes bad company and environment, running away from home and school, stealing, loyalty to bad company, lying and setting fire, and is called socialized aggression. Research shows that in Western civilization, approximately 10% of children and young people may have depressive disorder, 2 to 9% of children show specific phobias, and 2 to 5% of children have clinically significant anxiety symptoms (Oatley & Jenkins, 2003).

### **Differences in the manifestation of internalized and externalized problems in relation to gender**

Externalized forms of behavioral disorders are more common in younger male adolescents, while internalized problems are more common in younger female adolescents (Moylan et al., 2011). Extensive research on externalized (behavioral) and internalized (emotional) behavioral disorders in adolescents aged 6–16 years was conducted by a large group of authors (Rescorla et al., 2007) in as many as 31 countries on a sample of 55,508 children and adolescents. Based on the testimonies of parents whose children are included in the sample, the mentioned group of authors found that female adolescents have higher overall scores in all countries than male adolescents when it comes to internalized behavioral disorders, while male adolescents predominate with externalized behavioral disorders in all countries included in the sample. It is important to note that an additional analysis in which they divided the age into two groups (the first group aged 6-11 and the second group aged 12-16) found that younger female adolescents do not show internalized behavioral disorders significantly more (only in some countries) in relation to younger male adolescents

aged 6-11 - this difference is only significant at the age of 12-16 (10 out of 27 countries). When it comes to externalized behavioral disorders, the situation is the opposite. Male adolescents outperform adolescent girls in 19 of the 28 countries, while in only 5 of the 27 countries with regard to the age group (12-16 years). Covariance of externalized and internalized behavioral disorders is also more common in male respondents (Loeber & Keenan, 1994, according to Oland & Shaw, 2005), and they score higher on features of oppositional defiance disorder and hyperactivity (Miller et al., 1997, according to Stormont, 2002).

Scientific findings consistently show gender differences in adolescent internalized and externalized problems. Adolescent boys are at the forefront of aggressive and rule-violating behaviors (Achenbach et al., 1991; Bongers et al, 2004, Bongers et al, 2008; Caron, 2006), while adolescent girls show a higher level and higher prevalence of internalized problems such as depression and anxiety disorders (Achenbach et al., 1991).

Research on gender differences in the prevalence of internalized and externalized difficulties is consistent and states that internalized problems are more common in female adolescents and externalized problems in male adolescents (Macuka & Smojver-Azic, 2012; Macuka, Smojver-Azic, & Buric, 2012; Macuka & Jurkin, 2014; Ricijas, Krajcer, & Bouillet, 2010). In the Poljak and Begic (2016) study, the prevalence of anxiety problems in children ranges from 10% to 20%. They are represented in both genders, although they are more common in girls after the age of six.

### The problem and aim of research

The developmental outcomes of adolescence can greatly affect the further maturation and functioning of a young person. Adolescence is a period with an increased risk for emotional and behavioral problems. The period of adolescence is a time when appropriate pedagogical procedures and preventive measures can influence the direction of such models of behavior towards socially appropriate forms. However, there is a justified concern that adolescents by entering into risky behaviors impair their further psychosocial development, so it is necessary to start various preventive actions as early as possible in order to orient young people towards positive social values.

The aim of this paper is to determine the differences between externalized and internalized behavioral problems in the population of young adolescents in the city of Tuzla on eight different scales of syndromes (anxiety/depression, recitence, physical difficulties, aggression, rules violation, social problems, thinking problems and attention problems).

The paper starts from the assumption that there are differences between younger adolescents with internalized and externalized behavioral problems with regard to gender, in such a way that externalized problems will be more frequent in male adolescents and internalized behavioral problems in female adolescents.

## METHODS

### Sample of respondents

The sample of respondents in this study consists of 587 young adolescents of both genders. Male adolescents (303) and female adolescents (294) are fairly evenly represented in the sample. The research was realized in fifteen elementary schools in the area of the city of Tuzla, so that two classes from each school were included, one in the seventh and one in the eighth grade. The sample is intentional (only seventh and eighth grades), and within it, classes are chosen randomly. Table 1 shows the structure of the sample according to the school that the respondents attend. Of the total number of respondents, 5.8% attend Elementary School „Centar“, 6.3% attend Elementary School „Jala“, 9.2% attend Elementary School „Sjenjak“, 6.8% attend Elementary School „Slavinovici“, 7.8% attend Elementary School „Simin Han“, 7.0% attend Elementary School „Brcanska Malta“, 6.3% attend Elementary School „Pazar“, 7.8% attend Elementary School „Kreka“, 4.8% attend Elementary School „Bukinje“, 7.0% attend Elementary School „Tusanj“, 7.3 % attend Elementary School „Miladije“, 5.1% attend Elementary School „Solina“, 6.3 % attend Elementary School „Pasci“, 6.5% attend Elementary School „Husino“ and 6.0% attend Elementary School „Mramor“.

Table 1. Distribution of respondents according to the elementary school they attend

School	N	%
ES Centar	34	5.8
ES Jala	37	6.3
ES Sjenjak	54	9.2
ES Slavinovici	40	6.8
ES Simin Han	46	7.8
ES Brcanska Malta	41	7.0
ES Pazar	37	6.3
ES Kreka	46	7.8
ES Bukinje	28	4.8
ES Tušanj	41	7.0
ES Miladije	43	7.3
ES Solina	30	5.1
ES Pasci	37	6.3
ES Husino	38	6.5
ES Mramor	35	6.0
Total	587	100.0

The sample of this research consists of seventh and eighth grade elementary school students. Table 2 shows the structure of the sample with respect to the class they attend. Of the total sample, 50.9% respondents attend the seventh grade and 49.1% respondents attend the eighth grade.

Table 2. Distribution of respondents in relation to the class they attend

Grade	N	%
7 <sup>th</sup>	299	50.9
8 <sup>th</sup>	288	49.1

Table 3. Distribution of respondents in relation to gender

Age	Gender				Total	
	Female		Male			
	N	%	N	%	N	%
Total	284	48.38	303	51.90	587	100.00

### Method of data collection and measuring instrument

Data were collected in the second semester of 2017/2018, more precisely from February to June 2018, after the research was approved by the Ministry of Science, Culture and Sports of Tuzla Canton, as well as the directors of elementary schools in which the research was conducted. The prevalence and manifestations of externalized problems in the adolescent population were examined using the Achenbach integrated assessment system, the version for adolescent self-assessment (ASEBA Youth Self-Report - YRS, Achenbach, 2007). The instrument measures adaptive functioning, i.e. competencies and maladaptive functioning, i.e. behavioral, emotional and social problems at the age of 11 to 18. The instrument contains eight syndrome-specific scales that measure problems with a tendency to associate, namely: Anxiety-Depression, Recitence-Depression, Somatic Complaints, Social Problems, Thinking Problems, Attention Problems, Rule Violation Behavior, and Aggressive Behavior. The syndromes are grouped into externalized and internalized. Externalized syndromes refer to conflicts with other people and their expectations and include rules violation behavior and aggressive behavior (examples of claims: "I violate the rules at home, at school, etc.", "I often tease others"). Internalized syndromes refer to individual-centered psychological difficulties and overly controlled behaviors, including Anxiety/Depression, Recitence/Depression, and Somatic Complaints (examples of claims: "I am recitent, I try to stay away", I am sad or depressed). Behavior is assessed on 112 claims, and on a three-point scale. The task of the respondents was to answer each of these 112 statements in the questionnaire with 0 - not true, 1 - sometimes or partially true, or 2 - completely true. Higher scores imply a higher prevalence of behavioral problems.

### Reliability of measuring instruments and metric verification of scales

The reliability of the YSR measurement scale was evaluated using the Cronbach alpha coefficient. The value of this coefficient for the entire YSR scale is .93, which indicates a high level of reliability, i.e. the internal consistency of this instrument. Our results support the homogeneity of syndrome Anxiety/Depression, Recitence/Depression, Somatic Complaints, Social Problems, Attention Problems, Thinking Problems, Rules Violation Behavior, and Aggressive Behavior. A similar value was obtained in other studies, e.g.

The Cronbach's alpha coefficient of internal consistency on a sample of 459 children and adolescents aged 12 to 18 is .96 (Achenbach, 1991). Broberg et al. (2001) on a sample of 2522 adolescents aged 13-18 also received a high alpha coefficient ( $\alpha > .70$ ). Although the psychometric properties of the YSR scale have generally been shown to be adequate, some studies have shown low levels of reliability (Cronbach's alpha) for some scales (Achenbach, 1991; Jessor, 1998; Kvernmo & Heyerdahl, 1998).

The latent space of the scale, that we used in this study to operationalize and measure behavioral disorders, was examined using factor analysis.

All statistical prerequisites (KMO sample adequacy measure = .869; Bartlett sphericity test  $\chi^2 = 25299.006$ ;  $p < .000$ ) were met to perform YSR factor analysis. The coefficient of internal consistency of all factors is satisfactory. The method of analysis of the main components of YSR led to the following results. Based on the Guttman-Kaiser criterion of retaining factors with an intrinsic value above 1, 32 factors are distinguished. Based on the Scree chart, 4 factors stand out, while based on the content, two stand out. Therefore, the results point to a two-dimensional solution that explains 20.509% of the variance and those results are shown in Table 4.

The first factor is most saturated with items related to adolescents' problems with others ("I violate the rules of behavior at home, at school and elsewhere"; "I argue a lot", "I hang out with problematic children") (Table 5), and the second factor is most saturated with items related to problems with oneself or within oneself ("I like to be fair to others", "I like to be relaxed in life", "I am afraid of some situations, places outside of school")(Table 6). Accordingly, the first factor can be called externalized problems, while the second factor can be called internalized problems.

Table 4. YSR analysis factor results

	Factor 1	Factor 2
	.60	.64
	.57	.53
	.56	.56
	.54	.61
	.53	.58
	.53	.56
	.53	.52
	.52	
	.52	
	.52	
	.52	
	.50	
	.50	
	.50	

Table 5. The structure of the first factor

The structure of the first factor	
I feel dizzy or light-headed.	.60
I violate the rules at home, at school and elsewhere.	.57
I swear and say other bad words.	.56
I am disobedient at school.	.54
I am disobedient to my parents.	.53
I am nervous or tense.	.53
I often tease others.	.53
I hang out with troublesome children.	.52
I argue a lot.	.52
I'm destroying my personal items.	.52
I'm deliberately trying to hurt myself or kill myself.	.52
I physically attack other people.	.50
I do some things that other people find weird. Describe:	.50
I can't sit still.	.50

Table 6. The structure of the second factor

The structure of the second factor	
I like to be fair to others.	.64
I am overly scared or tense.	.53
I feel tired for no apparent reason.	.56
I try to help others when I can.	.61
I enjoy a good joke.	.58
I like to be relaxed in life.	.56
I am afraid of some situations, places outside of school.	.52

After exploratory factor analysis, we examined the two-dimensional structure of YSR by confirmatory factor analysis. The values of the model fitting indicators are  $\chi^2 = 12.083$ ,  $df = 4$ ,  $p = .017$ ; NFI = .989; CFI = .992; RMSEA = .059.

High values of the NFI and CFI indicators indicate a good fit of the model as well as the RMSEA indicator which is in an acceptable range. Based on these results, we can say that the factor structure is acceptable, i.e. that the confirmatory factor analysis enabled the verification of the two-dimensional YRS model.

The results of the factor analysis confirm the findings of previous studies which show that the instrument used in this study can detect the prevalence of internalized and externalized behavioral problems in young adolescents and gender differences.

### Data processing methods

The following methods in the research were used: descriptive statistical methods, measures of central tendency, measures of dispersion and asymmetry of score distribution on Youth Self Report scales, t-test and Cohen's d index and correlation.

## RESULTS AND DISCUSSION

To show the prevalence of externalized and internalized problems in the adolescent population, we used descriptive statistics. Measures of central tendency, measures of dispersion and asymmetry of score distribution on YSR scales are shown in Table 7. According to skewness values, for all YSR scales and subscales asymmetry is positive (longer right arc of distribution, more below-average cases) pointed (leptocurtic). Since lower scores indicate less externalized and internalized problems, we can say that the psychosocial functioning of most adolescents in the sample is within the norm. In statistical data processing, in determining the clinical rank, the T score must be 70 or greater than 70 ( $T > 70$ ) (Achenbach & Rescorla, 2001).

Table 7. Measures of central tendency, measures of dispersion and asymmetry of score distribution on YSR scales

Variable	N	Min	Max	M		SD	Skewness		Kurtosis	
				Stat	St.e		Stat	St.e	Stat	St.e
Anxiety/depression	587	16	41	24.13	.17	4.22	1.08	.10	1.81	.20
Recitence /depression	587	8	21	10.81	.10	2.51	1.15	.10	1.27	.20
Somatic Problems	587	9	25	11.74	.13	3.16	1.42	.10	1.80	.20
Social Problems	587	11	27	14.07	.12	2.89	1.47	.10	2.70	.20
Thinking Problems	587	10	28	13.08	.14	3.37	1.49	.10	2.29	.20
Attention problems	587	28	65	42.57	.26	6.28	.57	.10	.48	.20
Rules violation problems	587	12	28	16.21	.12	2.91	1.41	.10	2.28	.20
Aggressive behavior	587	20	53	29.16	.22	5.34	1.18	.10	1.58	.20
Internalized problems	587	33	86	46.69	.35	8.37	1.26	.10	2.00	.20
Externalized problems	587	32	79	45.37	.31	7.62	1.34	.10	2.01	.20
Total score	587	118	255	161.77	.99	24.21	1.12	.10	1.34	.20

**Legend:** N- total number; MIN- the lowest score; MAX- the highest score; AM- Arithmetic mean; SD- Standard deviation; Skewness; Kurtosis; St.e.- Standard error

Analyzing the relation between internalized and externalized problems, their significant relation was established. The correlation coefficient is .60 at the significance level of  $p < .01$ . This data tells us that adolescents who have more internalized problems also have more externalized problems and vice versa.

Achenbach and Rescorla (2001) report an average correlation of .53 between children's internalized and externalized problems. Similar data have been obtained in other studies (Achenbach & McConaughy, 1997; Barry et al, 2005; Brajsa-Zganec, 2002; Caron, 2006; Macuka, 2008; Stevens et al., 2005). Covariation is a very common occurrence when it comes to problems in adolescence. For example, one longitudinal study shows that between 19% and 25% of boys between the ages of 7 and 14 have more than four covalent disorders and this number increases with age (Jessor, 1998). We can conclude that in the psychopathology of adolescence the covariation of behavioral disorders is more the rule than the exception.

Since the gender of adolescents is a relevant factor in relation to behavioral disorders, differences in the prevalence of externalized and internalized problems in male and female adolescents were also analyzed. Assumed significant differences in the prevalence of externalized and internalized problems between male and female adolescents were identified, and the results of the comparison are shown in Table 8.

No significant differences in overall YRS score were found between male and female respondents. The score is the total result, i.e. the sum of the amounts of items related to a certain syndrome. However, it was noticed that externalized problems were statistically significantly more prevalent in male respondents ( $t = -5.73$ ;  $p < .001$ ), and internalized problems in female respondents ( $t = 3.65$ ;  $p < .001$ ). In addition, the male respondents had statistically significantly higher scores on the Social Problems and Rule Violation Behavior subscales. The female respondents had statistically significantly higher scores on the Anxiety/Depression, Somatic Problems, and Thinking Problems subscales. Research conducted by Cristovam MAS. et al. (2019) shows that female respondents showed a higher frequency of internalized problems and overall problems than male respondents ( $p < .001$  for both). Male respondents in a variety of cultures exhibit more impulsiveness and other uncontrolled outward-directed behaviors than females (Achenbach & Rescorla, 2001; Macuka, 2008; Mash & Barkley, 2003). A broad European study conducted in the Netherlands and Italy indicates that females are at higher risk in the area of sexual behavior, while males are in the area of delinquent behavior and consumption of psychoactive substances (Ciairano et al., 2009, according to Ricijas, Krajcer, & Bouillet, 2010).

Table 8. Gender differences in scores on YRS scales and subscales

Variable	Gender	N	AM	SD	t	p
Anxiety /depression	male	303	23.41	4.14	2.13	.03
	female	284	24.90	4.16		
Recitence /depression	male	303	10.58	2.35	-.20	.83
	female	284	11.05	2.64		
Somatic problems	male	303	11.24	3.00	2.10	.03
	female	284	12.27	3.24		
Social problems	male	303	14.01	3.00	-2.40	.01
	female	284	14.12	2.77		
Thinking problems	male	303	13.05	3.33	-2.01	.04
	female	284	13.10	3.40		
Attention problems	male	303	42.13	6.57	-1.74	.08
	female	284	43.04	5.93		
Rules violation problems	male	303	16.61	3.17	-5.97	.00
	female	284	15.76	2.53		
Aggressive behavior	male	303	28.82	5.60	1.24	.21
	female	284	29.51	5.02		
Internalized problems	male	303	45.24	8.07	-3.65	.00
	female	284	48.22	8.41		
Externalized problems	male	303	45.44	8.18	5.73	.00
	female	284	45.28	6.98		
Total score	male	303	159.88	25.30	1.01	.31
	female	284	163.78	22.85		

Although gender differences in research are mostly consistently determined (externalized problems are more common in boys and internalized problems in girls), their significance is not well explained.

For example, it is difficult to determine whether the observed gender differences are due to differences in the expression of the disorder itself (e.g., direct aggression versus indirect aggression).

The mechanisms and causes of gender differences are different for different disorders and for the same disorders at different ages. This further complicates the understanding of symptomatology with respect to the gender of adolescents. In order to determine the magnitude of the effect of differences in independent samples of young adolescents, additional analyzes (Cohen's *d* index) were made. The index scores are as following: for internalized problems *d* = .78, for externalized problems *d* = .11, for anxiety/depression *d* = .35, for social recitence *d* = -.35, for aggression *d* = .15, for rules violation *d* = -.58, for social problems *d* = .45, for thinking problems *d* = .16, and for attention problems *d* = .21. These scores indicate that the determined magnitudes of the effect belong to low or moderate, but internalized problems are high differences, and additionally indicate that the difference in the prevalence of these problems between two samples of young male adolescents and young female adolescents is significant. In a study conducted by Macuka (2016), it is noticeable that the group of younger adolescents achieves slightly higher results in the cluster of internalized problems compared to the cluster of externalized problems, which is confirmed by the values of additional calculated t-test (internalized problems: *M* (*SD*) = 14.21 (7.55), externalized problems: *M* (*SD*) = 12.73 (7.17), *t* = 4.38, *p* < .01). By analyzing the differences in the representation of individual clusters of problems, gender differences in the representation of grouped problems of the internalized type (which are more common in adolescent girls) but not the externalized type were determined between adolescents. However, the analysis of the results on separate scales of the syndromes found statistically significant differences in the syndromes anxiety / depression, physical difficulties and delinquency-rules violation (Macuka, 2016).

High results on the syndrome scales are clinically significant, because they indicate a high level of problems. In determining the clinical rank of scores (*T* > 70), Achenbach and Rescorla (2001) started from the DSM-IV classification. The YSR score was divided into three categories: normal (up to 67), borderline (67 to 70), and clinical (above 70). This means that if the total number of results in one questionnaire exceeds 70, they are sorted into a group with a high level of problems. The task of the respondents was to answer each of these 112 statements (items) in the questionnaire with 0 - not true, 1 - sometimes or partially true, and 2 - completely true. The total number of chosen answers on the items represents the score. Higher scores imply a higher prevalence of behavioral problems.

A significant association between ASEBA scores and DSM diagnoses - at a significance level of *p* < .001 (Kasius et al., 1997) was observed and confirmed in numerous studies. Table 9 shows the distribution of adolescents according to normal and clinical levels depending on the severity of externalized and internalized problems. In this study, it was found that in the general population there are about 3% of adolescents with clinically significant levels of

externalized problems and about 2% of those who exceed the clinical rank of internalized problems. At the same time, these are adolescents who need appropriate treatment.

Table 9. Distribution of adolescents according to the severity of the disorder

	Clinical level		Normal level	
	N	%	N	%
Externalized problems	18	2.9	569	97.1
Internalized problems	13	2.3	565	97.7

A higher incidence of delinquency, more mistrust in relationships, lower communication skills, less empathy and less socialization was observed in males in relation to females (Cristovam MAS et al., 2019).

Examining the presence of externalized and internalized problems in previous studies using YSR indicates certain similarities and differences between cultures. One study comparing Dutch and American adolescents found that American adolescents had more problems than Dutch adolescents (Verhulst et al., 1989). The authors found that 13% of the variance may explain the national difference (Verhulst et al., 1989). Achenbach (1991) reports significantly lower overall scores on a sample of Puerto Rican adolescents compared to American adolescents. A comparison between adolescent Americans and adolescents from Jamaica, however, did not reveal significant differences in overall problems (Lambert et al., 1998). In two Scandinavian studies, Danish adolescents showed a lower level of problems compared to American adolescents, while Norwegian adolescents, especially females, had higher overall scores of problems (Kvernmo & Heyerdahl, 1998).

## RESEARCH LIMITATIONS

The effect of using self-assessment of personal problems in the behavior of younger adolescents is a limitation of this research. Additional assessments of adolescent behavior from several different sources would be useful in future research. Eventually, the possibility of involving parents or teachers in some future research should be considered, as they are also a valuable source of information. In this research, we obtained all the data from younger adolescents by the method of self-assessment, which should certainly be taken with caution because it is about student perceptions, and it would be very interesting to know what the answers of parents or teachers would be and how they assess family functioning and adolescent behavior. However, it should be noted that some researchers emphasize the importance of subjective thinking of young adolescents (Smetana & Daddis, 2002). This would mean that the personal perception of adolescents has a leading role and is very important, regardless of the degree to which the real situation is reflected.

## CONCLUSION

The results of this research are in line with theoretical explanations of the development of behavioral problems and the results of relevant empirical studies by other authors that clearly indicate differences in the manifestation of internalized and externalized behavioral problems with respect to gender. The progress of knowledge about behavioral problems can be primarily attributed to a large number of empirical studies that have been conducted over the last half century. Thanks to the results of the research, numerous questions have been clarified about the etiology and epidemiology of behavioral problems, as well as successful approaches in the prevention and treatment of problems of this kind. In an effort to prevent externalized behavioral problems in young adolescents, it is important to emphasize the importance of studying the etiology. Identifying the causes of behavioral disorders is necessary in order to develop effective prevention and treatment programs aimed at reducing the incidence and prevalence of behavioral problems. The role and position of the family in this regard is extremely important. The research provided epidemiological data on the prevalence of externalized behaviors of young adolescents, and the secondary goal is the need to emphasize the importance of designing and implementing successful prevention and treatment programs. Preventive programs seek to reduce risk, and strengthen protective factors, while family therapy gives the best results in severely dysfunctional families.

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## EFFECTS AND CORRELATION BETWEEN PSYCHOLOGICAL AND EMPLOYEMENT CONTRACT: THE RELATIONSHIP BETWEEN THE ORGANIZATION AND EMPLOYEES

*Original scientific paper*

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### ABSTRACT

*The paper aims to research data on the psychological contract which in our country are almost unknown; provide suggestions emphasizing the importance of psychological contracts and fill the managerial and legal gaps faced by Kosovar organizations due to lack of information on psychological contracts. The paper is focused on determining the importance and role of psychological contracts in the formation of positive organizational relationships and maintaining the desired level of work, positive attitudes towards the work of employees in the business sector, etc. The paper provides knowledge and guidance to organizations on how to manage psychological contracts and pave the way for practical research of these contracts to local businesses. The paper presents a contribution to answering a number of questions on the economic value of the psychological contract between employees and management in Kosovo organizations based on the literature reviewed. Also, based on the studies conducted, our conceptual research emphasizes the importance of psychological contract in organizational behavior and the benefits that psychological contract brings to organizations. The paper itself represents originality and value for researchers, organizations in Kosovo and for later studies of the field.*

**Keywords:** *psychological contract, organization, legal, human resource management, relationship.*

### INTRODUCTION

The psychological contract (PC) is a non-traditional and specific legal instrument. Its essence contains a certain set of implied expectations and an understanding of the mutual obligations between the organization and the employee. The content of the contract is determined and composed by the needs and expectations of both parties: employees - what they expect from the organization and what they are willing to offer to the organization and the organization what it actually expects from employees and what it is willing to do. provide for them in return. The psychological contract involves perceptions of mutual obligations implied within the employment relationship (Atkinson & Cuthbert, 2006). The clarity of the job role and the formation of realistic expectations regarding the job and the context of the job

are significant as well as the premises for the creation of a psychological contract by both the employee and the employer. In reality, psychological contract is not a legal category. Certain scientific contributions have shown that the psychological contract is not just an institute or concept, but a category which is widely applicable. As such, not only has it found application in the sphere of economics, but it is constantly evolving and reflecting impact in all spheres that have a direct or indirect impact on labor relations and labor. Labor relations are regulated by legislation. Of course, to ensure the basis of legal validity, an employment contract must contain the elements required by law. The contract defines all the important issues related to employment, place of work, number of working hours, days off, earnings, etc.

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In addition to the employment contract, employment is regulated by the Collective Agreement.

This paper is an attempt to show that management and managers, as individuals and representatives of certain business entities, are in fact the ones who create and shape the psychological contract and that the psychological contract is just one of the tools that managers can use to achieve strategic goals and increase productivity. It should have the function of creating feelings for employees that they manage the psychological contract and that they have control over the activities of the organization (Yehuda & Rousseau, 2019).

In addition to creating and administering a psychological contract, attention will be paid to non-compliance with the psychological contract, where one exists, and ways to avoid breach of contract and, if it occurs, how to mitigate the consequences.

The paper covers not only the economic aspects of the psychological contract but also the legal aspects. Understanding the very concept of the contract, its origin, types of contracts, essential elements and ways of termination, the nature of the psychological contract and its elements are highlighted. Starting from the aspects of economic difficulties, it turns out that the importance of the psychological contract is increasing because through the functioning mechanisms of the management of psychological contracts can increase the productivity of employees without additional investment in human resources.

The psychological contract is not a legal category but arose from the doctor-patient relationship. The first scientific contributions have shown that the psychological contract is not just an institute or concept but above all a category which is widely applicable. As such, it has not only found application in the sphere of economics but it is constantly evolving in all spheres that have a direct or indirect impact on labor relations.

## LITERATURE REVIEW

The first attempt to understand and analyze more deeply the relationship between employees and employer's dates back to before the Second World War. Cornet Bernard, in his theory of equilibrium and the increase of returns (Cornet, 1988) suggests that the ongoing involvement of employees is directly dependent on the remuneration to the organization to which the employee belongs, which should be adequate in relation to the efforts made.

Twenty years later, this theory was extended by Mach and Simeon, (as cited by Conway & Briner, 2005) according to the model of contribution - incentives. This contribution analyzes in detail the nature of things that are exchanged and declared in terms of making an ongoing contribution to the employee, which depends on his perception in relation to the incentives of the organization, whether they are of equal contribution or as the highest of employees.

Under this model, an organization remains at an advantage or equilibrium if the contribution of employees far exceeds the incentives of the organization (Conway & Briner, 2005). It should be noted that theory of Mach & Simeonis rarely accepted, although there are direct similarities between the two approaches.

The first to introduce the idea that a psychological contract is involved in a wide range of interpersonal exchanges between the patient and the psychotherapist is Menninger, K., in his book *Theory of Psychoanalysis* (1958)(Conway & Briner, 2005). However, he did not explicitly use the term "psychological contract". Only in the republishing of this book does he analyze the psychological contract and declare that the conduct of both parties to the contract depends on conscious and unconscious processes which can sometimes be contradictory. If both parties are satisfied with the expectations, i.e. by the exchange itself, the contract will continue to exist, otherwise the contract will cease to exist. According to Menninger, it is important to define the meaning of the term "satisfied". According to him, the contract depends on the patient's attitude and the services of a psychotherapist. According to Menninger, it is important to define the meaning of the term "satisfied". According to him, the contract depends on the patient's attitude and the services of a psychotherapist.

The first to enforce a psychological contract in the workplace is Argyris (Argyris, 1960). He believed that employees and their organizations created a psychological contract that made it possible to express and meet the needs of both parties. In other words, if employees think that management sometimes respects their right to develop and advance, but also to respect their initiatives, then employees will respect the organization's right to advance.

In his study of production facilities, Argyris used the term "psychological employment contract", which, according to him, corresponds to a tacit agreement between the employee and the superior. Argyris believes that as long as the supervisor guarantees employee standards informally, employees will maintain a high level of productivity and a low level of offense (Argyris, 1960). Another important study for defining the concept of psychological contract is the study published in the book *Management and Mental Health*, 1962. The author Levinson researched how a psychological contract could be used to promote mental health. The study was conducted on a sample of 874 workers at a tool factory in the United States. In the study, he defined the psychological contract as: "A series of mutual expectations that the parties to a contract may not be aware of, but that nevertheless manage their relationship" (cited from Conway & Briner, 2005).

These expectations are silent and are occasionally created earlier or in the external environment of the organization where he is employed. The psychological contract is composed of specific expectations of both parties, is dynamic and represents the subject of changing circumstances between the parties.

The basic idea of the study is that individuals have needs that guide them to initiate and develop relationships that are interdependent and in which the parties behave in such a way that they meet their needs. It is the expectations that flow from this exchange that form a psychological contract.

Levinson further develops the concept by introducing the concept of reciprocity, as a process of fulfilling a psychological contract. Reciprocity has many conditions and elements. A sense of reciprocity motivates the contracting parties to stay in the contract on the one hand, while on the other hand the personalization of the organization is carried out to the extent that the individual identifies with the goals and needs of the organization. If there is no reciprocity then the employee as a party to the contract is irritated, dissatisfied and refuses to meet the needs of the other party by refraining from the behavior she achieves.

With great influence on the further development of the concept of psychological contract was Schein (1994), who in his book *Organizational Psychology* paid more attention to understanding the position of the employer. He believes that both the individual and the employee have expectations from the employer and the employer has expectations from the employees. These expectations are neither written nor formalized, but they strongly influence behavior. To reach a psychological contract, there is a need for mutual influence and constant bargaining in order to maintain a psychological contract.

He hypothesizes that psychological contract emerges as the product of different types of culture in organizations in theory X, Y. According to Theory X, if employees are expected to be indifferent, hostile, and economically motivated, management strategy will enable them to act in that correct manner.

Schein's matching hypothesis was previously analyzed by Kotter (1973) who concluded that the compliance rate was directly proportional to the likelihood that employees would report job satisfaction, productivity, and turnover reduction. The match here shows what they have to do and what they gain in return.

Perhaps the greatest influence on the understanding of the psychological contract is Rousseau (1995). According to Rousseau a psychological contract has a promising nature and contains obligations that are reciprocal. In the analysis of the psychological contract, the emphasis is on the employee and his perception.

New theorists seek to better understand labor relations through psychological contract. They use the psychological contract not only to understand and predict employee behavior, but also to understand economic and other changes in society. Many studies have been done to analyse the relationship between employees' perception of psychological contract.

Kasekende (2017) in his study measured the effects of psychological contract in employee engagement by using PC inventory in 14 agencies in Uganda. He found that by respecting the PC the employees' engagement in the work place will increase.

Protsiuk (2020) attempted to identify the relation between employees' PC perception and the occurrence of counterproductive work behaviour. Her study was focused on SMEs' managers and owners in Ukraine. The results of her study show that there is a significant relationship between PC, relation expectation and counterproductive work behaviour.

The psychological contract is as important as employment contract and as Guest (2004) states: "the state of the psychological contract of workers on flexible employment contracts is at least as positive and sometimes more positive than that reported by workers on permanent contracts"

## THE CONCEPT OF PSYCHOLOGICAL CONTRACT (PC)

The psychological contract itself is a concept and as such can be applied to all interpersonal relationships. Of course, the key elements of this concept can be applied to other areas.

"The" psychological contract "represents the broad perception of employees of the contribution they have promised to give to the employer and of what they are convinced the organization will promise in return (Conway & Briner, 2005). The psychological contract represents (Maguire, 2002) a set of employee-generated expectations that determine what an individual and an organization expect to give and receive from each other during their employment relationship. According to Sims (1994) PC is an individual trust system formed by the organization in relation to the terms of the exchange agreement between him/her and the organization (Rousseau, 1995); What employees are willing to try and contribute in exchange for something they value with their employer, such as job security, pay and benefits or ongoing training (Newell & Dopson, 1996); The emotional connection between employer and employee. It is implicit and as such informal and involves mutual responsibility and expectation (De Meuse & Tornow, 1992).

When we talk about defining a psychological contract, we can not mention just one but we must keep in mind the development and trends of defining the term psychological contract. Common elements to all definitions of psychological contract are (Conway & Briner, 2005): confidentiality, implicit nature, perceived agreement, Exchange, beliefs about ongoing Exchange, the exchange between the two parties is ongoing, parties to the psychological contract and the psychological contract is shaped by the organization

**Confidentiality.** – Since the publication of Rousseau's article, theorists have shifted their focus of interest to promise, and obligations and expectations are considered general terms and are considered only if they contain a perceived promise.

According to Wanous (1977), expectations represent what workers expect from an employer. On the other hand, the psychological contract is based on the perception of a mutual obligation which describes the relationship between the employee and his employer

and is based on bona fides, not on the expectation of what the employer is obliged to provide based on the promise of perceived reciprocal exchange. “All promises include expectations, but all expectations do not include promises” (Conway & Briner, 2005).

**Implicit nature.** – The promise is further explored through its implicit and explicit nature (Conway & Briner, 2005). Some definitions say that a psychological contract contains clear and implicit promises. Implicit promises arise from the written or oral agreement of both parties (employer and employee). An implicit promise is made by interpreting patterns of exchanges that have occurred in the past, learning from the experiences of others, but also other factors that indirectly affect the parties, but which they do not take seriously.

Repeated actions between the parties where each party observes the behavior and reaction of the other party creates an implicit psychological contract. This kind of psychological contract creates their future relationship. Therefore, when an employee is valued or rewarded on special occasions to feel valued, the employee in the future expects the organization to greatly appreciate his/her efforts.

It remains unclear how understandable the promise of entering into a psychological contract can be. The legal agreement provides a form for legal validity and these promises are clear. According to Rousseau’s theory of social information processing (Conway & Briner, 2005), an open and public engagement has greater impact than a subtle implied or personal promise. It is likely that the inclusion of a clear promise in a psychological contract will make this contract a strong predictor of future employee behavior.

**Subjective nature.** – Subjective means that each individual sees things in his own way. An employee may not fully or properly understand the behavior of the organization or its representatives and vice versa. This is why any attempt at such an interpretation would be subjective and superficial. Due to the multiple and sometimes contradictory sources of information, the psychological contract remains subjective.

If we look at the psychological contract objectively it means that both parties interpret and understand the terms of the contract in the same way as third parties. However, while some of the conditions necessary for objective interpretation are clear and measurable, it can still be interpreted in a subjective way. And so, we came to the conclusion that if the psychological contract contains subjective elements that can be broadly interpreted, then the contracting parties would have little confidence that their organization would accept such an exchange (loyalty in exchange for respect).

**Perceived agreement.** – What distinguishes a psychological contract from a legal contract is that the parties to the psychological contract believe that there is consent of the will of the parties. This consent does not have to be real or the parties have to understand the contract. This further means that if a contract is primarily subjective, then it must be interpreted in a subjective way and vice versa, if a contract is primarily objective, then it must be interpreted objectively.

**Exchange.** – The essence of the contract is reciprocity. Without reciprocity we cannot talk about a contract because all commodity contracts presuppose reciprocity. Reciprocity means that expectations, what each party has promised to deliver or fulfill, are equal. Numerous studies have been conducted among employees and lists of employee contributions and offers of the organization were created. However, it was not possible to find which employee contributions matched the organization’s offerings.

**Beliefs about ongoing exchange.** – A psychological contract is broader than a legal contract because it includes beliefs or beliefs about anything that may be subject to exchange. Focusing only on the basic elements leads to neglecting the wide and varied degrees of potential exchange.

**The exchange between the two parties is ongoing.** – The exchange with the psychological contract is constant and takes place all the time in the form of continuous negotiations. This exchange is going on because the promises are being fulfilled constantly, not just once as is customary with commodity law contracts. Expectations must be met cyclically.

**Parties to the psychological contract.** – The definition of a psychological contract applies to all parties to the contract, the employee and the organization (employer) or the person authorized by the organization. The employee is easy to identify, but the question is who the organization is.

Employees are considered to see the actions of an organization as the actions of their superiors, and often through their actions, attribute to the organization a human trait. An organization may present itself as a Contracting Party through its agents or representatives.

**The psychological contract is shaped by the organization.** – Many definitions say that a psychological contract consists of an exchange trust. Beliefs are formed by a number of factors. Some are related to the organization itself and some to the employee’s personality. Previous work experience can have a lot of impact on building beliefs, then the internal needs of the employee, the influences and beliefs of the people around him, as well as their positive or negative experiences. Some theorists believe that dominant beliefs are influenced by the organization and that beliefs acquired in previous organizations may not be part of a psychological contract.

## CONTENT OF THE PSYCHOLOGICAL CONTRACT

A psychological contract presents a broader perception of an employee about the contribution they have promised to give to their employer and what they believe the organization will promise in return. The content of a psychological contract is broadly defined because it can include everything the employee has promised to contribute and everything the organization has promised to fulfill in return.

Rousseau (1995) divides content into two parts, i.e., considers content from two perspectives, the employee and the employer: (1) employee premises like loyalty, job volunteering that are not in the job description, the period before dismissal, readiness for relocation, protection of assets and information of the organization and willingness to stay in the organization for a period not less than two years; (2) on the other hand, the promises of the organization are: promotion, high salary, work-related salary, additional training, full-time employment, career advancement and reliance on personal problems (Zhao et al., 2007).

The perception and promises of the parties depend on the following factors: Factors within the organization, Factors outside the organization; Individual and social factors and Violation of psychological contract and psychological contracting.

**Factors within the organization.** – An organization initiates a psychological contract by offering a job through which it shapes a psychological contract.

Rousseau at the level of the organization distinguishes between the represented and the representatives. The represented terminates the contract on his own behalf and on behalf of the organization and the representative, on the other hand, on behalf of the organization. The organization communicates with its employees through human resources and personnel practice departments. They make promises that can be implicit and clear. Implicit communication is complex and delicate and involves how contractors respond to the behavior and response of employees and other contracting managers (such as line managers). Explicit communication involves written communication from a variety of statements, email correspondence. Individuals as contractors have an important role to play in communicating with employees in their expectations of what they will do and what they will receive in return from the organization. Line managers play an important role in communicating with employees. In particular, he is an important manager of the department whose contribution is great to the commissions in communication and growth, especially at the time of change in the organization. However, “there is no list of jobs that these managers can perform, but it can be said with certainty that providing support and motivation is one way to shape the content of a psychological contract” (Conway & Briner, 2005).

**Factors outside the organization.** – Factors outside the organization influence the content of the psychological contract through the expectations that the employee forms before joining a new organization. Even before the first employment, individuals have some expectations, not only from the employer, but also from the workplace itself. Experience plays an important role in shaping expectations not only the personal experience of the employee but also the experiences of the people around him, socialization at school and the local community, cultural patterns, socio-economic status and the degree of media influence (Conway & Briner, 2005).

Another way to influence is personal experience that is not related to the employee’s work, and that significantly affects their expectations and understandings (parents, divorce, changes in personal relationships). The third category of factors captures the impact of economic, political and legal change.

**Individual factors.** – The psychological contract is interpreted subjectively. Since there are no two identical personalities and there are no two identical interpretations of a psychological contract which means in other words that even if the management offered all employees the same conditions each employee would have a different psychological contract. Perceptual shaping is influenced by individual change, ideology, and self-contribution. In theory and among scholars, the greatest attention has been paid to the analysis of employee personality and the ideologies of the profession and exchange.

**Employee personality.** – One of the main explanations for the specific nature of the psychological contract is the personality of the employee. This can be observed through three processes (Cullinane & Dundon, 2006): personality influences job and task choices, personality influences how contract terms are interpreted and how employees display contractual behavior. Employees who have a fair sense will enter into a transaction agreement and employees with high self-esteem and conscience will prefer to enter into a relational psychological agreement. When it comes to tasks, this means that employees with a higher level of neurosis manifested through emotional instability, lack of trust and anxiety, tend not to get involved in jobs that require trust, long-term obligations, trust in a person other and delayed pleasure.

Another personality trait can influence the creation of a psychological contract, which is cognitive bias. According to Rousseau, such a trait can cause an employee to make promises that he cannot make or to an extent that exceeds his abilities and often justifies his failure for external reasons that he cannot control. The greater the impact of an employee’s observations under the influence of self-sufficient bias, the more inclined employees will be to believe that they should take over the incentive received from the organization where they are employed.

When talking about the influence of ideologies, we must mention the most important among theorists: the ideology of the profession and the ideology of exchange. The authors Coyle-Shapiro and Neuman (2004) investigated the influence of creditors’ exchange ideologies and exchange ideologies on psychological contract. These ideologies begin with thinking about the orientations of similar personality types. According to them, exchange ideology refers to the degree to which employees believe that the way they are treated by the employer reflects their effort. Further elaborating on their thesis, they conclude that there are workers who do not mind being rewarded for the effort they make while other workers strive for equality and prefer the exchange to be fair and just. Finally, there is a third group of employees who do not intend to be properly rewarded for their efforts.

This attitude is based on the ideology of the creditor. According to this ideology, individuals prefer that others owe them better than they owe others. Coyle-Shapiro and Neuman (2004) in their study concluded that respondents with fewer points on exchange ideology and more on creditor ideology felt a greater commitment to the organization and were more willing to respond to incentives from the organization. The study shows that it depends on individual ideology how much employees will feel compelled to give to the organization and how much they feel compelled to take on the incentives of the organization.

**Social factors:** among the social factors that influence the creation of a psychological contract, the most important are the social characteristics and socialization in the workplace.

The social trait mostly influences the formation of the psychological contract through the process of social information. Social information is a process in which employees receive and interpret employee attitudes and behaviors through social goals. Social information is a process in which employees receive and interpret employee attitudes and behaviors through social goals. Social cues can be statements, observations of employees' moods and behaviors, and all kinds of communication that can have a greater or lesser impact on employees' understandings and attitudes to a greater extent than they do. delicate or personal.

Non-fulfillment of a psychological contract and "psychological contracting" are two concepts specially developed as two main factors that affect the content of a psychological contract.

Numerous studies have shown that changes in obligations and consequently in the content of the psychological contract are the result of inaction of one of the parties. They also showed that non-compliance leads to a reduction of psychological contract transaction elements and employee-related obligations. In other words, when an organization reduces its liabilities to employees and employees reduce their liabilities to the organization.

On the other hand, "psychological contraction" involves four stages (Conway & Briner, 2005): information, negotiation, observation and renegotiation. In the first phase, the information phase, each party informs the other party of its needs. This phase is followed by the negotiation phase when the employee and the organization negotiate and reach a consensus on what each party is prepared to provide to the other party. The talks are followed by observation. At this stage, employees and employers look at each other to ensure the fairness of the psychological contract. The final stage is renegotiation. At this stage, what the parties are willing to provide to each other is renegotiated. The renegotiation takes place on the basis of the first negotiations or one of the parties will decide to withdraw from the relationship.

We can also analyze the content of the psychological contract through an alternative approach. Proponents of this view are the theorists Rousseau, Parks, Kidder, and Gallagher; Sels, Janssens, and Van Den Brande (2004).

They find that the standard approach to interpreting the content of a psychological contract cannot be applied to individual groups. According to them, the two main features of the psychological contract, dynamism and development, make this contract unsuitable for a unique content analysis, when related to different jobs. Consistent with this interpretation approach (Parks, Kidder, & Gallagher, 1998) describe some elements of a psychological contract (Conway & Briner, 2005) as follows:

- 1) Focus - the emphasis of the psychological contract is on socio-emotional elements, not on economic problems;
- 2) Timeline - refers to the duration of the contract and is divided into duration and accuracy of the contract;
- 3) Stability - corresponds to the extent to which the terms of the contract may be changed beyond explicit or implicit renegotiation;
- 4) Scope of the contract - A psychological contract has clear limitations and limits;
- 5) Clarity - the terms of the contract must be clear and visible to third parties and open disputes between the parties due to subjective interpretation; and
- 6) Exclusivity - represents the degree to which an employee views exchange resources as unique and irreplaceable

## ANALYSIS OF THE LEGAL NATURE OF THE PSYCHOLOGICAL CONTRACT

The psychological contract presents a broad perception of the employee about the contribution they have promised to give to the employer and what they believe the organization will promise in return (Conway & Briner, 2005). In the analysis of the legal nature, we will start with the type of contracts, parties, issues, bases of the contract through the manner of conclusion, duration and form and finally we will touch on the manner of its conclusion.

The first thing to notice is that the psychological contract is not provided for by positive legal rules, i.e. it is not a named contract. This means that the form of the contract and the essential elements are determined by agreement between the parties. Employees are represented on the one hand as employees and on the other hand by the organization or the responsible person, who enters into the contract on behalf of the organization.

A psychological contract is a bilateral agreement because both parties have obligations. This is a freight contract because for the effort made by the worker, the employer has to pay a cash benefit (usually bonuses, commissions). The obligation to perform is permanent so these are permanent but also allied contracts because at the time of termination it is not known exactly how long the contract will last or what the results are. The content of this contract is determined by the employer in the job vacancy and the candidates are nearing completion, individually.

The basis of concluding a psychological contract is employment, and without the termination of the employment contract, the psychological contract will not exist. Based on the above we can say that the psychological contract is an introductory contract, individual and dependent, which is concluded due to certain characteristics of the parties

All conditions relating to the conclusion and termination of the named contracts also apply to the psychological contract. In other words, the conclusion of the contract requires that the parties have the ability to contract so that the object of the contract is possible and permissible and that has the consent of the will.

The psychological contract ceases to exist due to the non-fulfillment of the obligations of one of the parties in the contract or due to the termination of the object of the contract, i.e. the termination of employment through recognition, dismissal or when the employee is declared redundant.

Although the psychological contract is neither provided for nor regulated by law, then it exists and functions in practice. As such it has become part of customary law and often has a greater impact on labor regulation than the employment contract itself. Some institutions have taken over from the named contracts rules regarding the termination of contracts, while on the other hand, it is certain that in the future the oral termination of the contract will be accepted even though such an institution is not recognized by continental law.

As part of the doctrinal law, the psychological contract has a strong impact on social relations, because it is deeply rooted in the consciousness of people, as something that is useful and good for society, in this case for labor relations.

## CONCLUSION

Psychological contract is a relatively new concept that evolves in line with changes in early relationships, the labor market and organizational changes. It started in a field of medicine but found wide application in all interpersonal relationships. The paper contributes to answering a number of questions to discover the economic value of the psychological contract between employees and management in organizations. As mentioned in the introduction we have emphasized that labor relations and management in for-profit organizations are based on profit maximization. Profit is influenced by a number of factors, one of which is productivity and commitment to the organizational goals of workers and the market (competition).

We are witnessing a global economic crisis, when unemployment is high, liquidity is declining and profits are declining. The main way companies struggle is to reduce costs in order to maximize profits. This is why companies use reorganizing and firing employees, which provokes negative emotions in employees who agree to change working conditions because they have no alternative.

A psychological contract is defined as the totality of expectations that employees have towards their employers and vice versa, the expectations that employers have of their employees. We have seen from numerous studies that the psychological contract is "alive". Its content changes as the needs of the parties change. It is a process of ongoing silent negotiations based on signals and subtle signs in the company. In addition to listening to non-verbal communication, verbal communication is important, not only among employees, but also between management and employees. Human resource management and mentors (line managers) play a key role in this communication. Human resource management, through the stages of workplace analysis, planning, recruitment, selection, training and management of the company's departure, influences the creation of behavioral models in the company, creating an atmosphere in the workplace and creating advertising good or bad. Due to the complexity of the functions, it performs, human resource management should consist of professionals who are experts in various fields: psychology, sociology, economics, law, etc.

And finally, the organization must act as a "good host", i.e. take care of its employees. In such an atmosphere, workers are prepared for conditions not provided for in their employment contract because they feel respected. In the fight against competition and the constant race for profit, companies have forgotten their essence and emphasized professionalism as the core value, which includes lack of emotion and concern for others. Once back at their core, companies can survive in these times of crisis, thanks to a psychological contract that requires no extra expense for its appearance, duration, or expensive attorneys to terminate or terminate the contract.

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## EXPLORING THE RELATIONSHIP BETWEEN JOB SATISFACTION AND ORGANIZATIONAL COMMITMENT FROM A GENDER PERSPECTIVE IN KOSOVO CONTEXT

*Original scientific paper*

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### ABSTRACT

*This paper examines the relationship between job satisfaction, organizational commitment and gender in Kosovo employment institutions. Despite the positive efforts to change the legislation, in order to increase women's participation in the labor market, Kosovo still remains the country with the lowest participation of women in the labor market, comparing to the other countries in the region. The study of job satisfaction and organizational commitment helps to understand the dynamics that generate the continuation of women at work and encourage many others to be included in the labor market. This paper uses the cultural heritage approach to understand the phenomenon. The methodology used to gather the data was quantitative one. A questionnaire was distributed to 338 employees of 11 employment institutions in Kosovo. The data revealed that more females than males show high level of job satisfaction and organizational commitment in the institutions where they work. This confirms the ‘the paradox of the contented female worker’, as explained by Clark (1997). The study also shows that there exists also a positive correlation between job satisfaction and organizational commitment of employees, both females and males, in the employment institutions involved in this study.*

**Keywords:** gender, job satisfaction, organizational commitment, employees, Kosovo

### INTRODUCTION

During the years 1970-1980 the number of women in the labor market, in a global context has increased (See: Forgiionne & Peeters, 1982, p. 101), this due to job market diversification and changes in labor legislation. The process of labor market feminization took place at different rates in different countries. Along with studies focused on employment issues, in the 1980s, researchers began to examine job satisfaction as well as organizational commitment, with the aim of developing strategies to lead organizations to success, because job satisfaction seems to have an impact on the success of the organization (Brown & Lam, 2008), as well as organizational commitment.

As women became an important part of the labor market, gender issues were also seen as closely linked to job satisfaction and organizational commitment.

This article aims to analyze the relationship between job satisfaction, organizational commitment and gender within Kosovo context.

The research objectives are: (a) to examine the relationship between gender and job satisfaction in Kosovo context (b) to examine the relationship between gender and organizational commitment in Kosovo context (c) to analyze the relationship between job satisfaction and organizational commitment in Kosovo context.

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The findings of this paper are important because they shed lights on some important elements that are related to the employees' job satisfaction and organizational commitment in Kosovo companies from gender perspective. The results of the present paper may have policy implications with the aim, not only to increase the company success, but also to increase the participation of female in the job market in Kosovo context.

The first part of this paper reviews, according to the literature, the relationship between gender and job satisfaction and organizational commitment.

The second part of this paper describes the Kosovo context, basing on the approach of the cultural heritage. The next part of the paper gives a description of the study methodology, the applied model, hypotheses and the research instrument, participants and sampling, procedure of data analyzing and study limitations.

The fourth part of the paper shows the research finding and discussions, focusing on the objectives set out at the beginning of the paper and on the fulfillment of the study purpose.

Last, the present paper gives the conclusions and some recommendations, which may be useful for raising the company's success and the involvement of woman in the labor market in Kosovo context.

## **KOSOVO CONTEXT AND THE CULTURAL HERITAGE APPROACH**

Following the humanitarian crisis triggered by the 1999 war, Kosovo focused on socio-economic and political recovery. The transition from a traditional society to a more urbanized and contemporary one, aimed to led to the labor market more women and girls. A considerable number of different organizations, including domestic and international non-governmental organizations, through various programs and projects have contributed to the advancement of the position of women towards achieving gender equality (ABGJ, 2011, p. 11). As a result, there was an increase in interest of girls attending university and postgraduate education in Kosovo (GAP Institute, 2017, p. 3) as well as the interest of women to find a job, which is almost at the same level as that of men. Number of male jobseekers registered with the Employment Agency in 2019 was 52,343, while the number of women jobseekers registered with the employment agency was 43,547. To moreover, over 6,700 women jobseekers had completed their bachelor studies, which is a higher number than number of male jobseekers with the same profile (4,067). (GAP Institute, 2019, p. 4).

As a matter of fact, despite the efforts to increase the number of employed women, Kosovo continues to have the lowest levels of female employment in the entire region. According to the World Bank, labor force participation in Kosovo is very low, especially among women. The employment rate in 2016 was higher for men than for women, as 43% of men of working age were employed compared to 12.7% of women of working age.

The inactivity rate is higher in rural areas, where inactivity among women reaches high levels up to 77.2% compared to that of men at 37% (Kosova Democratic Institute, 2017, pp. 5; 9). An analysis by the GAP Institute states that in addition to dedication to household chores, women in Kosovo face other employment barriers. An important barrier has to do with the traditional division of professions. While another barrier has to do with the discriminatory language of working competitions (GAP Institute, 2017). Traditional patriarchal culture, especially in rural areas, seems to compose a very strong barrier for the employment of the woman in Kosovo (GADC, 2020, p.18).

People in Kosovo actually have such a negative perception of market functioning of work, so that, nine out of ten people require work through personal contacts, family, friends and relatives. Age, place of residence (urban versus rural), educational attainment, status marital status, age of children and acceptance of remittances have been seen to be important factors affecting labor market participation, especially by women and youth. Women generally seek more accomplishments higher education than men to find a job (Kosova Democratic Institute, 2017, p. 17).

Despite the fact that there are not many studies on job satisfaction and organizational commitment, especially the studies related to gender perspective in the context of Kosovo, there are some comparative studies at a regional level, which can be used to better understand the dynamics of the phenomenon in Kosovo as well. According to Fargher, Kesting, Lange, and Pacheco (2008) job satisfaction has been strongly associated not only with measures of organizational culture, but also with cultural heritage of a society as measured by its basic value and belief system.

According to a study, conducted by Bednarska and Szczyt (2015, pp. 5-6), Kosovo was part of the countries with a low level of job satisfaction (as well as Albania, Montenegro, North Macedonia, Slovenia, Turkey, etc.). People in these countries made their general work satisfaction dependent particularly on pay.

In another study, conducted by Peterson, Kara, Fanimokun, and Smith (2019), the relation between organizational commitment and gender is related to the country culture. So they found out that organizational commitment is higher among men than women in four countries (Australia, China, Hungary, and Jamaica) and higher among women than men in two countries (Bulgaria and Romania). The study suggests limitations to the traditional modernity-based understanding of gender and the workplace. They find that models of gender and commitment developed for a Western context have important exceptions. Their results suggest that CEE is not homogeneous with regard to work and gender. This approach can be used to understand the Kosovo dynamics as well related to job satisfaction, organizational commitment and gender perspective.

## LITERATURE REVIEW ON JOB SATISFACTION AND ORGANIZATIONAL COMMITMENT FROM A GENDER PERSPECTIVE

### Job satisfaction and gender perspective

Job satisfaction is commonly interpreted as an emotional response to a value judgement by an individual worker and it results from the perceived fulfilment of one's important job values (Henne & Locke, 1985). Employees satisfied with their work conditions are more likely to demonstrate engagement as a means of reciprocity for the organization that has benefited them (Aselage & Eisenberger, 2003).

The findings in the international literature about the relationship between gender and job satisfaction are very heterogenous. It seems that cultural heritage of a country influences the job satisfaction of men and woman.

According to Forgiogne and Peeters (1982) female express less job satisfaction than man in their working place, because of the level of training of all kinds. The Bednarska and Szczyt (2015) study doesn't support the expectation of significant gender discrepancies in well-being at work.

Other studies have shown that, compared to men, woman experience higher levels of job satisfaction (Bender, Donohue, & Heywood, 2005; Clark, 1997; Kaiser, 2007; Huang & Gamble, 2015). This finding has been called 'the paradox of the contented female worker'.

So, some reasons that explain this gender gap on job satisfaction are:

1. Low levels of career expectations by women, which lead to higher levels of job satisfaction, (Clark, 1997); According to Huang and Gamble (2015, p. 344) gender role expectations in general influence job satisfaction.
2. Women value flexibility at work more than men and working on more flexible jobs they tend to have higher levels of job satisfaction (Bender et al., 2005).
3. Women preferences are related to the jobs which facilitate a good work-life balance, and as a consequence drive to higher level of job satisfaction (Redmond & McGuinness, 2019).

Williams et al., (2006) claim that the paradox of the contented female worker is weakening over time. According to Kaiser (2007) this is the consequence of modernization of a labor market regime in terms of equal opportunities for women and men.

### Organizational commitment and gender gap

There exist many contributions on developing the concept of organizational commitment (Allen & Mayer, 1996; Baack, Luthan, & Jerry, 1991; Cohen, 2007; Kanter, 1968; Sheldon, 1971). Allen and Meyer (1996) developed the concept of organizational commitment based on the affective commitment and the continuance commitment. Other authors have developed a concept of organizational commitment basing on the employee's loyalty to the organization, willingness to

exert effort on behalf of the organization, degree of goal and value congruency with the organization, and desire to maintain membership (Cohen, 2007, p. 336). Aydin et al., (2011) using a meta-analysis method, included and analyzed fifteen research studies, focused on the job satisfaction of teachers, organizational commitment and gender. Among others, referring to O'Reilly and Chatman (1986, p. 492) they spoke about three levels for organizational commitment: (1) the level of accordance that is related to necessity of accordance because of an award or a penalty; (2) the level of identification that is related to the feeling as a part of the group when the person gets the opportunity to express himself freely; (3) the level of internalization that is related to the accordance between the organizational and personal norms, so the employee makes willingly the organizational norms (Bursalioğlu, 2005, p. 144).

According to Aydin et al., (2011) study findings, the effect of gender on job satisfaction is in the favor of males. For the levels of accordance and continuance were found in favor of females while for the levels of identification and internalization it was on the favor of males.

As well as for job satisfaction, many organizational and gender studies suggest that the implications of gender for commitment-related concepts differs among societies (See: Peterson et al., 2019). So, government policies and cultural heritage seem to explain the empowerment of woman at working market, which vary from the Western societies to the Eastern ones, which is reflected to the organizational commitment too (Stavrou, Casper, & Ierodiakonou, 2015).

### The relationship between job satisfaction and organizational commitment

In some studies job satisfaction is considered as a variable which influences the organizational commitment. Taking the example of USA and India companies, Chordiya, Sabharwal, and Goodman (2017) found out that, in both countries' contexts, job satisfaction has a significant positive impact on affective organizational commitment. In other studies focused on the relationship between job satisfaction (JS) and company commitment (CO), the last one is considered as an independent variable which influences on the JS. For example Munfaqiroh, Mauludin, and Suhendar (2021) found out that organizational commitment which is influenced by transformational leadership has an influence on employee job satisfaction. The same results have been revealed by Adekola (2012), Akhtar, Durrani, & Hassan, (2015).

In other studies both JS and CO influence each-other. For example Testa (1999) shows that organizational commitment influences employee job satisfaction and even job satisfaction values depends from the organizational commitment in the companies.

In the present study we tried to explore the relationship between the two variables (JS) and (OC), but further studies should analyze which variable influences the other.

## METHODOLOGY

### Hypotheses, the applied model and the research instrument

In order to explore the relationship between job satisfaction, organizational commitment and gender gap, 3 hypotheses were raised:

H1. Women experience more job satisfaction than men;  
 H2. Women have higher organizational commitment than men;

H3. There is a positive correlation between job satisfaction and organizational commitment for both males and females.

So, the applied model is showed in the following figure:

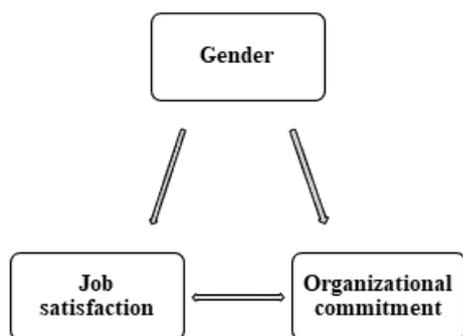


Figure 1. The applied model

As described in the preview sections of the present paper, the main focus is to explore the relationship between job satisfaction and organizational commitment from gender perspective in Kosovo context. The instrument used in this research is a structured questionnaire and the variables used are: the independent variable of gender, the variable of job satisfaction (JS) (10 items), and the variable of organizational commitment (OC) (10 items). To construct the variable of JS and OC, as a reference was taken the model offered by Munfaqiroh et al. (2021).

The questionnaire has been validated and tested. According to the reliability statistics the Crombach’s Alpha for the variable “job satisfaction” (10 items) is .963. The Crombach’s Alpha for the variable of “organizational commitment” (10 items) is .956. Thus the research instrument meets the reliability requirements, because the Crombach’s Alpha is > .7.

### Participants and sampling

The questionnaire was distributed to 11 employment institutions in Kosovo.

The sample used to gather data was a mixed between random and purposeful one, so in one hand everyone in the population has an equal chance of getting selected, but on the other hand a gender balanced inclusion of the sample was intended to be reached.

In a population of N = 2805 employees, with a confidence level of 95% (z score = 1.96), population portion (.5), margin of error of 5%, a sample of 338 respondents was selected.

### Procedure of data analyzing

The questionnaire was administrated through google forms during the period October-November 2021 and SPSS 23 program was used to analyze the data. A pilot phase has used to test and validate the research instrument. Descriptive statistics were used to test the hypotheses and help their verification, so to explain the relationship between job satisfaction, organizational commitment and gender.

### The study limitations

This research was exposed to some limitations:

*First*, there is a limited literature on studies linking job satisfaction with organizational commitment and gender perspective in the Kosovo context.

*Second*, the relationship between job satisfaction and organizational commitment is not exhaustive. It is necessary to explore more in depth the impact of these two variables on each other as well as the impact of other variables that may affect job satisfaction and organizational commitment in different organizations of Kosovo; such as age, education, company culture etc.

*Third*, the generalization of the present study findings is limited, because the selected sample is mainly focused on the urban area employment institutions, where the possibility of woman participation in the job market is higher than in rural areas. So the attitudes of the respondents in this study cannot represent the attitudes of the women and men in rural areas in Kosovo.

## RESULTS

### Gender respondents profile

Although the participation of women in the labor market in Kosovo is lower than that of men, in this study an attempt was made to balance the number of participants from a gender point of view. Thus, the gender profile of the respondents does not represent the ratio of employed women and men in the labor market in Kosovo. Among the 11 employment institutions, family businesses, educational institutions, textile production companies, etc. were selected, where the participation of women is considerable.

As described above, in the present study, the frequency of male and female respondents tends to be balanced. 51.8 percent of the respondents are female and 48.2 percent are male.

Table 1. The respondents’ gender profile

Gender	Amount	Percentage
Male	163	48.2
Female	175	51.8
Total	338	100.0

Taking in consideration the respondents' level of education, according to the gender, it is noticed a dominance for the category of males who have finished the post-university studies (42.9% of all male respondents) and a dominance of the category

of females who have completed the university studies (53.1% of all female respondents). The biggest part of the respondents belongs to the category of university and post-university graduated employees (84% for males and 81.1% of females).

Table 2. The respondents' education profile according to gender

Gender	Education					Total
	Mandatory completed	High school completed	University studies completed	Postuniversity studies completed	Other (Specify)	
Male	.6%	10.4%	41.1%	42.9%	4.9%	100.0%
Female	.0%	14.3%	53.1%	27.4%	5.1%	100.0%
Total	.3%	12.4%	47.3%	34.9%	5.0%	100.0%

Regarding the age, it is noticed that the category of 31-40 years old dominates for males and the category of 21-30 years old dominates for females.

Table 3. The respondents' age profile according to gender

Gender	Age						Total
	Less than 20 years old	21-30 years old	31-40 years old	41-50 years old	51-60 years old	More than 60 years old	
Male	4.9%	24.5%	35.6%	18.4%	11.0%	5.5%	100.0%
Female	6.3%	42.3%	36.0%	9.7%	3.4%	2.3%	100.0%
Total	5.6%	33.7%	35.8%	13.9%	7.1%	3.8%	100.0%

**Job satisfaction and organizational commitment according to gender perspective**

Referring to the variables of the job satisfaction and organizational commitment, according to the descriptive analyze, in a scale from 1 to 5 (where 1 = totally disagree and 5 = totally agree) the total means score seem to be above 3 that can be interpreted as a good average of job satisfaction variable and the organizational commitment variable.

Table 4. Average score of JS and OC

Variable	Min	Max	Average score
Job satisfaction (JS)	1.00	5.00	3.82
Organizational commitment (OC)	1.00	5.00	3.93

In order to better explore the level of the job satisfaction and the level of organizational commitment, according to the gender perspective, a three level scale for each variable has been constructed and measured. Basing on the descriptive analysis, the variables of Job Satisfaction and Organizational Commitment have been measured using three levels: low, medium and high.

The descriptive analysis showed that more woman (61.7%) than man (53.4%) show high level of job satisfaction (N = 338, p < .05).

Table 5. The correlation between gender and job satisfaction

Gender	Job satisfaction levels			Total
	Low	Medium	High	
Male	14.1%	32.5%	53.4%	100.0%
Female	8.0%	30.3%	61.7%	100.0%
Total	10.9%	31.4%	57.7%	100.0%

The descriptive analysis showed also that females (65.1%) more than males (60.7%) showed higher level of organizational commitment (N = 338, p < .05).

Table 6. The correlation between gender and Organizational Commitment

Gender	Organizational commitment levels			Total
	Low	Medium	High	
Male	6.1%	33.1%	60.7%	100.0%
Female	5.7%	29.1%	65.1%	100.0%
Total	5.9%	31.1%	63.0%	100.0%

Started from the literature review and the confirmation of the two first hypotheses, it is expected a positive correlation between JS and OC. With the aim to explore this correlation the Gamma test has been used. According to the data, there exist a positive correlation between OC and JS (Gamma = .902, N= 338, p < .05).

Table 7. The correlation between organizational commitment and job satisfaction

Levels of Job satisfaction	Levels of Organizational Commitment			Total
	Low	Medium	High	
Low	4.4%	6.5%	0.0%	10.9%
Medium	1.5%	17.8%	12.1%	31.4%
High	.0%	6.8%	50.9%	57.7%
Total	5.9%	31.1%	63.0%	100.0%

As the Table 7 shows, when the level of job satisfaction is high, the organizational commitment is high too. 50.9 percent of the respondents (both males and females) reported high level of job satisfaction and high level of organizational commitment too.

## CONCLUSIONS AND IMPLICATIONS

As the study results show, more females than males show high level of job satisfaction in the institutions where they work. This confirm the ‘the paradox of the contented female worker’, as explained by Clark (1997).

The study also show that more females than males show high level of organizational commitment. There exists also a positive correlation between JS and OC of employees both females and males in the employment institutions involved in this study.

Taking in consideration the conclusions of this study, some recommendations can be mentioned:

- In order to improve the level of organizational commitment managers must invest on increasing the level of job satisfaction to the employees both females and males.
- Educational administrators could help individuals in organizations to improve their job satisfaction and commitment by taking into consideration the different gender expectations.
- In Kosovo context the improvement of the job satisfaction and organizational commitment, especially among women, can help the continuation of women at work and encourage many others to be included in the labor market
- Further studies should be undertaken in order to better explore the variables which influence job satisfaction and organizational commitment in Kosovo organizations, taking in consideration the cultural heritage of the Kosovo society.

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## ELECTRONIC COMMUNICATION SKILLS OF DEAF AND HARD OF HEARING PEOPLE

*Original scientific paper*

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### ABSTRACT

*The aim of this paper was to examine the literacy skills of deaf and hard of hearing people in electronic form writing and to compare these skills in relation to standard (“paper-pencil”) writing. The sample included 50 deaf and hard of hearing students aged from 12 to 20 years. The students were supposed to have basic literacy to be able to answer questions by writing. The Questionnaire for determining basic electronic literacy, which consisted of 15 simple questions about the student’s everyday life, was used. Variables used: correct response, vocabulary, and spelling mistakes, i.e., substitution, omission, addition, and metathesis. The test was performed at two different time intervals and in two different forms (standard and electronic forms). Data were processed by descriptive analysis and t-test. More favorable results were obtained in favor of standard writing compared to electronic writing on all variables except for vocabulary. Statistically significant differences were found for the variables vocabulary, omission, and substitution. It is important that there is also communication competence, and especially better language competence expressed in electronic form. More complex activities, such as education, studying, or doing business, require language competence for electronic expression.*

**Keywords:** *electronic communication skills, deaf and hard of hearing people*

### INTRODUCTION

From the psycholinguistic aspect, writing is a complex activity, which, in order to learn, requires prior mastery of speech expression. These two activities are extremely interdependent. Well-developed writing is the most developed form of linguistic expression. It must emphasize all the details of a certain situation, in order to be clear to the one who receives a certain message, and even what is left out in the spoken form. “Deaf and hard-of-hearing students form a unique subpopulation of writers, one that exhibits great challenges in learning to write effectively and fluently” (Wolbers, 2007, p. 257).

“Some deaf learners are somehow able to compensate for the lack of auditory access to the spoken language and attain native-like knowledge of the language.

However, many deaf learners accomplish only partial acquisition of the spoken language and experience persistent difficulties in reading comprehension and written expression” (Berent, 2001, p. 124).

Hearing children spontaneously learn to speak. When they go to school, they are systematically trained in writing. In contrast, deaf and hard of hearing children, even today, when the use of cochlear implants is significantly present, often do not have fully developed speech before going to school. They learn speech and writing at the same time. Therefore, it is quite clear why these children often do not reach the ability to express themselves in writing to their hearing peers.

Deaf children write the way they speak. Their written text is generally the best test of language achievement.

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This allows you to find out at the same time where they occur and what are the most common errors. On the other hand, the analysis of the text indicates what, in the corrective rehabilitation procedure, the most attention should be paid to.

Research during the past several generations in the United States and elsewhere has found that deaf children and adults have difficulty with numerous aspects of reading and writing in the language being taught. These range from the smallest units (phonemes and graphemes) to morphemes, syntax, vocabulary, and pragmatics. Bound morphemes, function words, complex grammatical constructions, and verb tenses pose special challenges. (Moore, 2006, p. 52).

Literacy today, in the age of information technology, has an extremely important role in all ages and every segment of social life.

“Computer technology and the Internet have a tremendous potential to broaden the lives and increase the independence of people with disabilities. Those who have difficulty leaving their homes can now log in and order groceries, shop for appliances, research health questions, participate in online discussions, catch up with friends, or make new ones” (Kaye, 2000, p. 124).

According to Henderson, Grinter, and Starner (2005), “in 1982 Barbara Wagreich, a deaf-blind computer professional wrote an article about the possibilities of new technology, email, and how it might prove beneficial for people with disabilities, particularly the deaf...Email was not only a formal medium for business meetings and communications but also an informal tool for maintaining friendships and furthering acquaintances.”

Based on an online survey of deaf and hard of hearing adults, Bowe (2002) points out that results showed that respondents were using e-mail and instant messaging (IM) far more than telephone typewriters (TTY) and relay services. The study participants virtually all had e-mail and IM at home. While the vast majority also had and used e-mail at work, just 1 in 3 had IM at his or her place of employment.

“Short Message Service (SMS) represents the first communication technology that has broken down the barriers between Deaf and hearing individuals. Unintended and unforeseen by the engineers who designed it, the way that texters are using SMS is perhaps a revolution in communication. Extrapolating from research with hearing users, it is predicted that deaf texters will use SMS to increase the bonds between themselves in deaf communities, creating new opportunities to develop relationships, understanding, and intimacy with those not physically present” (M. R. Power & D. Power, 2004, p. 341).

Based on a project conducted, Akamatsu, Mayer, and Farrelly (2005, p. 120) state that “data collected confirm that two-way text messaging technology is indeed useful for deaf adolescents and helps alleviate some of the concerns that have kept them from developing independence as quickly or readily as their hearing peers.”

Henderson et al. (2005) reveal that both Deaf and hearing teens share similar communication goals such as communicating quickly, effectively, and with a variety of people. Distinctions between the two populations emerge from language differences.

Research results showed that Deaf users in Australia are discerning the purposes for which they use each method: SMS for social and personal interactions, TTY for longer communications and (via the relay service) with people and services without TTYs, fax for business and social contact, and computers for personal and business e-mails as well as Web browsing, accessing chat rooms, word processing, games, and study (M. R. Power, D. Power, & Horstmanshof, 2006). Also, an online survey of German deaf people demonstrated that SMS is used most, with more than 96% of respondents having access to a mobile phone. Most use is directed toward sociability (keeping in contact, and making arrangements with friends and family). However, there is some instrumental use (getting tasks or business accomplished, making appointments, and obtaining information) (D. Power, M. R. Power, & Rehling, 2007).

The study conducted by Pilling and Barrett (2007) is the only comprehensive survey of the text communication preferences of deaf people who cannot or prefer not to use voice telephony in the United Kingdom. Respondents used several forms of text communication, selecting them for specific purposes. E-mail was the most widely used form of text communication, but SMS was the most used by younger respondents. The most prominent reasons for liking different forms of text communication were that they were easy or fast. Henderson-Summet et al. (2007) researched the differences and similarities between deaf and hearing teen’s usage of electronic communication media. Five common themes: Identity, Connection, Control, Tension, and Convenience were identified. These themes allow to explore electronic communication from the “use-centric” view of teenagers who are indifferent to the underlying technology supporting this communication.

The study conducted by Okuyama and Iwai (2011) found that deaf high school students use texting for different purposes than do their hearing counterparts. Difficulties associated with the language of technology-mediated communication are identified in the deaf student data. The purpose of Okuyama’s (2013) article is “to explore textism in English as adopted by American deaf adolescents, examining its features and social function within the under-represented population of deaf teens in growing research on texting. This case study collected a corpus of 370 text messages exchanged via cell phone between a high-school pair at a US residential school. The messages indicated that the deaf adolescents adopted various characteristics of textism used by the English-speaking hearing adolescents studied by other researchers. However, the corpus also showed incidents of characteristics unique to the deaf teens’ texting, such as structural transfer from sign language.”

Also, the study by Okuyama (2014) investigated how texting was used by deaf adolescents in Japan. A small corpus of dyadic messages exchanged via cell phone between 2 deaf high-school students at a residential school was collected to examine the features of unconventional spellings typically used in text messages, or “textisms.” The study found that in the pair’s 356 messages, the deaf adolescents adopted characteristics of textisms very similar to those used by the hearing adolescents studied by other researchers on Japanese mobile communication.

It is important to determine the level of literacy skills of deaf and hard of hearing people in electronic form. That is, whether their literacy skills in electronic form are at the level of communication or language competence and whether they are identical to the standard (“paper-pencil”) form.

The aim of this paper was to examine the literacy skills of deaf and hard of hearing people in electronic form writing and to compare these skills in relation to standard (“paper-pencil”) writing.

## METHODS

### The sample of respondents

The sample included 50 deaf and hard-of-hearing students. The research was conducted by primary (46%) and secondary school students (54%), both genders (36% male and 64% female) (Table 1), aged from 12 to 20 years. The conditions for selecting the sample were: hearing loss above 80 dB, prelingual hearing loss, students having basic literacy to be able to answer questions by writing, and students using email.

Table 1. The sample of respondents

Simple		Gender				School			
		Male		Female		Elementary		High	
Total	%	f	%	f	%	f	%	f	%
50	100.0	18	36.0	32	64.0	23	46.0	27	54.0

### Measuring instrument and research conducting manner

To examine the written communication of deaf and hard of hearing students, that is to say, to determine the possible differences in writing communication by standard (“paper-pencil”) or electronic forms, was used the *Questionnaire for determining basic electronic literacy*, which consisted of 15 simple questions about the student’s everyday life. Questions: Say your name. How old and what grade are you? What is the name of the place where you live? Who are your family members? What are your mother’s and father’s names? If you have siblings, what are their names? If you have a house, what does it look like? What do you usually do at home? If you have a pet, what is it and what is its name? What do you like to eat? What clothes do you wear most often? What interests you most at school? Which subjects do you like the most at school? What would you like to do when you finish school? Who do you hang out with the most?

Based on the answers to the questions, it was possible to determine the basic knowledge of syntax, dictionary, and the correctness of writing. Variables used: correct response, vocabulary, and spelling mistakes, i.e., substitution, omission, addition, and metathesis.

The test was performed at two different time intervals and in two different forms.

For the first time, respondents received a questionnaire containing 15 questions in standard (“paper-pencil”) form to which they had to give answers in writing, for 30 minutes. The examination was repeated after 15 days, in order for the students to forget the questions.

The second time, questionnaires were sent to them through e-mail, in electronic form. Also, they were given 30 minutes to answer the questions and return the email to the examiners.

### Data processing

Data were processed by descriptive analysis. Frequencies, percentages, and descriptive statistical parameters (minimum, maximum, mean, and standard deviation) were calculated. To test the differences between the results of standard and electronic writing *t*-test was used. SPSS for Windows was used to process data.

## RESULTS AND DISCUSSION

In Table 2 the total representation of results for the examined variables is presented.

There is a higher overall prevalence of correct answers in standard writing (645) compared to electronic writing (636), as well as a lower total number of errors in writing (substitution, omission, addition, and metathesis), which indicates favorable results of standard writing. More favorable results of electronic writing in relation to the standard are expressed in the total volume of vocabulary, where deaf and hard of hearing respondents wrote a total of 2678 words in standard writing, in answers to questions, and 2874 words in the e-mail.

Table 2. Frequency of variables

Writing	Correct answers	Vocabulary	Substitution	Omission	Addition	Metathesis
Standard	645	2678	300	189	27	17
Electronic	636	2874	339	255	51	25

Descriptive statistical parameters are presented in Table 3. There are discrepancies in the results of two ways of writing for deaf and hard-of-hearing students. That is, more favorable results were confirmed in favor of standard writing compared to electronic writing on all variables except for vocabulary. The mean for correct answers, with the corresponding standard deviations, in standard writing, was  $12.90 \pm 1.92$ , and electronic  $12.72 \pm 2.917$ , for words in standard

writing  $53.56 \pm 24.60$ , and electronic  $57.48 \pm 26.83$ . The mean for substitutions, with the corresponding standard deviations, in the standard letter was  $6.00 \pm 4.42$ , and electronic  $6.78 \pm 4.39$ , for omissions in the standard letter  $3.78 \pm 2.44$ , and electronic  $5.10 \pm 4.80$ , for additions in standard writing  $.54 \pm .79$ , and in electronic writing  $1.02 \pm 1.29$  and for metathesis  $.34 \pm .56$ , and in electronic writing  $.50 \pm .79$ .

Table 3. Descriptive statistical parameters of variables

Variables	Writing forms	Min	Max	M	SD
Correct answers	Standard	6	15	12.90	1.92
	Electronic	5	15	12.72	2.17
Vocabulary	Standard	18	107	53.56	24.60
	Electronic	7	118	57.48	26.83
Substitution	Standard	0	16	6.00	4.42
	Electronic	0	14	6.78	4.39
Omission	Standard	0	9	3.78	2.44
	Electronic	0	17	5.10	4.80
Addition	Standard	0	3	.54	.79
	Electronic	0	4	1.02	1.29
Metathesis	Standard	0	2	.34	.56
	Electronic	0	3	.50	.79

The influence of the writing form of deaf and hard-of-hearing students on the results of the examined variables was assessed by *t*-test.

Statistically significant differences were found for the variables vocabulary, omission, and substitution.

Table 4. T-test results

Variables	M	SD	SE	t	df	p
Correct answers	.18	1.64	.23	.78	49	.44
Vocabulary	-3.92	12.34	1.74	-2.25	49	.03
Substitution	-.78	3.13	.44	-1.76	49	.08
Omission	-1.32	3.89	.55	-2.40	49	.02
Addition	-.48	1.43	.20	-2.37	49	.02
Metathesis	-.16	.65	.09	-1.74	49	.09

The reasons for the favorable results on most variables in favor of standard writing may be different. These can be the way of mastering writing (students in school primarily learn to write by standard, not electronic

writing), speed of writing during text writing, writing practice, better visibility, and the possibility of continuous monitoring of text written by standard writing on paper and the like.

According to Bowe (2002, p.6), “most important for educators is that strong reading and writing skills are essential if adults who are deaf or hard of hearing are to take advantage of today’s communications technologies.” It is important that there is also communication competence, and especially better language competence expressed in electronic form. Communication competence is sufficient for simple, everyday activities. More complex activities, such as education, studying, or doing business, require language competence for electronic expression.

In addition to convenience and motivational factors, several studies (Akamatsu et al., 2005; Bowe, 2002; Henderson et al., 2005; Henderson-Summet et al., 2007; Okuyama & Iwai, 2011, according to Maiorana-Basas & Pagliaro, 2014) discussed the importance of strong literacy skills in using text-based technologies. Unfortunately, none of the studies investigated the effect of these technologies on literacy development among individuals who are DHH.

The aim of the research conducted by Salikic, Hasanbegovic, and Svraka (2018) was to examine the communication and linguistic competence of a meaningful understanding of the written communication form of deaf persons. Deaf subjects were divided into two groups. One group wrote letters to another group, with the standard form of writing, on a topic of free choice, and the other group responded to the letter. After these correspondences, the letters were analyzed in a way to search for an understanding of the content. The letters were agrammatic with a large number of omitted letters and syntactically difficult to understand. However, children who are deaf, perfectly-recognized the context and responded to letters with understanding. The results of the research showed that the deaf respondents have communication, but not linguistic competence in the written form of communication.

The aim of the second research, by the same authors (2019), was to examine the linguistic structure of the written form of communication for deaf children through the use of simple and complex written sentences, questions asked and answers to questions asked, as well as the extent of the used statements and messages in the form of expression. The research results have shown that the questions were not grammatically correct but the respondents understood their essence and adequately responded to them, that although sentences were not linguistically properly written, deaf children can use the dialogue in written communication, that the respondents have problems in writing complex sentences but that there is a possibility of using complex sentences.

Similar types of research need to be conducted using electronic writing, to determine the electronic language competence of deaf and hard of hearing people.

Hasanbegovic (2012) tested the success of typing and text understanding in deaf children. The success was tested with two computer fonts. The research points out that deaf children make mistakes in writing/typing and also they have problems with understanding standard letters/fonts.

Teaching how to write with the help of computer technology can play a significant role in the development of electronic literacy - electronic linguistic competence.

The aim of the research conducted by Hasanbegovic and Mahmutovic (2014) was to determine the development of syntax in the language development of children who are deaf or hard of hearing, who are taught new linguistic features with the help of computers. It was found that the computer program significantly contributes to the development of syntax.

Also, based on the research conducted by Mahmutovic, Hasanbegovic, and Powlakic Hadziefendic (2018), it can be concluded that there is a statistically significant difference in the implementation of diagnostic procedures when evaluating reading and writing, in favor of the application diagnostic software, in comparison to the classic evaluation method. Applied software-based diagnostics, both theoretically and in practical terms, provide a more efficient and effective way of implementing diagnostic procedures for evaluating speech-language development than classical (“paper-pencil”) estimation methods.

All of the above indicates that knowledge of communication and language electronic competence, and knowledge of the impact of computer technology on their development, can enable the development of special educational and rehabilitation programs and software for training deaf and hard of hearing people for electronic communication, as well as programs for its evaluation.

## CONCLUSION

This paper presents preliminary research on the literacy skills of deaf and hard of hearing people in electronic form (electronic communication) and a comparison of this skill in relation to standard (“paper-pencil”) writing. More favorable results were obtained in favor of standard writing compared to electronic writing on all variables except for vocabulary. The reasons for the favorable results in favor of standard writing may be different. These can be the way of mastering writing (students in school primarily learn to write by standard, not electronic writing), speed of writing during text writing, writing practice, better visibility, and the possibility of continuous monitoring of text written by standard writing on paper and the like.

It is important that there is also communication competence, and especially better language competence expressed in electronic form. Communication competence is sufficient for simple, everyday activities. More complex activities, such as education, studying, or doing business, require language competence for electronic expression.

Knowledge of communication and language electronic competence, and the effect of computer technology on their development, can enable the development of special educational and rehabilitation programs and software for training deaf and hard of hearing people for electronic communication, as well as programs/software for its evaluation.

Through the detailed analysis of written content, in future researches, it is necessary to determine the level of literacy skills of deaf and hard of hearing people in electronic form. That is, whether their literacy skills in electronic form are at the level of communication or language competence and whether they are identical to the standard (“paper-pencil”) form. In addition, it is important to determine the impact of computer technology on the development of literacy among people who are deaf and hard of hearing.

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