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The Relationship Between Applied Phonological Disorder Treatment Approaches and Evidence-based Speech and language Therapy Practice

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VILNIAUS UNIVERSITETAS
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Taikomų fonologinio sutrikimo įveikimo strategijų ir įrodymais grįstos logopedinės praktikos sąsajos

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INTRODUCTION

Relevance and significance of the research. Speech sound (phonetic and phonological) disorders are the most common disorders in pre-school (10–15%) and school age (6%) children (Enderby et al., 2009; McLeod, Harrison, 2009; Lof, 2011, 2015). Children with speech sound disorders constitute the largest group of individuals who receive support of a speech and language therapists (McLeod, Harrison, 2009; American Speech-Language-Hearing Association, 2010; McLeod and Baker 2017; Cabbage, DeVeney, 2020; Ireland, McLeod, Farquharson, Crowe, 2020). Children of this group are characteristic of various difficulties that may have influence on comprehension of their speech: articulation (motor production of speech), perception, phonological representation, phonotactics, prosody etc. (International Expert Panel on Multilingual Children’s Speech, 2012). In the international context, an obvious progress in research on speech sound disorders of children in English is observed (Roddam, McCurtin, Murphy, 2019; Baker, McLeod, 2011b). Despite that, research studies still too little emphasise the effect of evidence-based speech and language therapy or highlight specific characteristics of other language groups (e.g. Baltic, Slavic, Finno-Ugric etc.) in treating phonological speech sound disorders. There are not many other research works on models of errors done by children with phonological disorders: Icelandic (Másdóttir, Bergs, 2022), Spanish (Pavez, Coloma, 2016), Turkish (Topbas, 2006), German (Fox, Dodd, 2001). Because of this gap in inter-linguistic research, it remains unclear how differential features of the phonological disorder or treatment strategies basically grounded on the English language are applied in populations speaking other languages.

Similar tendencies are noticed in the national context, too. Increasing numbers of children with speech and language disorders are observed in education institutions of Lithuania. Referring to the

official statistics, school students with speech sound disorders¹ constituted 18,864 disorders, including 6,904 with phonetic disorders, 11,924 with phonological disorders in academic year 2020–2021² (Lietuvos statistikos departamentas, 2021). Typically, in our country, children only with the phonological disorder are qualified by an education institution's (school, nursery-kindergarten) commission of child welfare as having mild special educational needs (SEN). Still, there is no unified register of school students with SEN in Lithuania (for instance, in some regions/ municipalities of Lithuania, only data on children having diagnosis of assessment conducted by pedagogical and psychological/ educational support services is included in the school student register). Therefore, an assumption can be drawn that a number of children with phonological disorders can be actually much higher than the official data reveals.

Moreover, relevance of this topic is substantiated by the situation of the recent decade of intensive search for common definitions of speech and language disorders throughout the European Union countries (Dokoza et al., 2015) and the concept of the discussed professional activities (NetQues, 2013). According to the NetQues project data, the terminology of speech and language disorders used in many countries is related to the sector where speech and language therapists work, i.e. health or education sectors (Dokoza et al., 2016).

Successful treatment of a disorder starts from identification of a disorder. Assessment of speech and language abilities and setting of

¹ Students attending pre-school and pre-primary education groups, primary forms and forms 5–12 or high school (gymnasium) forms 1–4.

² It is important to note that Lithuanian *Descriptor of Classifications of Groups of Special Educational Needs*, which is referred to when identifying speech and language disorders in our country, attributes deficits of pronunciation of sounds based on phonemic awareness and (or) lack of articulatory imaging to the group of phonological disorders because it complies with an idea that speech sound disorders of motor origin, i.e. phonemic articulatory, hypertonic, hypotonic or mixed dysarthria, organic hypernasality) can manifest not only at a phonetic but also at a phonological level (Kairienė, Daniutė, 2015). Official documents do not display exact data on every speech sound disorder (including phonemic acoustic dyslalia).

precise speech and language therapy conclusions (in this case, of a group of speech sound disorder in children) are inseparable from knowledge on differential features allowing characterisation of a disorder. Differential diagnostics provides preconditions for choosing and applying a proper theoretical approach to treating disorders, and it is the basis for therapies and strategies which often determine effectiveness of speech and language therapy (Dodd, McCormack, 2005; Strand, McCauley, 2008). Usually, strategies to treating children's speech sound disorders are divided into two approaches / groups (Oliveira, Lousada, Jesus, 2014; 2015; McLeod, Baker, 2017): based on motor learning³ and based on phonological learning⁴. Each approach encompasses particular strategies based on therapies. According to Baker, McLeod (2011b), scientific literature may present over 46 strategies for treating speech sound disorders of English-speaking children. As such diversity of strategies is available, practitioners face quite an important challenge of choice for specific cases of speech sound disorders in children.

International research on speech and language disorder, including those related to the phonological disorder, are being carried out on various continents and in various countries: the USA (Brumbaugh, Smit, 2013), the Netherlands (Priester, Post, Goorhuis-Brouwer, 2009; Diepeveen, Haaften, Terband, Swart, Maassen, 2020), the UK (Joffe, Pring, 2008; Hegarty, Titterton, McLeod, Taggart, 2018), Portugal (Lousada et al., 2013; Oliveira, Lousada, Jesus, 2015), Australia (McLeod, Baker, 2004; Williams, McLeod, 2012; Baker, McLeod, 2014; Furlong et al., 2021), Honk Kong (To, Law, Cheung, 2012) and South Africa (Pascoe et al., 2010) etc. Also, research works of a similar kind have been conducted and are being conducted on other speech and language disorders: COSTA project on developmental

³ The concepts *motor learning approach*, *approach based on motor learning* and *motor-based approach* were used synonymously in this dissertation thesis.

⁴ The concepts *phonological learning approach*, *approach based on phonological learning*, *phonologically-based approach* and *cognitive-linguistic approach* were used synonymously in this dissertation thesis.

language disorder / DLD (Law et al., 2019); international survey of speech and language therapists (carried out in three countries: Estonia, Lithuania and Finland) that aims at revealing differential features of children's speech dyspraxia (Lahteinen, 2022) as well as survey of speech and language therapists in Australia and New Zealand that aims at disclosing features of treating children's speech dyspraxia (Gomez, McCabe, Purcell, 2019) etc.

Analysis of Lithuanian statistical data and increasing need for speech and language therapy in case of the phonological disorder as well as analysis of scientific research conducted in the international context and theoretical approaches to treating the disorder, strategies and evidence-based speech and language therapy practice show relevance of this topic. Nevertheless, it is little and fragmentarily investigated in Lithuania. Only two research works on the phonological disorder based on the qualitative approach (semi-structured interview, analysis of school documents and student's written works) were found in our country. Linkevič (2018) revealed experience of speech and language therapists who took part in the research identifying the phonological disorder in school age children. In the second research aiming to disclose manifestation of phonological disorders in spoken and written language of school age children, 150 documents on primary form students of that school, i.e. forms for speech and language assessment results and dictations (written texts), have been analysed (Saročkienė, 2016). No research studies based on quantitative approach were found neither on the concept of the phonological disorder nor on diversity of speech and language therapy support seeking to treat the phonological disorder and analysing interrelations between children's speech sound disorders and evidence-based practice. This doctoral research is the first investigation in Lithuania that reveals correlations between phonological disorder and evidence-based practice.

Over recent two decades, evidence-based practice is increasingly becoming a more relevant topic in education and other areas (management, politics etc.). The process of evidence-based education

in the area of education science is analysed in various countries (Geležinienė, 2010, p. 59). Speech and language therapy is not an exception. International documents (ASHA⁵, CASLPA⁶, ESLA⁷, IALP⁸, SPA⁹) describe the profession of a speech and language therapist¹⁰ as an autonomous, interdisciplinary, based on science profession which is close to education, biomedicine, linguistics, psychology. The concept of ‘evidence-based practice’ (EBP) used in speech and language therapy derives from another related concept ‘evidence-based medicine’ (EBM).

It is obvious that the interest of researchers in evidence-based practice of speech and language therapy in professional community

⁵ Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association. (2018). *2020 Standards for the Certificate of Clinical Competence in Speech-Language Pathology*. Accessed via the Internet at: www.asha.org/certification/2020-SLP-Certification-Standards.

American Speech-Language-Hearing Association. (2016). *Scope of practice in speech-language pathology*. Accessed via the Internet at: <https://www.asha.org/policy/sp2016-00343/>.

⁶ Canadian Association of Speech-language Pathologists and Audiologist (2016). *Scope of Practice for Speech-Language Pathology*. Accessed via the Internet at: https://www.sac-oac.ca/sites/default/files/resources/scope_of_practice_speech-language_pathology_en.pdf

⁷ European Speech and Language Therapy Association (2019). *SLT Profession Profile*. Accessed via the Internet at: <https://eslaeurope.eu/wp-content/uploads/2021/06/ESLA-Statement-on-SLT-Professional-Profile.pdf>

⁸ International Association of Logopedics and Phoniatrics Education Committee. (2010). IALP Guidelines for initial education in speech-language pathology. *Folia Phoniatrix Logopaedica*, 62(5), 210-216. doi: 10.1159/000314782. PMID: 20653111.

⁹ Speech Pathology Australia. (2015). *Scope of practice in speech pathology*. Accessed via the Internet at: <http://www.speechpathologyaustralia.org.au/library/20150720%20-%20Scope%20of%20Practice%20-%20FINAL.pdf>

¹⁰ Speech and language therapists in Lithuania and throughout the world work not only in the education, but also in the health care sectors. In our country, those who want to work as specialists in health care institutions (early child rehabilitation centres, child rehabilitation sanatoria, clinics etc.) currently must attend an additional course on *logotherapy / clinical speech and language therapy* which is organised in largest university hospitals of the country. After graduation from this course, the qualification of a logotherapist / clinical speech and language therapist is awarded, a seal number and the right to work in the health care system are received.

increases: numbers of research studies related to evidence-based practice, application of it rapidly grow (Roddam, McCurtin, Murphy, 2019; Roddam, 2016; Lemincello, Hess, 2013; McCurtin, Roddam, 2012; Roddam, Skeat, 2010; Ivoškuvienė, Makauskienė, 2012; Lof, 2011; Justice, 2010; Bowen, 2008, 2006; Dodd, 2007; Gillam, Gillam, 2006; Johson, 2006; Zipoli, Kennedy, 2005; Kalf, 2003). The development of evidence-based practice was prompted by rapidly increasing abundance of knowledge and information sources whose reliability sometimes is doubtful, also by the need to pay for provided services, assurance of quality of educational services, increasing diversity of support methods and relevance of research on efficiency of interventions (Ivoškuvienė, Makauskienė, 2012; 2018).

Experts of speech and language therapy have also acknowledged importance of evidence-based practice. The American Speech-Language-Hearing Association (ASHA) approved the “Report of the Joint Coordinating Committee on Evidence-Based Practice” back in 2004. The professional body of SLTs in the UK, RCSLT, as far back as in 2005 underlined importance of evidence-based practice in the clinical guidelines for the speech and language therapy profession (RCSLT Clinical Guidelines, 2005). The Academy of Neurologic Communication Disorders and Sciences (ANCDs) carried out dissemination of evidence-based practice in the field of neurologic communication disorders, i.e. prepared methodological guidelines for treating these disorders (cit. Dodd, 2007, p. 6). The European umbrella organisation for speech and language therapy associations, ESLA (earlier CPOOL), also supports evidence-based practice and conducting of high-quality research to substantiate regular practice. The SLT Profession Profile (2019) underlines that “when making decisions, speech and language therapists must apply principles of evidence-based practice. These encompass integration of professional experience, personal and one’s family wishes and expectations as well evidence of best performed research”. The Lithuanian SLT Profession

Profile ¹¹ (2019) also mentions aspects of evidence-based practice, i.e. when planning and providing speech and language therapy, needs and opinion of that person and one's relatives, selection and application of specific, evidence-based speech and language as well as critical assessment of them are underlined.

It is recommended to comply with the evidence-based practice principles when making various decisions, including prevention, assessment, treatment and management of disorders. However, evidence-based practice is applied most broadly in treating speech and language disorders, assessment of its efficiency (Lemoncello, Hess, 2013). This means that, when making decisions related to differentiation, identification of and (or) treating speech and language disorders, speech and language therapists should ground on main principles of evidence-based practice. Traditionally, evidence-based practice is related to scientific evidence, practical experience and needs and values of a child and one's family (McCurtin, Roddam, 2012; Roddam, 2016; Ivoškuvienė, Makauskienė, 2012, 2019; Roddam, McCurtin, Murphy, 2019). When dealing with speech and language therapists' decisions on speech and language therapy, selection of treatment strategies, perhaps most often it is identified with scientific research (evidence). In other words, application of various therapy strategies is based on results of scientific research. However, it is a partly errant opinion because even if high quality research helps to make a general decision concerning a particular intervention, other factors, such as needs and values of a child and one's family, practical experience, also play an important role (Kamhi, 2006b).

A traditional model of evidence-based practice was supplemented with the context of professional performance. The latter is treated as important and having influence on the change of practice.

¹¹ Order on Approval of the Profession Profile for the Education Sector and Library Performance, p. 49. Descriptor of the Qualification of a Speech and Language Therapist, Levels 6 and 7. 19 July 2019, No. V1-143, Vilnius.

Factors that are related to the context reflect responsibility of a child and one's family, contribution to speech and language therapy and pragmatic aspects, such as resources, expenses, accessibility, politics etc. (Elwyn, Frosch, Kobrin, 2015).

Grounding on an updated model of evidence-based practice (McCurtin, Clifford, 2015; Clifford et al., 2017; Erickson et al., 2018), such practice should encompass four components: evidence of scientific research, evidence of specialists' experiences and practice, evidence related to a child and what can be called context-related evidence.

Novelty of the present doctoral research is based on the aim to find out which factors of evidence-based practice (evidence) determine decisions of speech and language therapists concerning application of strategies to treat the phonological disorder. The research is related to the need to better understand the effect of evidence-based practice in decision-making by speech and language therapists (Roddam, 2015, p. 32). Only few research works of a similar kind were found in scientific data bases. One of them is research conducted by Selin, Rice, Girolamo, Wang (2019) aiming to discover how speech and language therapists apply results of scientific research when providing support to children with developmental language disorder. McCurtin, Clifford (2015), McCurtin, Healy, (2017) profoundly investigated strategies/therapies and techniques applied to treat dysphagia and sought to identify the factors that are the basis for decisions made by speech and language therapists while choosing treatment selections in dysphagia practice. Other research works usually investigate attitudes of speech and language specialists or specialists of other fields to evidence-based practice, competencies (knowledge, understanding, skills) and occurring challenges: speech and language therapists (Zipoli, Kennedy, 2005; Stephens, Upton, 2012; Thome, 2018; Fulcher-Rood, Castilla-Earls, Higginbotham, 2020; Thome, Loveall, Enderson, 2020; Greenwell, Walsh, 2021), speech and language specialists and audiologists (Alhaidary, 2019), nurses (Šiaudvytė, Mockienė, Skarbalienė, 2018), social workers

(Rice, Hwang, Abrefa-Gyan, Powell, 2010), psychologists and psychologists-to-be (Rye et al., 2017), physical therapists (AlKetbi, Hegazy, Alnaqbi, Shousha, 2021) etc. An increasing attention from scholars shows that the conception of evidence-based practice is becoming a highly important object of scientific research, which is still finding its place in scientific discourse of speech and language therapy.

This doctoral research is unique in its goal to reveal correlations between applied strategies for treating the phonological disorder and evidence-based practice of speech and language therapy, the systemic approach is maintained. Differential features of the phonological disorder and their characteristics, treatment strategies applied by speech and language therapists as well as contents and context of evidence-based practice of speech and language therapy encompassing results of scientific research, needs and expectations of a child and one's family, professional and practical experiences of speech and language specialists, context of performance are analysed.

Substantiation of the scientific problem of the research and level of its investigation. The scientific problem of the research is proven by research on children's speech sound disorders (including the phonological disorder) conducted over the latter five years and based on various scientific methodological approaches (Arabi, Jalilevand, Marefati, 2017; Randolph, 2017; Cummings, 2018; Etim, Dada, Bassey; 2018; Hegarty, Titterington, McLeod, Taggart, 2018; Lee, 2018; Jesus et al., 2019; Roepke, Greenwell, Brosseau-Lapr e, 2019; Cabbage, DeVeney, 2020; Ireland, McLeod, Farquharson, Furlong, 2020; Morris, Serry, Erickson, 2021; Nilsson, Nyberg, 2021; Str mbergsson Siemons-L hring, 2021). Scientific significance of the problems of children's speech sound disorders, their identification and treating them are substantiated in research on speech and language therapy carried out by Baker, Williams, McLeod, McCauley (2018) proposing a designed taxonomy of phonological intervention as well as systematic and narrative reviews of peer-reviewed papers published by foreign scholars: Baker, McLeod (2011a; 2011b) carried out a

narrative review of 134 publications from 1979 to 2009; Wren, Harding, Goldbart, Roulstone (2018) carried out a systematic review of 26 articles published by 2012 on interventions of pre-school age (2–5 years) children’s speech sound disorders meeting sampling criteria.

Moreover, the research on efficiency and effectiveness of speech and language therapy are becoming increasingly more relevant (Gillon, 2000, 2018; Williams, 2000a, 2000b; Law, Garrett, Nye, 2004; Law et al., 2012; Denne et al., 2005; Lass, Pannbacker, 2008; Peter, 2011; Allen, 2013 et al.; Lousada et al., 2013 etc.). Researchers of speech and language therapy (Joffe, 2008; Baker, McLeod, 2011a; Bessas, Trimmis, 2016) emphasise that it is important to know more on what intervention strategies are effective in various cases of speech sound disorders and to create as strong base of scientific evidence for a selected evidence as possible.

Scholarly questions related to treating speech and language disorders and application of strategies in practice are being asked for over two decades: *What theoretical/ evidence-based strategies are applied by speech and language therapists?*, *What is the substantiation of a particular chosen strategy?* *Which strategies applied in practice are the most efficient and effective?* and many other similar questions (Pring, 2004; Bowen, 2008; Schmit, Justice 2012; McCurtin, Clifford, 2015; Wren et al., 2018 etc.).

The present doctoral research contributes to scholarly acquaintance with a phonological disorder and scientific substantiation of treating this disorder. Moreover, the empirical research reveals specificity of the Lithuanian language as one of the languages attributed to the branch of Baltic languages in the case of the phonological disorder, thus supplementing scientific evidence already existing in the international database.

The essence of the scientific problem of the doctoral research **consists of the following questions:**

- What is the theoretical concept of the phonological disorder, what differential features and characteristics are attributed to the phonological disorder in national and international contexts?
- What theoretical provisions are referred to by child speech sound disorder treatment? What are possible approaches to phonological disorder treatment?
- What components form a theoretical model of evidence-based practice?
- What practice of phonological disorder treatment dominates when applying speech and language therapy? What is the scientific substantiation and effectiveness of applied approaches?
- What is the structure and manifestation of the concept of the phonological disorder dominating in activities of a speech and language therapist?
- What is the structure and manifestation of evidence-based practice dominating in activities of a speech and language therapist?
- Does the applied evidence-based practice of speech and language therapy influence application of chosen more effective phonological disorder treatment approaches? What factors determine decisions of speech and language therapists choosing phonological disorder treatment approaches? How are these factors related to evidence-based speech and language therapy?

Hypothesis:

1. In terms of the concept of the phonological disorder, speech and language therapists usually emphasise features related to difficulties of the phonological awareness, more rarely they underline alterations in motor skills of speech.
2. When making decisions concerning choice of phonological disorder treatment approaches, speech and language therapists tend to refer to their and colleagues' professional experience and

individual needs of a child, one's family as well as values and expectations rather than scientific research data or the context of professional activities.

3. Speech and language therapists who demonstrate lower manifestation of scientific evidence (research) in their performance, more often apply treatment approaches that are based on motor learning. Approaches based on phonological learning are more often applied by these speech and language therapists whose performance involves higher manifestation of scientific evidence.

The hypotheses were formulated on the ground of research conducted by scientists: *hypothesis No.1* (Gillon, 2018; Bowen, 2015, 2009; Girona, Fabus, 2011; Lof, 2011; Garšvienė, Juškienė, 2008; Garšvienė, Ivoškuvienė, 2003 etc.); *hypothesis No. 2* (Baker, McLeod, 2004; 2011a, 2011b; Kamhi, 2006a; McLeod, Baker, 2016 etc.); *hypothesis No. 3* (McCurtin, Healy, 2017; McCurtin, Clifford, 2015).

The research object – relationship between applied phonological disorder treatment approaches and evidence-based practice of speech and language therapy.

The doctoral research aim – to reveal the relationships between applied phonological disorder treatment approaches and manifestation of evidence-based practice of speech and language therapy.

To reach the research aim, the following objectives have been set:

1. To reveal the theoretical concept, differential features, characteristics of the phonological disorder in international and national contexts.
2. To reveal diversity of theoretical approaches, phonological intervention approaches of speech sound disorder treatment and theoretical aspects of evidence-based practice of speech and language therapy.

3. To design and substantiate a theoretical model of phonological disorder treatment approaches and strategies.
4. To reveal practice applied by speech and language therapists for phonological disorder treatment, including the most frequently applied approaches, context and intensity of provided support.
5. To identify structural components of the concept of the phonological disorder, manifestation of them and their correlation with practice of treatment approaches applied by speech and language therapists.
6. To reveal the structure and manifestation of evidence-based practice of speech and language therapy that dominates in speech and language therapists' practical activities.
7. To identify the correlation and character between phonological disorder treatment approaches applied by speech and language therapists and manifestation of evidence-based practice of speech and language therapy.

The following conceptions, theories and provisions have been employed for interpretation of the research results:

- The research is based on *provisions of the positivist paradigm*. Positivism grounds on the ontology of objective and determinist ontology and possibility of an objective research process (Poviliūnas, 2010; Creswell, 2008). Researchers following this approach usually apply quantitative (deductive) research approach (Taylor, Medina, 2011) and declare that when aiming to investigate a particular field of phenomena one needs to raise a hypothesis grounding on partly known but perhaps imprecise and incomprehensive facts on correlations among these facts or explaining these correlations (Nekrašas, 2010, p. 89). Application of quantitative research methods provides an opportunity to quickly perform large-scale measurement while retaining confidentiality and anonymity of research participants, to objectively analyse data and to clearly present research results (Denscombe, 2010). Conclusions of this research are formulated

on the basis of quantitative analysis of the data from the written survey of speech and language therapists by applying methods of statistical analysis and not by employing subjective insights. Philosophical origination of evidence-based practice reaches as far back as even the middle of the nineteenth century (Mead, 2000, cit. McCurtin, Roddam, 2012, p. 12) and is inseparable from a French philosopher and sociologist A. Comte who is called the originator of positivism and evidence-based education (Kardelis, 2017). Even though efficiency and effectiveness is not the doctoral research object and aim in the present thesis, the approach is maintained that professional performance of speech and language therapists should be based on scientific research (evidence), including effective strategies that are applied for treating the disorder.

- In case when a research focuses on the decision making, a researcher can use an opportunity to apply hypothetical or generalised knowledge and ground on the *position of pragmatism* (Žydžiūnaitė, Sabaliauskas, 2017, p. 42). Morgan (2007) introduced pragmatism as an alternative to positivism. Pragmatism eliminates boundaries between positivism and constructivism as well as creates a link between them when trying to find out what is meaningful in both of them (Shannon-Baker, 2016). The philosophical theory of pragmatism underlines experience and acknowledges it to be the most important and decisive factor when perceiving the world and planning the future (Morgan, 2007; Dewey, 1997). Complying to this approach, decisions that are made by speech and language therapists concerning usefulness of a strategy for treating children's phonological disorder should be assessed with regard to whether they prove to fit ("work") in practice. In other words, when providing speech and language therapy, attention is focused on solution of a problem (Creswell, 2009), the pragmatic goal to achieve, i.e. as high effect over as short time as possible. It is highly relevant today, when the political focus is laid on

assurance of highest quality services in terms of best price and quality ratio¹². Moreover, this work does not aim at deep exploration of social or other circumstances (social, political etc. contexts remain at the background).

- *Evidence-based practice paradigm.* Evidence-based practice is an objective, balanced and responsible use of scientific research and high quality available data that helps to make political and practical decisions aiming at “better” results for service receivers¹³. The evidence-based practice paradigm was initially applied in health care¹⁴ sciences; later, in around 2000 (Dollaghan, 2007), it spread to other areas, such as education, management, politics etc. (Shortell et al., 2001; Dodd, 2007; Johnson, 2007; Loff, 2011). In evidence-based performance, most of attention is paid to strategies of treating disorders seeking to prove their efficiency by empirical research and not only by professional experience or opinions of experts. The evidence-based approach encompasses continuous critical review of literature on scientific research seeking to find out what information is reliable and what political and practical decisions would be the most efficient with regard to the “best” available evidence. Also, it encompasses rigid assurance and assessment of quality. The use of the notion “evidence-based practice” means the following (Crime and Justice Institute at Community Resources for Justice, 2009): 1) it is a defined result(s); 2) it is measureable; and 3) it is defined according to practical realities. The evidence-based practice paradigm is more suitable for result-

¹² In present time of financial shortage, it is like never before important to pay more attention to standardisation of services for a person and one’s family aiming to increase the quality of services provided in entire country and (or) in particular organisations (Rodddam, 2016).

¹³ Crime and Justice Institute at Community Resources for Justice (2009). *Implementing Evidence-Based Policy and Practice in Community Corrections*, 2nd ed. Washington, DC: National Institute of Corrections.

¹⁴ Development and conception of evidence-based practice are analysed in detail in the theoretical chapter 3 of this doctoral thesis.

oriented disciplines where services are provided to people. According to representatives of speech and language therapy science (Kamhi, 2006b; Roddam, Skeat, 2010; McCurtin, Roddam, 2012; Ivoškuvienė, Makauskienė, 2012; Roddam, 2016), the philosophy and implementation of evidence-based practice are suitable for the profession of a speech and language therapist and meets requirements of practical work.

In this doctoral research, evidence-based practice of speech and language therapy is understood as a fair and deliberate process of decision making with regard to the best available scientific evidence from several sources. The followed point of view has it that the data of scientific research is interpreted with regard to own and other colleagues' professional experience, needs and expectations of a child and one's family as well as the context of professional performance. The research supports that there can never be too much of evidence (Guyatt, Busse, 2006). An essential assumption is to combine theory and practice seeking to avoid even bigger gap between scientific research and practice of speech and language therapy (Schlosser, 2003; Justice, Fey, 2004; Kalf, Roddam, 2012). Despite an increasing understanding about importance of evidence-based practice in the area of education sciences, an obvious gap between what was found out as effective in the course of research and what is applied and practiced by pedagogues¹⁵ in their daily performance (Mitchell, 2008, cit. Foster, 2014, p. 50).

Fig. 1 presents generalised coherence of theoretical provisions and researcher's position on provision of speech and language therapy to a child with the phonological disorder that are maintained in the doctoral research.

¹⁵ Presently, speech and language therapists are awarded Bachelor/ Master Degree in Education Sciences in Lithuania.

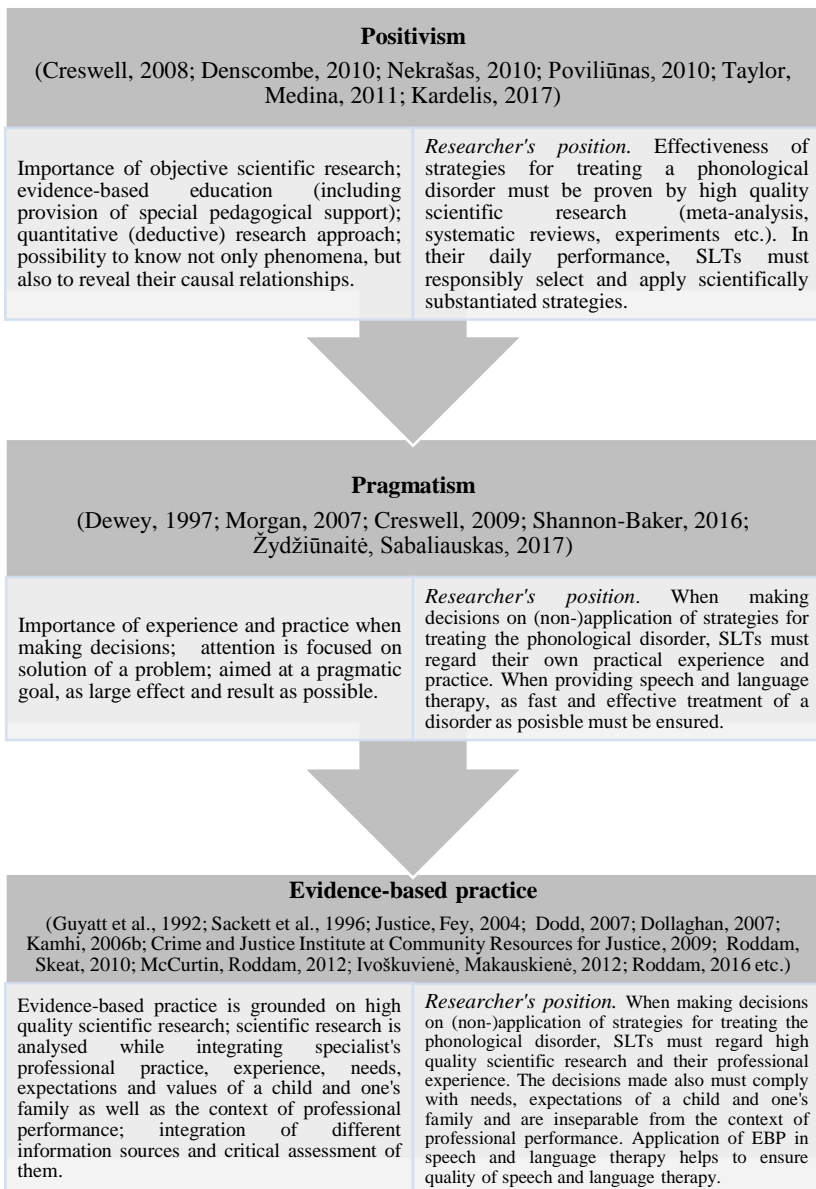


Fig. 1. Coherence of the theoretical provisions and researcher's position in the doctoral research

Scientific novelty and theoretical significance of the research:

- The concept of the phonological disorder as well as differential features and their characteristics were specified;
- The phonological intervention, i.e. approaches to and strategies for treating the phonological disorder applied by speech and language therapists, that was not investigated in Lithuania so far as well as the context and intensity were revealed;
- The theoretical model of approaches to and strategies for treating the phonological disorder was substantiated;
- Application of principles of evidence-based practice to treat speech sound disorders was emphasised;
- Effectiveness of strategies for treating the phonological disorder was substantiated from a point of view of evidence-based practice;
- Correlations among the understanding of differential features of the disorder, selected treatment strategies and evidence-based practice were identified.

Practical significance of the research: approaches to, strategies for treating children's phonological disorder and opportunities for applying them in practice were investigated and described highly in detail. Speech and language therapists, students of speech and language therapy will have a possibility to acquaint themselves with theoretical aspects and principles of evidence-based practice and opportunities for application of it to treat children's speech sound disorders. The research results are highly important for education of speech and language therapists and development of competencies. The presented empirically substantiated practical recommendations for speech and language therapists, educators of speech and language therapists, education policy-makers and others basically provide a possibility to review the model of provision of speech and language therapy and to ground practice of speech and language therapists on evidence-based strategies.

Steps of organisation of the doctoral research and stages of the empirical research. The doctoral research consisted of 6 steps of organisation of the research and 2 stages of the empirical research (see Table 1).

Table 1. *Process of the doctoral research*

Research steps, results, samples	Methods of data collection and processing	
<i>1. Theoretical analysis of scientific literature (in 2014–2017)</i>		
Theoretical analysis of the concept of children’s speech sound disorders, classifications.	<i>Theoretical analysis of scientific sources,</i>	
Revealing of the theoretical concept of a phonological speech sound disorder, its differential features and characteristics.		operationalisation,
Theoretical analysis of the concept, strategies based on phonological teaching and learning, possibilities for application of them and scientific substantiation seeking to treat children’s phonological disorders. Design of the theoretical model.		systematisation,
Analysis of the taxonomy of the phonological intervention		generalisation
Revealing theoretical aspects and principles of evidence-based practice of speech and language therapy. Design of the theoretical model.		
<i>2. Design of instruments for stage 1 and assurance of requirements of compliance with the research ethics (in 2016–2017)</i>		
Preparation of the research instrument (questionnaire for a written survey (open-ended questions) for experts) in Lithuanian and English.	Categorisation	
Planning of sampling criteria for research participants	Protocol of the research process	
Preparation of documents (ethics application form for conducting the research, checklist of data security, information sheet for research participants and an example of an e-mail letter-invitation to take part in the research) in English aiming to obtain the Ethics Permission to conduct research in the international context.		
Ethical approval of Šiauliai university Faculty of Education Sciences and Social Welfare, Department of Special education was obtained (<i>UMSG-27-11</i>)		
Ethical approval of the STEMH ethics committee at the University of Central Lancashire / UCLan was obtained (<i>UMSG-27-11</i>)		

Research steps, results, samples	Methods of data collection and processing
3. Stage 1 of the empirical research (exploratory research): analysis of diversity of practice of experienced speech and language therapists (in 2017 and 2019)	
Diversity of speech and language therapy for a child with the phonological disorder: national context <i>Research participants:</i> speech and language therapists of Lithuania who provide support to a child with the phonological disorder (N=14).	<i>Written survey of experts</i> (open-ended questions in Lithuanian and English)
Diversity of speech and language therapy for a child with the phonological disorder: international context (1) <i>Research participants:</i> speech and language therapists of the United Kingdom who provide support to a child with the phonological disorder (N=2).	Quantitative <i>content analysis</i> of the written survey
Diversity of speech and language therapy for a child with a phonological disorder: international context (2) <i>Research participants:</i> speech and language therapists of the United States of America (Nebraska) who provide support to a child with a phonological disorder (N=7).	
4. Design of the instrument for quantitative research (2019–2020)	
Design of the research instrument (e-questionnaire for speech and language therapists) on the basis of theoretical analysis of scientific sources, review of similar kind surveys conducted by foreign authors, data obtained from the exploratory (survey of experts) research, fragment of the questionnaire designed by McCurtin and Clifford (2015).	<i>Pilot research</i>
Pilot testing of the questionnaire (N=7)	
Design of the final version of the questionnaire by using the on-line platform https://www.surveymonkey.com/	
5. Stage 2 of the empirical research (quantitative research): correlations between the applied strategies for treating the phonological disorder and evidence-based practice of speech and language therapy (2020–2021)	
Features of a phonological disorder and manifestation of them. Context, intensity of speech and language therapy support. Strategies that are most often used to treat the phonological disorder. Structure and manifestation of evidence-based speech and language practice. Factors that determine decisions on selection of strategies for treating the phonological disorder. <i>Respondents:</i> speech and language therapists who provide support to a child with the phonological disorder (N=162).	<i>Questionnaire-based survey</i> <i>Statistical (quantitative) data analysis</i>
6. Generalisation of the research data (2021)	
Generalisation of the research results, preparation of conclusions, recommendations, scientific discussion, comments on limitations of the research.	<i>Theoretical interpretation of the research data</i>

Structure and volume of the doctoral thesis. The thesis comprises: glossary of the most important notions, abbreviations, introduction, 6 chapters (parts), scientific discussion, limitations of the research and guidelines for further research, conclusions, recommendations, list of references (402 sources), annexes.

The research data is illustrated by 129 tables (80 of them are presented in the doctoral dissertation, 49 – in the annexes) and 22 figures. The volume of the thesis is 516 pages.

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 - 1.1. Concept and Classification of Children's Speech Sound Disorders
 - 1.2. Phonological-based speech sound disorder
 - 1.3. Differential Features of the Phonological Disorder and Their Characteristics
2. THEORETICAL MODELS OF TREATING THE PHONOLOGICAL DISORDER
 - 2.1. Theoretical Approaches to Treating Speech Sound Disorders
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- 4.4. Procedures of Construction and the Structure of the Research Instruments
 - 4.4.1. Construction and the Structure of the Written Survey (Open-Ended Questions) for Experts
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- 4.5. Research Participants
 - 4.5.1. Sampling and Characteristics of Experts
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5. DIVERSITY OF SPEECH AND LANGUAGE THERAPY IN CASE OF THE PHONOLOGICAL DISORDER: RESEARCH RESULTS OF THE WRITTEN SURVEY OF EXPERTS

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 - 5.1.2. Features of Treating the Phonological Disorder
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- 5.2. Results of the Survey of Experts: the International Context
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SCIENTIFIC DISCUSSION (STAGE 1 OF THE EMPIRICAL RESEARCH)

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- 6.2.2. Strategies and Their Combinations that Are Most Often Applied to Treat the Phonological Disorder
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 - 6.5.3. Correlations between Evidence-Based Practice of Speech and Language Therapy and Applied Strategies
 - 6.5.4. Correlations between Components of Evidence-Based Practice of Speech and Language Therapy and Strategies Based on Motor and Phonological Learning: Generalisation
- 6.6. Correlation between Social, Demographic, Professional Characteristics and Strategies Applied for Treating the Phonological Disorder

SCIENTIFIC DISCUSSION (STAGE 2 OF THE EMPIRICAL RESEARCH)

LIMITATIONS OF THE RESERACH AND GUIDELINES FOR FURTHER RESEARCH

CONCLUSIONS

RECOMMENDATIONS

LIST OF REFRERENCES

ANNEXES

REVIEW OF THE CONTENT OF THE DISSERTATION

1. THEORETICAL CONCEPT OF THE PHONOLOGICAL DISORDER

The first part (3 chapters) encompasses results of the theoretical research: definition, classification and spread of children's speech sound disorder, concept of the phonological disorder in both national and international contexts. The origin of the phonological disorder and likely causes are explained. Also, importance of differential diagnostics of children's speech sound disorders, its influence on selection of treatment approaches and strategies are underlined. Theoretical features (characteristics) allowing differentiation of speech sound disorders of motor and phonological types are presented.

2. THEORETICAL MODELS OF TREATING THE PHONOLOGICAL DISORDER

The second theoretical part (3 chapters) focuses on the treatment of the phonological disorder. With regard to recent scientific literature, theoretical approaches to treatment of speech sound disorders are discussed, available classification of them is presented. However, most of attention was paid to the approach based on the phonological/cognitive-linguistic learning: basic principles of it are described, systematised goals of therapies and strategies of therapies based on these principles and possibilities of their application are presented, differences between traditional and phonological interventions are highlighted. Moreover, taxonomy of the phonological intervention proposed by Baker, Williams, McLeod, McCauley (2018) is presented, its structure is explained. Finally, the generalised theoretical model of treatment strategies for children's speech and sound disorders, which is referred to when conducting the doctoral research, is presented.

3. THEORETICAL FUNDAMENTALS OF EVIDENCE-BASED PRACTICE OF SPEECH AND LANGUAGE THERAPY

This theoretical part (4 chapters) reveals the development and concept of the evidence-based practice, emphasises its basic principles in speech and language therapy and importance for a speech and language therapist's profession. The theoretical model of evidence-based practice of speech and language therapy is presented especially focusing on detailed discussion about the components (evidence) of EBP. Moreover, the process of making evidence-based decisions is analysed. Grounding on the analysis of scientific sources, the scheme of decision making designed by the author is presented. Also, scientific substantiation and effectiveness of speech and language therapy (precisely, treatment approaches and strategies) for children with speech sound disorder of cognitive-linguistic origin is presented.

4. RESEARCH METHODOLOGY

The fourth part (5 chapters) deals with substantiation of the methodology of the doctoral research: the plan of the doctoral research, principles of ethics are presented, research methods (methods of data collection and analysis), construction of research instruments and structure, research sample are described and social demographic and (or) professional characteristics of research participants are presented.

Research plan. The research plan was designed (Figure 1). The research started with raising and specifying the problem questions. According to Kardelis (2017), a problem is formulated before collecting data because the collected data can influence it (p. 356). Later, hypotheses, object, aim and objectives of the doctoral research were formulated.

THE RELATIONSHIP BETWEEN APPLIED PHONOLOGICAL DISORDER TREATMENT APPROACHES AND EVIDENCE-BASED SPEECH AND LANGUAGE THERAPY PRACTICE

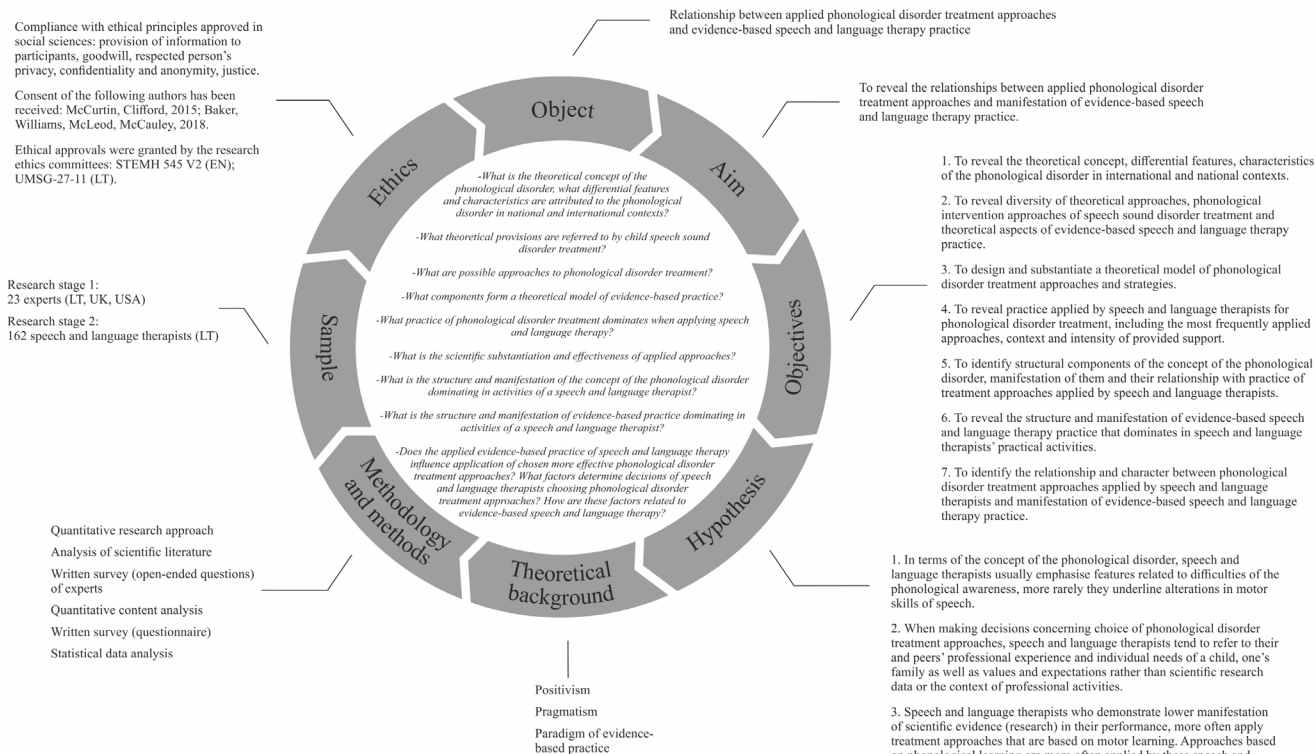


Fig. 2. Plan of the doctoral research

Research methodology and methods. The research employed the quantitative research approach. The following methods of data collection and analysis have been used:

- *Analysis of scientific literature*

Grounding on analysis of scientific literature, available classifications (classification systems) of children's speech sound disorders are presented, the concept of the phonological disorder is introduced, differential features of the phonological disorder and their characteristics are emphasised. Diversity of approaches to and strategies for treating children's speech sound disorders (including the phonological disorder), taxonomy of phonological intervention are presented. A theoretical model of evidence-based practice is substantiated. Moreover, analysis of scientific sources was referred to when interpreting results of the empirical research, which allowed deepening the understanding of the phenomenon, theoretical substantiation of it.

- *Written survey of experts (open-ended questions)*

Seeking to reveal diversity of speech and language therapy support to a child with the phonological disorder in both national and international contexts, a written survey of experts was conducted. Speech and language therapists having much experience were asked to answer open-ended questions in writing. Results of this survey were also used in constructing the instrument for the questionnaire-based survey.

- *Content analysis*

Quantitative content analysis of experts' answers to open-ended questions was carried out. Statements of the answers, separate phrases of statements, sentences or (and) words having the same or similar meaning were divided into categories and subcategories. Frequency of repeated statements (lexical-semantic units) was calculated.

- *Written survey (questionnaire-based survey)*

The structure and manifestation of the concept of the phonological disorder and evidence-based practice prevailing in practice of speech and language therapists were identified, correlations between the

phonological disorder and evidence-based practice of speech and language therapy were revealed. An authentic e-questionnaire designed by the researcher was used. The questionnaire was designed on the basis of reviews of scientific literature analysis, expert survey (context of Lithuania), other similar questionnaires and a fragment of a questionnaire for speech and language therapists designed by McCurtin, Clifford (2015) (permission of the authors was received). A questionnaire-based survey of speech and language therapists was carried out under mediation of representatives from pedagogical and psychological/ educational support services, chairs of methodological groups of speech and language therapists and (or) their deputies.

- *Statistical analysis of the data of the written survey (questionnaire-based survey)*

Descriptive statistics, multi-dimensional statistical methods were employed: exploratory and confirmatory factorial analyses, second order factor analysis, cluster analysis and linear regression analysis. Non-parametric Mann Whitney and Kruskal Wallis criteria were applied to compare answers of respondent groups (two or more). Also, the effect size was calculated.

Research ethics. When performing particular steps of the doctoral research, the following principles approved for social sciences were complied with (Žydžiūnaitė, 2007; Singer, 2008; Irwin, Pannbacker, Lass, 2013; Kardelis, 2017; Žydžiūnaitė, Sabaliauskas, 2017): informed consent of participants, goodwill, respect to personal privacy, confidentiality and anonymity, justice (volunteering, equality, usefulness of research). Ethical aspects were ensured in all steps of organisation of the research, from the analysis of scientific literature to generalisation, dissemination of obtained research results. Permissions for empirical research in Lithuania and foreign countries were obtained: in English (approval of the UCLan¹⁶ Committee for Ethics, *STEMH 545 V2*, 2017-05-26); in Lithuanian (*UMSG-27-11*, 2016-08-31).

¹⁶ University of Central Lancashire in the United Kingdom.

Research sample. A mixed sample was formed for the national written survey of experts (stage 1 of the empirical research): criteria-based, purposive and multiple cases sampling. 14 experts who are speech and language therapists working in various education institutions of Lithuania (nurseries-kindergartens, comprehensive education schools), pedagogical and psychological/ educational support services and (or) health care institutions, private practice took part in the survey. Experience of practical work with children with speech sound disorders (articulation and phonological) of at least 5 years was the most important criterion for sampling. The research sample was supplemented with 9 speech and language therapists from the United Kingdom and the United States of America (Omaha, Nebraska State). In the research stage 2 (questionnaire-based e-survey), 162 speech and language therapists from Lithuania took part. The research sample was formed by probability sampling; simple random sampling was applied.

5. DIVERSITY OF SPEECH AND LANGUAGE THERAPY IN CASE OF THE PHONOLOGICAL DISORDER: RESEARCH RESULTS OF THE WRITTEN SURVEY OF EXPERTS

Grounding on the data and results of the written survey of experts/ stage 1 of the empirical research, this part (2 chapters) presents diversity of speech and language therapy for children with the phonological disorder in both national and international (UK, USA) contexts. Main features, likely causes of the phonological disorder, strategies employed for treating the disorder, the context and intensity of speech and language therapy that were revealed during the written survey (open-ended questions) are presented. Also, referring to the theoretical model of evidence-based practice, it is aimed at finding out and describing which pieces of evidence, in specialists' opinion, have influence on the treatment of the phonological disorder.

First, the experts who expressed their consent to participate in the research were asked to remember and describe while answering open-

ended questions one particular case of a child who has/ had the phonological disorder¹⁷, without presenting any personal information (e.g. child's name, surname, place of residence etc.)¹⁸. The obtained answers were divided into categories and subcategories, indicating a number of lexical-semantic units in them. Also, examples of statements reasoning the subcategories are presented. When performing the content analysis, recommendations presented in methodological literature (Elo, Kyngas, 2008; Kardelis, 2017; Žydžiūnaitė, Sabaliauskas, 2017) as well as inductive logic were followed. It is important to note that the results allowed constructing the instrument for the quantitative research, i.e. the questionnaire intended for surveying a larger amount of representatives of the population.

The stage 1 of the research was the exploratory research. The exploratory survey of experts chosen as a starting point to investigate problems related to the concept of the phonological disorder and treating it in both national and international contexts. An exploratory research is typically used when research is in a preliminary stage and definitive conclusions arising from it are rare (Maxwell, Satake, 2006). Because of that, it was decided not to present obtained detailed data and generalised results in the summary of the doctoral thesis. These are presented in detail in the main text and annexes of the doctoral thesis only.

¹⁷ In Lithuania: phonological disorder (phonemic acoustic and/or phonemic articulation dyslalias). Phonemic articulation dyslalia mean a combination of a functional or organic disorder of pronunciation of sounds (for phonetic articulation dyslalia) and a phonological disorder (for phonemic acoustic dyslalia) (Musteikienė et al., 2015). In UK and USA: consistent phonological disorder.

¹⁸ Each of all research participants described one case of a child, with the exception of one female speech and language therapist who presented 2 cases. In total, experts presented 15 different cases of children with the consistent phonological disorder.

6. CORRELATIONS BETWEEN STRATEGIES FOR TREATING THE PHONOLOGICAL DISORDER AND EVIDENCE-BASED PRACTICE: RESEARCH RESULTS OF THE QUESTIONNAIRE-BASED SURVEY OF SPEECH AND LANGUAGE THERAPISTS

The sixth part (6 chapters) presents the results of the questionnaire-based survey of speech and language therapists / stage 2 of the empirical research. Features of the phonological disorder that are the most manifesting and least significant with practitioners, their correlations with strategies applied for treatment by speech and language therapists are discussed. Due to the confirmatory factor analysis, the theoretical model of approaches and strategies based on phonological and motor learning is substantiated. Also, the structure and manifestation of the concept of evidence-based practice of speech and language therapy and real-life practice of treating the phonological disorder by speech and language therapists are revealed, starting from intensity of speech and language therapy, context and ending with the most frequently and the most rarely employed strategies or their combinations for treating the phonological disorder. The end of the chapter is dedicated to finding out whether evidence-based practice of speech and language therapy has influence on application of selection of more effective strategies for treating the phonological disorder. In other words, the factors that determine selection of strategies for treatment of the phonological disorder by speech and language therapists are discussed.

Structure and manifestation of the phonological disorder concept. The first part of the questionnaire targeted at revealing the differential features and their characteristics that are typical to children with the phonological disorder from the speech and language therapists' point of view. The respondents were asked to assess the presented 123 statements in scores of a range scale according to the following criteria: 1 – absolutely not, 2 – seemingly not, 3 – neither yes nor no, 4 – seemingly yes, 5 – absolutely yes. When analysing the obtained research data and aiming to reveal the structure of features of

the phonological disorder, factor analysis was carried out¹⁹. Statements presented in this part of the questionnaire comprised 25 separate scales (factors).

Seeking to reduce the corpus of the obtained data and to reveal main differential features of the phonological disorder, second order factor analysis of the factors obtained earlier was carried out. The results demonstrated that the data suited the factor analysis: KMO = 0,857, o Bartlett's test of sphericity $p = 0,000$. The internal consistency coefficient Cronbach alpha (α) of separate factors varies from 0,692 to 0,886, which demonstrates that the factors are homogenous. To sum up the obtained research results, it was found out that the structure of the surveyed speech and language therapists' conception of the phonological disorder consists of 5 components, which are supplemented with 25 subscales:

- ***Difficulties of phonological awareness*** (partition (merging) or words, difficulties of manipulation with sounds, difficulties of awareness about rhythm and rhyme, difficulties of recognition and identification of sounds, difficulties of identification of sounds of a word, difficulties of awareness of linguistic units, difficulties of auditory awareness, difficulties of differentiation between similar sounds, distortion of sound syllable structure).
- ***Difficulties of speech and adjacent education*** (difficulties of spoken language and communication, underdevelopment of motor skills, lack of processing visual information, motivation and self-regulation, lack of processing auditory information and attention, alterations in pace, fluency of speaking and bilingualism (multilingualism), difficulties of speech alteration, initiation and intelligibility, difficulties of written language, i.e. i.e. learning of reading and writing).
- ***Consistent errors of substitutions, omissions and assimilation*** ((de)nazalization and stopping, backing and fronting, severe and consistent errors of sound pronunciation, omissions of sounds,

¹⁹ Method of factor analysis of main components was applied (*Varimax* rotation).

syllables, consonant assimilation, errors in substitution of sounds in the group of s and š).

- ***Alterations of speech motor skills*** (breathing, voice, phonation and prosody, alterations of the structure and functions of the articulatory mechanism).
- ***Errors of using sounds in speech and repetition of syllables, words*** (errors of sound usage in fluent speech, pronunciation of sounds, imitation and compliance with language rules, repetition of syllables, words and rapid automatized naming).

On the ground of the obtained results, the first and the last structural components were assessed in high scores, their means vary from 4,06 to 4,15 (5 in a five-point range scale). This shows that speech and language therapists tend to support that in case of the phonological disorder, first of all, difficulties of phonological awareness and sound usage, repetition of syllables and words are characteristic. The practitioners who took part in the research also agree that a child with the phonological disorder demonstrates permanent errors of substitutions, omissions and assimilation of sounds ($M = 3,66$). The most frequent of errors reflecting deficits of phonological processes are the following: substitutions of sounds of group ([s] and [š], exchanges of sounds [k], [g] and [t], [d], substitution of sounds [r] [l] with sounds [j] and [v]); distortion of the sound syllable structure of words (especially for words with multiple syllables) and assimilation of consonants. In terms of omissions of sounds, it was found that omission of consonants is frequent in combinations of consonants; omissions of other types manifest more rarely. Moreover, the respondents unanimously agree that, in case of the phonological disorder, difficulties of written language, i.e. reading and writing, are typical ($M = 4,44$). The lowest mean value was recorded for alterations in speech motor skills ($M = 2,36$) and rate, fluency of speech ($M = 2,69$).

Applied treatment approaches to the phonological disorder.

The speech and language therapists who participated in the research were asked to indicate which strategies and how often they apply for

treating the phonological disorder. The respondents could choose only one option displayed next to each of the listed 38 strategies: 0 – not familiar, 1 – never (0 %), 2 – rarely (10–30 %), 3 – sometimes (40–60%), 4 – often (70–90 %), 5 – always (100%). Aiming to comprehensively analyse and reveal the most popular, i.e. always or frequently applied for treating the phonological disorder, strategies applied for treating the phonological disorder, the rating of strategies has been made (Figure 2).

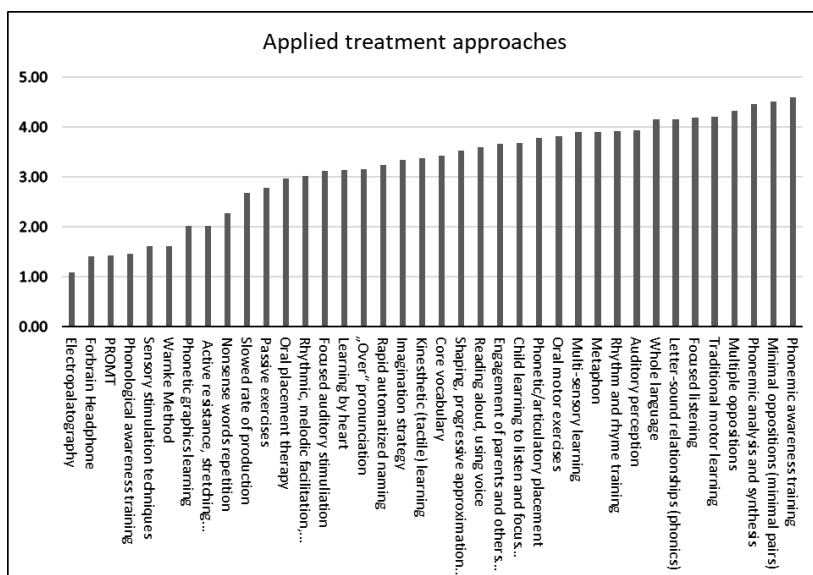


Fig. 2. Applied approaches for treatment of phonological disorder, mean (maximum score 5)

The rating demonstrates the five most popular strategies: phonemic awareness training (M = 4,61, SD = 0,74), minimal pairs (M = 4,52, SD = 0,82), phonemic analysis and synthesis (M = 4,46, SD = 0,82), multiple oppositions (M = 4,33, SD = 0,94) and traditional motor learning approach (M = 4,21, SD = 1,02). In general, grounding on the research data, it can be stated that the first four strategies are attributed to the approach based on cognitive-linguistic/ phonological

learning, the fifth strategy is attributed to the approach based on motor learning. A traditional motor learning approach is among the most popular 5 strategies applied by Lithuanian speech and language therapists, despite this strategy in scientific literature is named as less effective for treating the phonological disorder. The speech and language therapists who took part in the survey also frequently apply the strategy of non-speech oral motor therapy – active oral-motor exercises involving a jaw, lips, a tongue ($M = 3,82$, $SD = 1,40$). It is important to note that respondents' opinions concerning application of this strategy in practice was not unanimous.

To sum up answers of the respondents, it was found that the following strategies are seldom applied for treatment of the speech sound disorder of the cognitive-linguistic origin: prompts for restructuring oral muscular phonetic targets / PROMT ($M = 1,42$, $SD = 0,92$), sensory stimulation techniques (massage, electrotherapy, vibration) ($M = 1,62$, $SD = 0,94$), the Gillon Phonological Awareness Training Programme ($M = 1,47$, $SD = 1,03$) and all strategies of computer technology-based approaches, i.e. electropalatography ($M = 1,10$, $SD = 0,41$), Forbrain Headphones ($M = 1,41$, $SD = 1,08$), Warnke method ($M = 1,62$, $SD = 1,20$). Majority of them were unfamiliar to the speech and language therapists.

Combinations of strategies applied for treating the phonological disorder: results of the cluster analysis. Almost all speech and language therapists who participated in the survey apply combinations of strategies to treat the phonological disorder: including 45,52 % – always; sometimes – 53,10 % of the respondents. In practice of speech and language therapy, combinations of strategies based on motor learning or phonological learning are applied most often. After conducting the cluster analysis, it was found out that the strategies that are oriented to development of the written language or the whole language, approach of engagement of parents, family members and (or) other interested individuals in the education process are more often applied in combination with strategies of a phonological type.

The model of strategies based on motor and phonological learning: results of the confirmatory factor analysis. It is important to note that the confirmatory factor analysis was carried out to approve the theoretical structure of strategies applied for treating the phonological disorder.

The theoretical model of approaches and strategies based on phonological and motor learning for treating the phonological disorder²⁰ was approved by the method of confirmatory factor analysis (CFA) showing a statistically significant relationship of variables of appropriate latent factors and values of their factorial weigh. In other words, this model singles out two latent factors/ groups of strategies for treating the phonological disorder: 1) approaches based on phonological learning; 2) approaches based on motor learning. The results demonstrate the variables *auditory-perceptual strategies*, *(meta)phonological strategies* and *phonological contrast strategies* are attributed to the first factor; variables *speech-based therapy strategies*, *non-speech oral motor strategies*; *intelligibility of speech and compensatory strategies* to the second factor. The correlation coefficient between these factors is $r = 0,296$ ($p < 0,05$). This shows that both factors are interrelated, even though they represent different aspects. The correlation is weak, but statistically significant. The approved empirical model was used for further analysis of the obtained data, i.e. when analysing relationships between applied strategies for treatment of the phonological disorder and components of evidence practice of speech and language therapy or features of the phonological disorder.

When presenting the research data and generalised results in the text and annexes of the doctoral thesis, the remaining strategies were divided into the following groups: computer technologies-based approaches; approaches on auditory memory and focus development;

²⁰ The structure of the model was approved by using the sample of 145 surveyed individuals. The obtained structural model was assessed as sufficiently well suiting the analysis of the data because: $\chi^2 = 14,970$, $df = 8$, $p > 0,05$; RMSEA = 0,073, CFI = 0,981 and TLI = 0,951.

whole language approach; approaches on learning the grapheme–phoneme relationship (phonics); approach for learning phonetic graphics; approach of engagement of parents, family members and (or) other interested individuals.

Structure and manifestation of evidence- practice of speech and language therapy. Aiming to reveal the internal structure of evidence-based practice of speech and language therapy prevailing in our country, the exploratory factor analysis of statements of part 5 presented to speech and language therapists²¹ was carried out. The respondents were given a group consisting of 72 statements²² which reflect evidence-based practice of speech and language therapy. Speech and language therapists who participated in the survey were asked to express their opinion on suggested statements, indicating only one option next to each of them: 1 – *absolutely disagree*, 2 – *disagree*, 3 – *partly disagree*, 4 – *partly agree*, 5 – *agree*, 6 – *absolutely agree*. Assessment of the statements in a 6-score scale allowed analysing results of factor means, revealing manifestation of structural components (constructs).

The results of the factor analysis allow displaying the statements of the Lithuanian variant of the questionnaire:

- constitute three factors on scientific research and explain 49,129 % of data scattering (KMO = 0,799, df = 105, $p = 0,000$): scientific evidence-based practice; distrust in scientific evidence; substantiation of approach application;
- constitute four factors on practice of speech and language therapists and explain 40,678 % of the data scattering (KMO = 0,727, df = 231, $p = 0,000$): practically tested new approaches; intuition and relationship with a student; limited information on mass media; practice tested by science and time;

²¹ The exploratory factor analysis was applied, the alpha factoring method (Direct Oblimin rotation) was used, which allows singling out factors for which compatibility of statements expressing the them is the highest.

²² Statements were divided into 5 scales, 3 statements were eliminated from them.

- constitute two factors on professional experience of speech and language therapists and their colleagues and explain 55,157 % of the data scattering (KMO = 0,788, df = 15, $p = 0,000$): practical experience of colleagues; personal practical experience;
- constitute two factors on a child and one's family and explain 43,869 % of the data scattering (KMO = 0,678, df = 21, $p = 0,000$): needs of a child and one's family; contribution and responsibility of a child, one's family and other participants;
- constitute six factors on the professional activities context and pragmatism and explain 49,503 % of the data scattering (KMO = 0,694, df = 210, $p = 0,000$): simplicity of an approach; personal professional development; child-focused orientation; safe and regular practice-focused orientation; institutional and national policy; applicability in real practice.

Seeking to reduce the corpus of the obtained data and to reveal constructs of evidence-based practice prevailing in performance of speech and language therapists, second order factor analysis of previously specified factors was carried out. The research results demonstrated that the data suited factor analysis because the obtained KMO was 0,792, while Bartlett's spherical distribution criterion p was 0,000, which means that $p < 0,05$. Internal consistency of separate factors in terms of Cronbach α fluctuated between 0,545 and 0,807, which shows that the factors are partly homogenous. Weights of the variable factors in each of the factors are presented in Table 2.

Table 2. *The model of evidence-based practice that dominates in activities of speech and language practice: results of secondary factorial analysis (KMO = 0,792, df = 136, p = 0,000)*

Matrix of the factorial model	L	MSA	%
<i>Practical experience and needs of a child, one's family M = 4,90</i>			
Practically tested new approaches (M = 4,97)	0,830	0,808	27,089
Personal practical experience (M = 4,95)	0,748	0,854	
Needs of a child and one's family (M = 4,88)	0,729	0,814	
Child-focused orientation (M = 5,16)	0,685	0,831	
Practice tested by science and time (M = 4,73)	0,508	0,858	
Practical experience of colleagues (M = 4,72)	0,429	0,839	
<i>Scientific research M = 4,30</i>			
Scientific evidence-based practice (M = 3,78)	0,820	0,699	16,432
Substantiation of approach application (M = 4,85)	0,703	0,748	
Distrust in scientific evidence (M = 2,54)	-0,697	0,706	
Intuition and relationship with a student (M = 3,40)	-0,642	0,727	
<i>Practical applicability M = 4,12</i>			
Applicability in real practice (M = 3,88)	0,806	0,721	9,085
Simplicity of an approach (M = 4,09)	0,695	0,765	
Safe and regular practice-focused orientation (M = 4,31)	0,692	0,810	
Personal professional development (M = 4,22)	0,573	0,828	
<i>Context of professional activities M = 3,79</i>			
Contribution and responsibility of a child, one's family and other participants (M = 4,11)	0,733	0,800	6.841
Institutional and national policy (M = 3,98)	0,697	0,773	
Limited information on mass media (M = 3,29)	0,506	0,801	

Note: L – factor weight coefficient; MSA – Measure of Sampling Adequacy; % – factor descriptive power.

Grounding on the results of the factorial analysis, an empirical model based on evidence of 4 structural components dominates in activities of speech and language therapists in Lithuania:

- *practical experience and needs of a child, one's family*, comprising practically tested new approaches, personal practical experience, needs of a child and one's family, child-orientation, practice tested by science and time, practical experience of peers;
- *professional activities based on scientific research*, combining scientific evidence-based practice, substantiation of approach application, distrust in scientific research, intuition and relationship with a student;
- *practical applicability*, combining applicability in real practice, simplicity of an approach, orientation to safe and regular practice, personal professional development;
- *context of professional activities*, combining 3 scales: contribution and responsibility of a child, one's family and other participants, influence of institutional and national policy, mass media and limited availability.

The research has proven that the component "Practical experience and needs of a child, one's family" manifested in the revealed structure the most. Slightly lower scores were attributed to: evidence of scientific research and practical applicability. The respondents expressed their opinion that a context of professional activities was the least significant evidence.

Relationships between components of evidence-based practice of speech and language therapy and applied motor-based and phonologically-based approaches. Aiming to find out which constructs of speech and language therapists' generalised evidence-based practice determine selection of treatment strategies based on motor and phonological learning the most, analyses of multiple regression were carried out. 2 models of multidimensional regression were tested. All 4 factors formed after the second order factor analysis were included in the model as independent variables.

Fig. 2 presents generalised results of carried out multi-dimensional regressions. Grounding on the obtained results, it can be declared that the choice to apply approaches is related to the components of evidence-based practice: practical experience and

needs of a child, one’s family, data of the scientific research and context of professional performance. *Practical experience and needs of a child, one’s family* have statistically significant influence on application of strategies based on both motor and phonological learning. When dealing with the *context of professional activities*, it remained statistically significant only when deciding to apply the strategies based on motor learning. It also displays that the regressor of *scientific research* which is statistically significant for selection of application of both strategies; however, the speech and language therapists who took part in the survey, grounding on evidence of scientific research, more seldom tend to apply motor-based strategies and more often to apply strategies based on phonological learning. In this research, an independent variable of practical applicability is not statistically significant for speech and language therapists making decisions on application of any group of strategies.

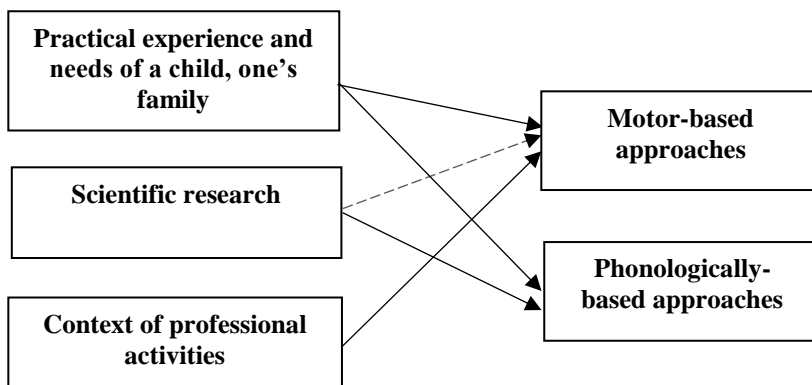


Fig. 2. Correlations of evidence-based practice of speech and language therapy with strategies based on motor and phonological learning: generalisation of models of multidimensional regression²³

²³ *Explanation.* A continuous black line means that the independent variable is statistically significant in the model of multidimensional regression. A dotted line symbolises a negative correlation.

At the end of the doctoral thesis, a scientific discussion, limitations of the doctoral research and guidelines for further research, conclusions, recommendations, list of scientific references in the Lithuanian and foreign languages and annexes are presented.

Annexes present: permissions of authors; ethical approval of Šiauliai university Faculty of Education Sciences and Social Welfare, Department of Special education; approval of the Committee for Ethics of the UCLan (UK) and related documents; the form of consent of research participants (experts) to take part in the survey; survey instruments; e-mail letters addressing the respondents; the template of the questionnaire; detailed quantitative content analysis and tables of statistical calculations of the data from the written survey (questionnaire-based survey) of speech and language therapists.

SCIENTIFIC DISCUSSION

Discussion of the results of the questionnaire-based survey of speech and language therapists (stage 2 of the doctoral research).

Deeper theoretical and practical knowledge of the phonological disorder and mastery of the evidence-based treatment of the phonological disorder could contribute to improvement of speech and language therapy to children with speech sound disorders. The researcher holds her opinion declaring that the collected data and generalised results of the doctoral research may be used to implement this goal.

Concept of the phonological disorder. The phonological disorder is children's speech sound disorder of the cognitive-linguistic origin. Because of that, a probability of likely differences among linguistic systems remains. Still they are not scientifically substantiated like in other cases of disorders (e.g. dyslexia). Research studies conducted by foreign authors allowed revealing differential features of the phonological disorder and their characteristics in the English-speaking environment. However, the need for empirical research on the phonological disorder in various languages is obvious. The doctoral research managed to disclose the concept of the phonological disorder in the point of view of Lithuanian speech and language therapists. This part of a scientific discussion on differential features of the phonological disorder and their characteristics focuses only on generalised results obtained after carrying out the second order factor analysis²⁴. The obtained results of the doctoral research demonstrate that usually difficulties of phonological awareness, errors of the use of sounds in spoken language and syllables, repetition of words and consistent errors of substitution, omission and assimilation of sounds are typical to children with the phonological disorder. Difficulties of speech and concomitant difficulties of education (with the exception of reading and writing) manifest more rarely. Alterations of speech

²⁴ With the exception for discussion of alterations of speech motor skills.

motor skills is the least manifested feature. It is worth discussing each of them in a greater detail.

Difficulties of phonological awareness. In opinion of Lithuanian speech and language therapists who participated in the research, difficulties of phonological awareness (including phonemic awareness and manipulation with phonemes) are the most manifested feature in the case of the phonological disorder. On the one hand, it can be stated that generalised results of this research prove the already known “truths”. Research works by Lithuanian (Saročkienė, 2016; Garšvienė, Juškienė, 2008; Garšvienė, Ivoškuvienė, 2003; Garšvienė, 1993a) and foreign (Bowen, 2015; Ghasisin, Mirani, Tazhibi, 2013; Gernand, Moran, 2007) authors declare that the phonological disorder is linked to the difficulties of auditory/ phonemic/ phonological awareness, phonemic analysis and synthesis skills. In other words, the phonological disorder can occur because of the lack of phonological skills. On the other hand, more recent scientific research studies reveal contradictory statements that emphasise the need for future research on relationships between phonological awareness skills and phonological disorders in the population of Lithuanian-speaking (monolingual) children. For example, Coloma De Barbieri (2007) attempted to answer the question on whether there is a relationship between phonological problems and phonological awareness (cit. Pavez, Coloma, 2016, p. 68). The authors involved 24 pre-school age children with the phonological disorder and DLD and 26 children with regularly developed language in the research. To sum up, the research revealed that there is no relationship²⁵ between phonological performance and phonological awareness. This shows that a typical phonological development does not ensure any satisfactory level of this metalinguistic ability. It was observed that other factors, such as vocabulary and phonological memory, are also necessary for the development of phonological awareness. The data proves earlier

²⁵ *Pearson r* test was employed to find out is there a correlation between the variables.

conclusions which declare that some children who have no phonological problems may also experience difficulties of phonological awareness (Hesketh, 2004).

Error patterns of speech sounds. The reviewed research studies allow stating that the deficit of phonological awareness not necessarily manifests for children with the phonological disorder (in cases of very mild or moderate disorders). A larger probability of poorer skills of the phonological awareness are typical when difficulties of the phonological disorder and combinations of other difficulties in language (e.g. grammar) are present or when a larger number of simplifications of phonological processes are observed (Pavez, Coloma, 2016). Nevertheless, scholars agree that despite any level of the phonological awareness abilities, children with the phonological disorder are characteristic of errors of the use of sounds in speech (Bowen, Cuples, 1998). It shows that children face difficulties when following rules for the use of sounds in speech. Because of that reason, children can pronounce isolated sounds properly; however, specific patterns of the use of sounds will be observed in their speech. This was also proven by 162 practitioners who took part in this doctoral research. When discussing a type of errors, it was found that, in respondents' opinion, not only severe and consistent errors of pronunciation of consonants²⁶, but also of diphthongs, vowels usually occur for children with the phonological disorder. Research on pronunciation of vowels by children with the phonological disorder, first of all, was limited with English-speaking children only. Scientific data bases displayed one comparative research on characteristics of vowel pronunciation by Spanish and American-English-speaking children. The research results demonstrate that children with the phonological disorders, while managing the Spanish language whose system of vowels is comparatively simpler, made much less errors in

²⁶ The most frequent of them: errors of sound substitution for the group of [s] and [ʃ], backing and fronting. Common are the errors of assimilation of consonants.

vowel pronunciation (M = 1%) than children with similar severity of phonological disorders while managing the American-English language (M = 11%) (Goldstein, Pollock, 2009).

The findings of earlier scientific research works and this doctoral research coincide. Scientific literature presents that consistent errors of sound and/ or syllable substitution, omission occur for children of this group (Brancalioni, Keske-Soares, 2016; Pavez, Coloma, 2016; Wren and Roulstone, 2008; Garšvienė, 1993a etc.).

Difficulties in repetition of syllables and words as well as in rapid automatized naming. To add, the respondents underlined that difficulties of repetition of syllables, words (including nonsense words) and rapid automatized naming occurred for children with the phonological disorder. A similar opinion is expressed also by Roepke, Bower, Miller, Brosseau-Lapr e (2020). Conclusions of the research by co-authors declare that 4–5-year old children with the speech sound disorder more poorly repeat syllables and words in comparison to children of regular development. However, it is worth emphasising that relationships of the ability of repeat syllables and words (including nonsense words), rapid automatized naming and phonological disorder are still little investigated in the scientific area. Similar research papers were found (Stampoltzis, Plakida, Peristeri, 2020; Rvachew, Matthews, 2017; Dispaldro, Leonard, Deevy, 2013; Guiberson and Rodriguez, 2013; Sasisekaran, Byrd, 2013); they usually reveal relationships of other disorders of speech and language²⁷, specific learning difficulties (dyslexia) and mentioned abilities. Also, various instances of scientific evidence can be found (Roepke et al., 2020; Waring et al., 2017; Rvachew, Grawburg, 2006) proving that children with speech sound disorders are characteristic of deficits of phonological processing, including phonological memory and coding. One thing is obvious that an ability to repeat syllables and words encompasses both multiple cognitive-linguistic and motor

²⁷ Developmental language disorder (DLD), childhood apraxia of speech (CAS), stuttering etc.

skills, i.e. auditory processing, phonological memory, phonological and motor planning, articulation (Rvachew, Matthews, 2017; Krivickaitė-Leišienė, 2014; Gathercole, 2006).

In opinion of the speech and language therapists who took part in the survey, children with the phonological disorder are characteristics not only of difficulties in cues of similarly sounding syllables or words, repetition of imaginary words, but also of difficulties in repeating syllables “pa”, “ta”, “ka”, word “pataka”. It is usually called in practice of speech and language therapy as performance of diadochokinetic tasks. Usually, scientific sources analysing differential disorders of the cognitive-linguistic and motor origin indicate that children with the phonological disorder are able to perform diadochokinetic tasks (Gironda, Fabus, 2011). Contrary to the cases of disorders of the motor origin (dysarthria, dyspraxia). For example, in the case of dysarthria, children do not maintain sequence of syllables in a queue of syllables/ words, shorten words; in the case of dyspraxia, they maintain the syllable structure of words, but distort the sonic structure of words (Kairienė et al., 2015). On the other hand, more recent research studies demonstrate that children with the phonological disorder perform diadochokinetic tasks, except for oral-motor ones, slower than children with normal speech development (Tafiadis et al., 2021).

Alterations in speech motor skills. The generalised research results show that speech motor skills of children with the phonological disorder are not altered. However, having paid attention to separate characteristics and their manifestation, it is observed that the practitioners who took part in the survey emphasise that breathing of children from this group, the voice were not altered, facial and articulation apparatus were symmetric, face expression was lively. Moreover, the children were not characteristic of difficulties in eating (chewing and swallowing). More detailed research data and results also revealed some problematic aspects. The respondents do not feel sure for having such manifestation of characteristics which in scientific literature are usually related to speech sound disorders of

motor origin, such as: disorders of prosody (pace, rhythm, intonation), anatomical alterations of the apparatus of articulation, incorrect position of organs of the apparatus of articulation, disorders in movements of the apparatus of articulation, altered tone of muscles of the apparatus of articulation and limited phonation. The surveyed larger population of speech and language therapists, however, proved the tendencies of the surveyed experts who took part in the research.

Bearing in mind that the phonological disorder is the speech sound disorder of the cognitive-linguistic and not motoric origin, it is understood that, in cases of the phonological disorder, alterations of the structure and functions of the articulation apparatus, muscle tone are not typical²⁸. This was proven by many foreign scholars (Ball, 2016; Gironde, Fabus, 2011; Lof, 2011; Spielvogel, 2011 etc.). True, bases of scientific data display contrary research results, too. For example, Gubiani, Carli, Keske-Soares (2015) and Bertagnolli, Gubiani, Keske-Soares, M. (2015) have it that children with the phonological disorders demonstrate poorer orofacial praxis²⁹ skills³⁰ and alterations of the stomatognathic system³¹. Other scholars (Marchesan, Martinelli, 2015; Giacchini, Mota, Mezzomo, 2012) emphasise that when phonological disorders are present, motor incapability or difficulties of praxia when performing motor

²⁸ With the exception of combinations of children's speech sound disorders.

²⁹ *Orofacial praxis* is an ability to plan and perform movements of one's mouth and face or conscious queues of movements (meaningful or not) (Bearzotti, Tavano, Fabbro, 2007). According to the authors, the development of motor skills starts in around the second year of age; at twelve, a child already should have developed motor skills and be able to perform fine, effective and coordinated movements. Kools, Tweedie, (1975) define the mentioned concept as an ability to perform: 1) qualified movements of speaking; 2) movements of muscles of articulation organs after verbal instruction or demonstration, i.e. to perform or repeat movements of a mouth and facial motor skills (cit. Bertagnolli et al., 2015, p. 287).

³⁰ Especially of lips and tongue which are related to speaking. An insufficient mobility of lips (contraction, vibration and whistling) are observed. Because of that reason, children may have difficulties in pronouncing some sounds (for instance, a sound [r]).

³¹ Alterations of the position of a lower jaw bend/ bite and a tongue when sucking, which also can have effect on learning to speak and speech development.

pronunciation of a phoneme may have influence on language disorganisation (cit. Giannecchini, Maximino, 2018, p. 374).

However, these and other similar research results should be assessed critically, since mismatched could have occurred due to differences in the use of the term of the phonological disorder in various countries³² (Dokoza et al., 2015). Usually, the term ‘phonological disorder’ is used when a speech sound disorder occurs without a clear reason and no neurological problems are diagnosed (Davidson, 2003, cit. Sessiani, 2018, p. 85). However, in some countries, the concept of the phonological disorder is used to name combinations of phonological and articulation or phonological and motor speech disorders. Lithuania is not an exception. Grounding on the classification of speech and language disorders which is valid in our country, it is common to call children of this group as having the phonological disorder (phonemic articulation dyslalia) or the phonological disorder (dysarthria). It should be noted that speech and language therapists are partly confused by this practice. Bertagnolli, Gubiani, Ceron, Keske-Soares (2015) compared abilities of orofacial praxis in three groups: typical phonological development, with the phonological disorder, with the phonetic-phonological disorder. Grounding on the research results, attention is focused on children with a combination of disorders who performed oral-motor tasks more poorly in comparison to other two groups of children.

Difficulties in speech and concomitant difficulties in education.

It was found that children with the phonological disorder are characteristic of a regular rate of speaking. Whereas the surveyed experts’ opinions on fluency of speech was not firm and unanimous. However, research results by Costa Albiero, Mota (2015) prove that there is no significant difference between fluency of speech for children with the phonological disorder and children with typical

³² For example, one of scientific sources declares that the phonological disorder is usually called the articulation disorder, the developmental articulation disorder (Sessiani, 2018). It is not related in any way with the definition of the phonological disorder presented in this doctoral research.

phonological development. Nevertheless, several more typical trends can be observed. First, in all investigated aspects, with the exception for a flow of words and syllables per minute, the group of children with the phonological disorder demonstrate higher averages than the group with typical phonological development. Moreover, speed of those with the phonological disorder was slower. The children made more pauses or repetitions, prolongations of sounds. According to Keske-Soares, Pagliarin, Ceron (2009), pace of speed for children with the phonological disorder can be slower due to likely linguistic or motor³³ disorders.

In opinion of a US scholar DeVeney (2022), speech sound disorders are usually mistakenly considered as a less important problem of child development. On the contrary, a high risk to experience long-lasting negative consequences of early literacy (Sices et al., 2007), written language, use of language and social consequences (DeVeney, 2022) occurs for children with speech sound disorders. Other research studies emphasise that children with the phonological disorder usually have the disorder of written language/reading and writing (Gillon, 2018; Shtereva, 2014; Silva, Ávila, 2013; Lof, 2011a; McNamara et al., 2010; Enderby et al., 2009; Lucker-Lazerson, 2003; Hesketh, 2004; Garšvienė, 1993c). Shtereva (2014) has it that the phonological disorder can influence child's development in two ways: 1) understanding of a structure of sounds of the spoken language; 2) retention of phonological information in short-term memory, which can cause problems determining reading and writing disorders. The data and results obtained in the present research basically coincide with conclusions of research studies earlier conducted by foreign scholars, since the respondents who took part in the research also prove that when children with the phonological disorder start attending school, usually difficulties in learning to read and write occur. It is important to note that the problem of

³³ When a combination of disorders of the cognitive-linguistic and motor origin is observed.

relationships between the phonological disorder and reading, writing skills has not been widely analysed at the scientific level in Lithuania.

The disorder of auditory awareness can have effect on the development of the whole linguistic system, too: incorrect use of cases, prepositions, suffixes, understanding of grammatical forms and morphological links (Garšvienė, 1993b). Dealing with correctness of vocabulary, language grammar, difficulties of connected language and linguistic pragmatics, opinions of the respondents differed and were not unanimous. Therefore, an assumption can be drawn that, in the case of the phonological disorder, disorders of language as a system not necessarily manifest.

Features of pragmatics of language for those with the phonological disorder have not been extensively investigated not only at the national, but also at the international levels. Only one empirical research was found so far. Savoldi and co-authors (2014) conducted a research aiming at assessment of pragmatics skills of children with the phonological disorder. Summing up the research results, the authors indicated that pragmatic skills of children with the phonological disorder are slightly lower than those of their peers, i.e. children demonstrated poorer skills than the age norm. However, despite that, the difference is not that big to identify a statistically significant correlation between skills in phonology and pragmatics. Also, no direct correlation between a degree of the phonological disorder and social communication (pragmatics) skills was found, even if the latter skills were lower than values of the applied test. Whereas there are much more of publications revealing relationships between other language disorders (e.g. cases of the developmental language disorder, autism etc.) and pragmatics of language available in scientific data bases.

To sum up the concept of the phonological disorder generated by Lithuanian speech and language therapists who participated in the research, it could be declared that it is not exactly precise in comparison to the concept prevailing in foreign countries. However, the researcher tends to refrain from generalisations of such kind, since

some mismatches are possible due to mismatches among linguistic systems. Moreover, the phonological disorder has been very vaguely investigated in our country (both when surveying speech and language therapists-practitioners and performing research with children with the phonological disorders), and statements found in scientific or methodological literature repeat each other. On the contrary, the researcher holds the position declaring that this doctoral research contributes to deeper revealing of the differential features of the phonological disorder and understanding for the population of Lithuanian-speaking children. Moreover, the comparative analysis of linguistic differences was not an object of this doctoral research. Research of such kind is a wonderful medium for future research.

Strategies and their combinations for treatment of the phonological disorder in speech and language therapy practice.

Differentiation of children's speech sound disorders is a very important part of speech and language therapist's activities because a correct conclusion drawn after speech and therapy assessment determines correct treatment of disorders (Strand, McCauley, 2008). According to the co-authors, different strategies and techniques for treating the disorder should be employed in a case of dysarthria, child speech dyspraxia or the phonological disorder. Grounding on the doctoral research data and generalised results, it was found out that the speech and language therapists who took part in the survey apply strategies based on both motor learning and phonological learning to treat the phonological disorder. As Kamhi (2006a) has it, practitioners suppose that the motor approach "works" in many cases. However, it is important to note that when treating the speech sound disorder of the phonological type it is purposeful to apply phonological-based strategies, but not motor-based strategies. The approach based on traditional motor learning is considered to be essential when treating articulation disorders in children (Kairienė, 2017a; 2017b). It was found that, in their practical performance, speech and language therapists also apply such groups of strategies as: computer technology-based approaches, approaches on auditory memory and

focus development; whole language approach, learning the relationship of grapheme-phoneme (phonics), learning phonetic graphics as well as engagement of parents and other participants. Among the most rarely applied strategies are computer technology-based approaches, phonetic graphics learning and some strategies based on motor learning³⁴. Basically it can be stated that speech and language therapists more seldom apply these strategies which are quite new or require specific training or resources. This was also proven by findings of other empirical research by foreign authors (Hegarty, Titterington, Taggart, 2021; Furlong et al., 2021; Hegarty et al., 2018). Moreover, similar results are observed when treating other speech and language or swallowing disorders, i.e. not only in cases of speech sound disorders of children. For example, McCurtin, Healy (2017) declared that, aiming to treat dysphagia, 116 surveyed speech and language therapists more seldom applied strategies that require specific technologies or resources.

The conducted research demonstrates that, seeking to treat speech sound disorders of the phonological type, speech and language therapists usually employed regular groups of strategies recognised in speech and language therapy as common practice (“standard”) of treatment of the phonological disorder: contrast-based therapies, therapies of hearing stimulation and awareness of auditory information, therapies of (meta-)phonological awareness. Also, practitioners often apply strategies for learning the relationship of grapheme-phoneme or development of the whole language system. The whole language approach focuses attention to the development of all components of the language where phonology is only one of them (Tyler, 2002). It is likely that speech and language therapists apply this strategy because children with the phonological disorder more often experience difficulties in other linguistic fields (Tyler, 2002). It is worth reminding that opinions of both surveyed speech and language

³⁴ For example, Forbrain headphones, Warnke methods, PROMT, sensory stimulation (massage, electrotherapy, vibration).

therapists and researchers coincide. In other words, practitioners tend to support the statement that disorders of the whole language can manifest for children with the phonological disorder; therefore, in some cases it is purposeful to apply not only these strategies which are oriented to phonology, but also to the remaining components of the language. When dealing with the teaching of the relationship between letter and sound, speech and language therapists have supported the results of expert survey (stage 1 of the research) declaring that it is common to apply alternative methods of learning based on interaction of various awareness aspects in our country. According to Hodson and Paden (1991), aiming at effectiveness of treatment of the phonological disorder, it is important to apply and coordinate various types of cueing which encompass auditory, visual, tactile and kinesthetic awareness (cit. Crutchfield, 2014, p. 22).

The researcher holds an opinion that the problem occurring due to applied strategies was highlighted after rating the means of separate strategies and not groups of them. After calculating means of application of separate strategies and rating them, it was observed that the top five strategies encompass not only strategies of the training of phonemic awareness, acoustically similarly sounding word pairs and queues / minimal pairs and multiple oppositions, manipulation with sounds³⁵, but also one of the strategies based on motor learning, i.e. the traditional approach to teaching sound pronunciation. The traditional motor learning approach is attributed to the speech-based therapy and is treated as less effective in cases of the phonological disorder (Hegarty et al., 2018; Rvachew, Brosseau-Lapre, 2012; Kamhi, 2006a; Klein, 1996). Also, the research respondents do not regard recommendations based on scientific research in their practice of speech and language therapy and usually apply other strategies of the motor type: active movements of a jaw, lips, a tongue, phonetic/

³⁵ These strategies are attributed to the group of strategies based on phonological learning and are considered as reliable strategies when treating the phonological speech sound disorder.

articulatory placement, shaping, progressive approximation techniques (on the basis of an acquired sound, the pronunciation of a new, similar articulation sound is taught). It is important to note that oral-motor exercises are attributed to the group of non-speech oral motor therapy, which absolutely mismatches with the basic principles for treatment of the phonological disorder discussed in scientific literature, i.e. in a case of the phonological disorder the rules of one's mother tongue are being learnt, intervention usually starts at the level of a word, but not at the level of an isolated sound or, particularly, the level of training of the apparatus of articulation. Moreover, in scientific sources (Kairienė, 2017; Rvachew, 2012; Peter, 2011; Lass, Pannbacker, 2008), active motor exercises is considered as an ineffective strategy when treating disorders of not only phonological type, but also for motor speech sound disorders.

Similar research studies were conducted in various countries throughout the world: the United Kingdom (Hegarty et al., 2021; Hegarty et al., 2018; Joffe, Pring, 2008); Portugal (Oliveira, Lousada, Jesus, 2015); Australia (Baker, McLeod, 2014); the USA (DeVeney, 2022; Cabbage, Farquharson, DeVeney³⁶); South Africa (Pascoe et al., 2010). The comparison of the present doctoral research results on strategies employed by practitioners with results obtained by other foreign authors is presented in subchapter 6.2.2 of doctoral dissertation.

Also, the respondents unanimously underlined that in their daily practice they employ various combinations of strategies. The obtained research results coincide with the findings of other researchers (Gomez, McCabe, Purcell, 2022, 2019; Furlong et al., 2021; McLeod, Baker, 2014; Pascoe et al., 2010; Joffe, Pring, 2008). After carrying out the cluster analysis, it was discovered that speech and language therapists tend to combine strategies based on the phonological learning, development of the whole language system or engagement of parents in a course of one speech and language therapy session. One

³⁶ The article has been submitted for publishing.

of the reasons why speech and language therapists tend to apply combinations of strategies can be reasoned by combination of strategies or their elements allowing a specialist to be flexible and open to changes when a child was not responding in a way that is expected (Furlong et al., 2021). On the other hand, organisation of group training sessions rather than individual sessions is another important reason of not a lesser importance. This means that speech and language therapy can be provided to a group of children whose diagnosis on speech and language disorders not necessarily are identical. In other words, children can experience speech sound difficulties due to both motor and phonological causes (Hammarström, Svensson, Myrberg, 2018). Therefore, a likely assumption can be drawn that a large number of children with speech and language disorders per one specialist in education institutions may make possibilities of speech and language therapists to personalise strategies of speech and language therapy for a particular pupil more difficult. According to Furlong and colleagues (2021), intervention aiming to meet each child's needs is an essential and logic substantiation of application of the combinations in practice. Moreover, it is important to mention that effectiveness of combinations of treatment strategies when treating speech sound and other speech and language disorders has not been empirically proven yet.

Structure and manifestation of evidence-based practice of speech and language therapy for treatment of the phonological disorder. When applying the exploratory factor analysis, 72 statements were generalised by employing the 17 factor-model (the model did not include several stand-alone statements). Research results obtained by McCurtin, Clifford (2015), whose designed instrument on decisions for treatment of the phonological disorder was used as the basis for conducting the survey of the present doctoral research, revealed 13 factors: main practice, scientific evidence-based practice, ethical-scientific practice, limited/ pragmatic practice,

evidence of patients³⁷ and colleagues, personal influence, practice standards, less scientific evidence, autonomous clinical experience, belief in research, learning from colleagues, responsibility of patients, special preparation. Scholars emphasise that decisions on selection and application of dysphagia therapies and techniques were based, first of all, on evidence from practice and pragmatic considerations. Seeking to discover structural and evidence-based differences of manifestation of practice at the international level, it is purposeful to conduct a comparative analysis of research results for Lithuania and Ireland³⁸ in the future.

Aiming to present a generalised structure of the EBP, second factor analysis was conducted as well. Finally, 4 components of evidence-based practice were identified: practical experience and needs of a child and one's family, scientific research, practical applicability, context of professional performance. Basically, the structure of speech and language therapy practice that prevails in our country meets the theoretical (Greenwell, Walsh, 2021; Erickson et al., 2018; Roddam, 2016; Elwyn, Frosch, Kobrin, 2015; McCurtin, Roddam, 2012; Dollaghan, 2007) model of evidence-based practice. However, several differences were observed. First of all, in the structure of evidence-based practice that emerged in this research, evidence related to needs of a child and one's family as well as practical experience of specialists comprise the whole common construct. In the theoretical model, these pieces of evidence are named as separate elements. Moreover, an additional piece of evidence, practical applicability, was singled out. It was discovered that in general speech and language therapists tend to support all four components of evidence-based practice. However, the most manifested piece of evidence by them is the merging of practical

³⁷ The present research employs concepts of clinical speech and language therapy because the research was conducted engaging speech and language therapists who provide support to individuals with the swallowing disorder in clinical practice.

³⁸ Conducting statistical calculations only with the statements that were present in the original questionnaire.

experience and needs of a child and one's family. Having surveyed 176 speech and language therapists from the United States of America, Thome, Loveall and Henderson (2020) found out that despite the respondents recognised evidence-based practice and its benefits, application of EBP components in practice of speech and language therapy was quite complicated (cit. Durgungoz and Emerson 2021, p. 2).

Relationships between evidence-based practice or speech and language and applied strategies: towards evidence-based decision-making. The decision-making is an object of interdisciplinary research, is often treated in different ways by various disciplines (Šarkutė, 2009). Durgungoz and Emerson (2021) have it that the decision-making should be understood as a process which is intended for the improvement of effectiveness of different professions. When dealing with the decision-making in speech and language therapy, usually this concept is linked to evidence-based practice because it is a key stage (step) in implementation of evidence-based practice of speech and language therapy³⁹. Aiming to make evidence-based decisions, speech and language therapists must regard scientific evidence, assess suitability of their experience for a particular situation and needs and priorities of a child and one's family. In their day-to-day activities, speech and language therapists must make many different decisions, including which strategy to choose in order to treat a disorder. This is supported by DeVeney (2022) who declares that one of the most important decisions that speech and language therapists make when working with children with speech sound disorders are related to employed approaches to the treatment of these disorders (DeVeney, 2022, p. 47). As McCabe (2018) has it, due to a large number of different strategies, speech and language therapists can face serious challenges; especially, that majority of them have

³⁹ In general, the traditional linear concept of decision-making, when a set of steps is presented to help a decision-maker to make the best decision from all available options, prevails in scientific literature (Šarkutė, 2009, p. 111).

scientific evidence of a similar level. The conclusions presented in this research should not be considered as absolute for cases of speech and language disorders in children, i.e. speech and language therapists working in Lithuania, in general, make decisions concerning application of strategies in their daily performance. However, the obtained data and generalised results of the empirical research allowed proposing significant insights on practice of treatment of the phonological disorder in our country. Also, the researcher agrees that speech and language therapy is a dynamic process, therefore, the conclusions of the doctoral research on the decision-making should not be considered as final or unchanging.

Implementation of the doctoral research allowed revealing relationships between applied strategies for treating the phonological disorder and evidence-based practice of speech and language therapy when treating a speech sound disorder of the phonological type. Before that, the model of approaches based on motor and phonological learning to treat the phonological disorder was empirically substantiated and the structure of evidence-based practice of speech and language therapy that prevails in speech and language therapist's day-to-day activities was revealed. Summing up the obtained data, it was found that three structural components of evidence-based practice of speech and language therapy that were observed in Lithuania determine the selection of strategies: practical experience, needs of a child and one's family, scientific research and context of professional performance. Resolution of the research respondents to apply strategies based on the phonological or motor learning is related to support of speech and language therapists expressed towards importance of scientific evidence – this is almost the most significant finding of the doctoral research. The research results have proven that these speech and language therapists who tended to diminish scientific evidence and its value more often applied ineffective strategies. On the contrary, these practitioners who trusted scientific research more often selected effective strategies to treat the disorder. It is important to note that selection and application of strategies of development of

oral motor skills (including articulation exercising) are based on needs, expectations of a child and one's family as well as on intuition of specialists. It was found that employment of the strategy of development of the whole language is also more intuitive and is not based on scientific research.

Moreover, the research results demonstrate that the selection of strategies is influenced not only by evidence-based practice of speech and language therapy, but also by structural components of the concept of the phonological disorder. It was discovered that if a child experiences difficulties of the phonological awareness, speech and language therapists who took part in the research more likely tend to use the strategies based on phonological learning. The results demonstrate that application of strategies based on motor learning is determined by occurring alterations in motor skills or errors of substitution, omission and assimilation of sounds. On the one hand, these findings explain why speech and language therapists apply not only the strategies based on principles of phonological intervention to treat the phonological disorder. On the other hand, they emphasise one more urgent problem of a limited ability to properly identify a type of child's speech sound disorder, which likely determines incorrectly selected approach to and strategies for the treatment.

The corpus of scientific research lacks quantitative research investigating the relationship between strategies applied to treat the phonological disorder and evidence-based practice of speech and language therapy or differential features of the phonological disorder. One systematic analysis (Clifford et al., 2017) and several empirical research works (Gomez, McCabe, Purcell, 2022, 2019; Greenwell, Walsh, 2021; Durgungoz, Emerson, 2021; Selin et al., 2019; McCurtin, Healy, 2017; McCurtin, Clifford, 2015; Collis and Bloch, 2012 et al.) that analyse the decision-making by speech and language therapists treating speech, language or swallowing disorders in some aspect were found. Research studies by McCurtin, Healy (2017) as well as McCurtin and Clifford (2015) are closest to the methodological approach of the present doctoral research. Research results obtained

by McCurtin, Healy (2017) show that applied techniques or therapies in cases of dysphagias, first of all, are determined by their suitability to an individual with swallowing problems and also by experience/knowledge of a speech and language therapist-practitioner. Other researchers declare that decisions made by specialists are most influenced by practical knowledge (McCurtin and Carter, 2015; McCurtin and Clifford, 2015) or intuition (Roulstone, Peters, Glogowska, Enderby, 2008). Gomez, McCabe, Purcell (2022) discovered that practical knowledge of the strategy was one of the strongest factors that influenced speech and language therapists' selection of strategies for the treatment of child's speech dyspraxia. Also, scholars pay attention to the instance that American and Canadian speech and language therapists who participated in the research regard some recommendations provided by scientific research. For example, concerning limited effectiveness of articulation exercises when providing speech and language therapy to children of this group. Scholars emphasise that, in comparison to results of earlier research works, articulation exercising is applied much more seldom. Collis and Bloch (2012) notice that speech and language therapists assessing and treating progressing dysarthria pointed out professional experience, application of best practice guidelines, workplace and degree of severity of dysarthria as important factors. Grounding on results of research conducted in Turkey, action, qualitative and quantitative (including surveys and experiments) research studies had no direct influence on applied speech and language therapy support (Durgungoz, Emerson, 2021). On the other hand, results of recent research works show that scientific research and needs, expectations of individuals with speech and language disorders increasingly more often become main factors that are regarded by speech and language therapists when making decisions (Greenwell and Walsh, 2021). Summing up results of similar research studies, it was observed that specialists tend to regard the evidence of professional practice and those meeting needs and expectations of an individual.

To sum up, the results of this empirical research also have proven that there exists a gap between scientific research and practice. It is important to note that the use of all components of evidence-based practice could have a positive effect and enable speech and language therapists to provide as more money- and time-saving services as possible and likely shorten lists those waiting for speech and language therapy, expand resources of services and, most importantly, provide conditions to improve speech and language therapy for children with the phonological disorders in various aspects (Hegarty, Titterington, Taggart, 2021; Ebbels, 2017; Dodd, 2007). It is necessary to continue putting all possible efforts to ensure that children with the phonological disorder had as high quality and evidence-based speech and language therapy as possible, which will increase effectiveness of the support and general results of education.

CONCLUSIONS

1. A speech sound disorder of the cognitive-linguistic origin is called the phonological disorder. The phonological disorder encompasses skills of speaking and attentive listening (phonological knowledge, process of speaking and perception). In the international context, the phonological disorder is divided into three types: delayed phonological development, consistent phonological disorder and inconsistent speech (phonological) disorder. After carrying out analysis of scientific literature, the following main differential features that are significant in identifying a disorder have been singled out: origin of a disorder, structure and functions of the apparatus of articulation, peculiarities of pronunciation of sounds and character of errors, degree of speech sound disorder, speech intelligibility, phonological awareness (levels of word, syllable, rhythm and rhyme, phoneme), side difficulties of learning. In Lithuania, the concept of the phonological disorder only partly corresponds to the international concept. In the national context, the phonological disorder is called phonemic acoustic dyslalia. A prevailing opinion in Lithuania declares that speech sound deficits of motor origin can manifest not only at the phonetical, but also at the phonological level; therefore, classification of disorders that is referred to in the country points out combinations of motor and cognitive-linguistic origin.
2. The analysis of theoretical sources allows stating the following:
 - Usually, approaches to treating children's speech sound disorders are classified in two ways: based either on motor or phonological learning. The approach based on the phonological learning is considered to be essential when treating the phonological disorder. Effectiveness of phonological therapies (auditory perceptual, meaningful phonological contrasts, metalinguistic) and their characteristic strategies was proven by scientific research in cases of

English-speaking children. Comprehensive scientific research should be carried out in Lithuania because effectiveness of treatment strategies has not been investigated so far. Also, the need for theoretical substantiation of approaches to and strategies for treating children's speech sound disorders is obvious.

- Evidence-based practice of speech and language therapy is usually linked to evidence-based assessment and speech and language therapy. Effectiveness of treating a disorder is determined by selection of reliable, evidence-based strategies and application of them in practice of speech and language therapy. Evidence-based practice encompasses such components as referring to high quality scientific research, professional experience and practice of specialists, needs, opinion and expectations of a child and one's family as well as the context of professional performance. Evidence-based practice of speech and language therapy is acknowledged as a long-term and complex process requiring continuous professional development, increase of qualification and critical thinking of specialists. Its importance to speech and language therapy is underlined by various large European and global professional organisations of speech and language therapists: ASHA, ESLA, RCSLT, SPA.
3. Grounding on the results of the confirmatory factorial analysis, the theoretical model of approaches to and strategies based on motor and phonological learning for treating the phonological disorder applied in the doctoral research has been approved and substantiated, and it can be used for further analysis of the obtained data.
 4. The results obtained during the empirical research revealed the practice applied by speech and language therapists treating the phonological disorder:
 - *The most often applied treatment strategies.* Speech and language therapists who took part in the survey usually apply

the following five strategies for treating the phonological disorder: training of phonemic awareness; minimal pairs; learning of basics (abilities) of sound analysis and synthesis; multiple oppositions and traditional motor learning. Four of them are attributed to the approach based on phonological learning. Respondents of this research sometimes apply active motor movements of jaw, lips, tongue (oral motor exercises) in case of the phonological disorder. The most rarely applied strategies are hierarchy of subsystems of the speech apparatus and integration of stimuli prompts for restructuring oral muscular phonetic targets (PROMT) as well as computer-based technology. Specialists usually apply combinations of strategies during one speech and language therapy session to treat a speech sound disorder of the phonological character.

- *Context of speech and language therapy.* Group (2–3 children) speech and language therapy delivered in a speech and language therapist’s room at an institution dominates. During speech and language therapy session, structured activities with elements of play are organised. Also, diversity of applied traditional educational measures (physical and play objects, paper cards etc.) was found out. Innovative measures for treating the phonological disorder were applied less often.
- *Intensity of speech and language therapy.* The respondents do not project a maximum number of speech and language therapy sessions for children with the phonological disorder per academic year. Speech and language therapy is usually provided two times per week, one session delivered by specialists lasts up to 30 minutes or one academic hour; during the session, children perform around 50 repetitions of pronunciation of a unit (phoneme, syllable, word, etc.) being practiced.

5. When differentiating and identifying the phonological disorder, the following features are significant: difficulties of the phonological awareness, speech and adjacent difficulties in

learning; consistent errors in substituting, omitting, assimilating sounds; alterations in speech motor skills; difficulties in the use of sound in speech and syllables, repetition of words. To sum up manifestation of them, the respondents assessed difficulties in the use of sounds and syllables, repetition of words and phonological awareness in highest scores. The lowest scores were given to speech motor skills, i.e. alterations of breathing, voice, phonation and prosody as well as structure and functions of the apparatus of articulation.

A statistically significant correlation was found between manifestation of structural components of the concept of the phonological disorder and strategies applied by speech and language therapists for treating the phonological disorder: phonological awareness, consistent errors of substitution, omission and assimilation of sounds as well as alterations in motor skills. The research results show that application of strategies based on motor learning to treat the phonological disorder is determined by consistent errors in substitution, omission and assimilation of sounds by children and alteration in motor skills identified by speech and language therapists; whereas application of strategies based on phonological learning is determined by dominating difficulties in phonological awareness. The effect of other two remaining features characterising the disorder in models of multidimensional regression was statistically insignificant.

The hypothesis stating that speech and language therapists usually emphasise features related to difficulties of the phonological awareness in the concept of the phonological disorder and more rarely related to alterations in speech motor skills was proven only partly. On the other hand, practitioners revealed a dominating view declaring that children with the phonological disorder are characteristic of not only difficulties of sound pronunciation, use and differentiation, but also of difficulties in reading, writing.

6. On the basis of the factorial analysis, a conclusion is drawn that the following internal structure of evidence-based practice of speech and language therapy prevails in performance of Lithuanian speech and language specialists:
- *Practical experience and needs of a child, one's family*, which consists of practically tested new strategies, personal practical experience, needs of a child and one's family, orientation to a child, scientific and time-tested practice, practical experience of colleagues.
 - *Scientific research*, which encompasses scientific research-based practice, substantiation of application of strategies, distrust in scientific research, intuition and relation to a pupil.
 - *Practical applicability*, which combined applicability in real-life practice, substantiation of a strategy, orientation to safe and regular practice, personal professional development.
 - *Context of professional performance*, which comprises 3 scales: contribution and responsibility of a child, one's family and other participants, influence of institutional and national policy, mass media and limited offer.

Manifestation of specialist's professional experience as well as child's and one's family needs is the largest. Manifestation of other pieces of evidence, i.e. scientific research, practical applicability and context of professional performance, is slightly less.

The hypothesis stating that when making decisions concerning selection of strategies for treating a phonological disorder speech and language therapists tend to regard their own and colleagues' professional experience and child's, one's family individual needs, expectations and values more, rather than scientific research or the context of professional performance, was proven.

7. It was found that selection made by speech and language professionals concerning which strategies for treating the phonological disorder to apply is related to components of evidence-based practice of speech and language therapy. The

largest influence on speech and language therapists deciding on application of strategies is made by practical experience and child's, one's family needs as well as scientific research and the context of professional performance.

The research results have proven the hypothesis stating that speech and language therapists in whose performance there is lesser manifestation of evidence more often apply strategies that are based on motor learning to treat the phonological disorder; whereas strategies that are based on phonological learning are applied by these speech and language specialists in whose activities manifestation of scientific evidence is higher.

APPROVAL OF THE DOCTORAL RESEARCH RESULTS

Papers on the topic of the doctoral research published in periodic scientific journals:

1. Kairienė, D., **Daniutė, S.** (2015). Motorinės kilmės vaikų garsų tarimo sutrikimų apibrėžtys, identifikavimas ir diferencinės charakteristikos [Definitions, Identification and Differential Characteristics of Motor Origin Speech Sound Disorders in Children]. *Specialusis ugdymas / Special Education*, 2 (33), 47-68. ISSN 1392-5369.
2. Kairienė, D., **Daniutė, S.** (2015). Kognityvinės-lingvistinės kilmės vaikų garsų tarimo sutrikimų apibrėžtys, identifikavimas ir diferencinės charakteristikos [Definitions, Identification and Differential Characteristics of Cognitive-Linguistic Speech Sound Disorders in Children]. *Specialusis ugdymas / Special Education*, 2 (33), 91-109. ISSN 1392-5369.
3. **Daniutė, S.**, Staliūnienė, I. (2021). Fonologinių gebėjimų apibrėžtis, įvertinimas bei sąsajos su skaitymo sutrikimu (disleksija) [Definition, Assessment of the Phonological Skills and Their Correlations With the Reading Disability (Dyslexia)]. *Specialusis ugdymas / Special Education*, 2(43), 53-108. ISSN 2424-3299. DOI: 10.15388/se.2021.v2i43.6

Papers on the topic of the doctoral research published in proceedings of scientific conferences:

1. **Daniutė, S.** (2016). Fonologinis (kognityvinės – lingvistinės kilmės) sutrikimas [Phonological (Cognitive-linguistic Origin) Disorder]. *XXI amžiaus kalbos tyrimai: nuo garso iki teksto: III tarptautinė mokslinė konferencija / Language Studies for the 21st Century: from Sound to Text: III International Scientific Conference*. Theses. Vilnius: Lithuanian University of Educational Sciences, 5-6.
2. **Daniutė, S.** (2017). Phonological Disorder in Children and Evidence Based Treatment Approaches. *Eat Safe, Speak Brave!:*

- 4th Congress of Baltic Speech and Language Therapists. Book of Abstracts. Riga: Speech therapists' association of Latvia, 36-37. ISBN 9789934191466. ISSN 2255-9647.
3. **Daniutė, S.** (2018). Theoretical Principles of Evidence-Based Practice in Speech and Language Therapy. *Alternative and Augmentative Communication: More than Words...: The 5th Congress of Baltic States SLTs*. Book of Abstracts. Šiauliai: Šiauliai University, 24. ISBN 9786098179156.
 4. **Daniutė, S., Jundo, K.** (2018). The Skills of Phonological Awareness in Children. *10th CPLOL Congress of Speech and Language Therapy „Effectiveness. Speech and Language Therapy. Science. Practice“*. Book of Abstracts. Cascais, Portugal, Paris: Standing Liaison Committee of E.U. Speech and Language Therapists and Logopedists, 139. ISBN 9782955250518.
 5. **Daniutė, S.** (2019). Fonologinio suvokimo gebėjimai ir jų formavimosi nuoseklumas [Skills of Phonological Awareness and Sequence of their Developmental]. *Pagalba vaikui ir šeimai: galimybės, iššūkiai perspektyvos / Help for the Child and Family: Opportunities, Challenges Perspectives* [electronic resource]: a collection of articles from an international scientific-practical conference / compilers: Jurgita Pintulienė, Laima Tomėnienė. Vilnius: Litera. 45–53. ISBN 978-609-482-032-8.
 6. **Daniutė, S.** (2020). Differential Characteristics of Dysarthria, Childhood Apraxia of Speech, Articulation and Phonological Disorders. *Fluency in Speech and Reading. 7th Congress of Baltic Speech and Language Therapists*. Book of Abstracts. Riga: Speech therapists' association of Latvia, 50-51. ISBN 978-9934-8778-1-0. ISSN 2661-5517.
 7. **Daniutė, S., Kairienė, D.** (2022). Evidence Based Treatment Strategies of Phonological Disorders: Why SLTs Do What They Do? *Speech and Language Therapy Across The Age Span: 8th online Congress of Baltic Speech and Language Therapists*. Book of Abstracts. Kaunas: Vytautas Magnus University

Education Academy; Šiauliai: Vilnius University Šiauliai Academy, Lithuanian Logopedists' Association, 48-49. ISBN 978-609-467-516-4.

8. **Daniutė, S.**, Miltenienė, L., Balčiūnas, S. (2022). Structure and Expression of Evidence-Based Practice in Speech and Language Therapy via Treatment Decision Making for Children with Phonological Disorder: a Survey of Speech and Language Therapists in Lithuania. *11th ESLA Congress of Speech and Language Therapy „New Frontiers in Speech and Language Therapy: Advancing Practice, Research and Education“*. Book of Abstracts. Salzburg, Austria: European Speech and Language Therapy Association, 27.

Presentations at international scientific conferences, congresses:

1. III International Scientific Conference „Language Studies for the 21st Century: from Sound to Text“. Presentation *Phonological (Cognitive-linguistic Origin) Disorder*. 2016-09-15 // Lithuanian University of Educational Sciences, Vilnius.
2. 4th Congress of Baltic Speech and Language Therapists “Eat Safe, Speak Brave!” Presentation *Phonological Disorder in Children and Evidence-based Treatment Approaches*. 2017-02-24-25 // Riga, Latvia.
3. 5th Congress of Baltic Speech and Language Therapists „Alternative and Augmentative Communication: More than Words“. Presentation *Theoretical Principles of Evidence-Based Practice in Speech and Language Therapy*. 2018-04-26/27 // Šiaulių universitetas, LLA, Šiauliai.
4. 10th CPLOL Congress of Speech and Language Therapy „Effectiveness. Speech and Language Therapy. Science. Practice“. Presentation *The Skills of Phonological Awareness in Children*. 2018-05-10/12 // Cascais, Portugal.
5. 6th Congress of Baltic Speech and Language Therapists “Autism: Communication is Everything...“. Presentation *Comparison of Phonological Disorder and Motor Speech Disorders*

(Dysarthria, Dyspraxia) in Children. 2019-04-05/06 // Tartu, Estonia.

6. 7th Congress of Baltic Speech and Language Therapists „Fluency in Speech and Reading“. Presentation *Differential Characteristics of Dysarthria, Childhood Apraxia of Speech, Articulation and Phonological Disorders*. 2020-03-06/07 // Riga, Latvia.
7. 8th online Congress of Baltic Speech and Language Therapists Speech and Language Therapy Across The Age Span. Presentation *Evidence Based Treatment Strategies of Phonological Disorders: why SLTs do what they do?* 2022-05-12/13 // Kaunas: Vytautas Magnus University Education Academy; Šiauliai: Vilnius University Siauliai Academy, Lithuanian Logopedists' Association.
8. 11th ESLA Congress of Speech and Language Therapy „New Frontiers in Speech and Language Therapy: Advancing Practice, Research and Education“ Presentation *Structure and Expression of Evidence-Based Practice in Speech and Language Therapy via Treatment Decision Making for Children with Phonological Disorder: a Survey of Speech and Language Therapists in Lithuania*. 2022-05-26/28 // Salzburg, Austria.

Presentations at scientific-practical conferences:

1. Scientific-practical conference of Lithuanian Logopedists' Association „Identification of Speech and Language Disorders in Children“. Presentation *Definition, Identification and Differential Characteristics of Phonological Disorders*. 2015-12-03 // Šiauliai University, LLA, Šiauliai.
2. Šiauliai district methodological-practical conference of teachers, educational support specialists "A Different Lesson. What's it Like?" Presentation *Assessment and development of auditory and phonological awareness skills: prevention of writing and/or reading disorders*. 2020-02-20 // Pakapė, Šiaulių district.

3. Republican methodological-practical conference „The Role of the Speech and Language Therapist in the Context of Inclusive Education“. Presentation *Phonological Disorder Treatment Approches in Speech and Language Therapy Practice: National and Internation Contexts*. 2022-04-12 // Vilnius University Šiauliai Academy, Pedagogical Psychological Service of Šiauliai city, Siauliai City Municipality Education Centre, Šiauliai.

Training sessions, seminars, lectures delivered on the topic of the doctoral research:

1. Seminar for the speech and language therapists of Šiauliai district *Phonological Disorder: Definition, Identification and Treatment*. 2017-04-05 // Šiauliai.
2. Lectures for the speech and language therapy students at the University of Nebraska *Identification and Treatment of Phonological Disorder in Children: Research Protocol, Ethics and Theoretical Analysis*. 2019-06-06. // Omaha, Nebraska, USA.
3. International training course for speech and language therapists „LINKS“. Presentation *Evidence-based Treatment of Phonological Disorders*. 2019-08-24/31. // Kranevo, Bulgarija.

The following events were attended in the course of writing the doctoral thesis:

1. International research trainership at the University of Central Lancashire. 2016-05-01/2016-07-29, Preston, United Kingdom.
2. Erasmus+KA107 mobility visit at the University of Nebraska. 2019-06-03/07. Omaha, Nebraska, United States of America.

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