

LATVIAN ACADEMY OF SPORT EDUCATION



Alina KURMELEVA

**THE DEVELOPMENT OF PARENTAL COMPETENCE
MODEL IN INFANT FLOATING**

Summary of the Doctoral Thesis

For obtaining the Doctoral Degree (*Ph.D.*) in the field of Health and Sports science
in the Sub-branch of Sport pedagogy

RIGA, 2021

The Doctoral Thesis has been worked out in Latvian Academy of sport education during the period 2014 – 2020.

Scientific advisor:

Prof. Dr.paed. Andra **FERNĀTE** (Latvian Academy of Sport Education)

Head of Doctorate Council:

Prof., Dr.paed. Jānis **ŽĪDENS**

Deputy of Head of Doctorate Council:

Prof. Dr.paed. Uldis **GRĀVĪTIS**

Members of Doctorate Council:

Prof. Dr.paed. Agita **ĀBELE** (LASE)

Prof. Dr.paed. Andra **FERNĀTE** (LASE)

Prof. Dr.paed. Juris **GRANTS** (LASE)

Prof. Ph.D. Jaak **JURIMAE** (*University of Tartu, EST*)

Ph.D. Aija **KĻAVIŅA** (LASE)

Assoc.prof. Ph.D. Anda **ĶĪVĪTE - URTĀNE** (RSU)

Assoc.prof. Ph.D. Artur **LITWINIUK** (*Józef Piłsudski University of Physical Education in Warsaw, POL*)

Prof. Ph.D. Arvydas **STASIULIS** (*Lithuanian Sports University, LTU*)

Assoc.prof. Ph.D. Signe **TOMSONE** (RSU)

Prof. Ph.D. Mati **PAASUKE** (*University of Tartu, EST*)

Prof. Dr.med. Inese **PONTAGA** (LASE)

Prof. Dr.paed. Žermēna **VAZNE** (LASE)

Scientific Secretary of Doctorate Council:

Assoc.prof. Dr.paed. Irēna **DRAVNIECE**

Official Reviewers:

Assoc.prof. Ph.D. Aušra **LISINSKIENE** (*Vytautas Magnus University, Lithuania*)

Prof. Dr.med. Anita **VILLERUŠA** (*Riga Stradins University*)

Assoc.prof. Dr.med. Anda **ĶĪVĪTE-URTĀNE** (*Riga Stradins University*)

The defence of the Doctoral Thesis will be held on July 22, 2021 11⁰⁰ a.m., room 205., LASE (Brīvības gatve street 333, Riga).

The Doctoral Thesis and Summary are available in the LASE Library and at homepage www.lspa.lv.

ISBN 978-9934-520-46-4

CONTENT

Content.....	3
General Description of the Doctoral Thesis.....	4
Chapter 1 “Correlation between the Development of Infant Swimming Skills and Parental Competence in Infant Floating” of the Doctoral Thesis	
.....	
11	
Chapter 2 “Methods” of the Doctoral Thesis.....	13
<i>Scientific literature review and analysis.....</i>	<i>13</i>
<i>Questionnaire survey.....</i>	<i>13</i>
<i>Modelling.....</i>	<i>13</i>
<i>Expert opinion method.....</i>	<i>16</i>
<i>Mathematical statistics.....</i>	<i>17</i>
Chapter 3 of the Doctoral Thesis analyses the results obtained.....	17
<i>Subchapter 3.1 “Specialists' Opinion on Parental Competence in Infant Floating and Development of Infant Swimming Skills”</i>	
.....	
<i>17</i>	
<i>Subchapter 3.2 “Parents' Opinion on Parental Competence in Infant Floating and Development of Infant Swimming Skills”</i>	
.....	
<i>21</i>	
<i>Subchapter 3.3 “Development of the model to improve parental competence in infant floating based on the previous research”</i>	
.....	
<i>26</i>	
<i>Subchapter 3.4. Assessment of the developed model and development of scientifically based recommendations for the implementation of the model to improve parental competence in infant floating</i>	
.....	
<i>37</i>	
Discussion.....	39
Conclusions.....	44
List of scientific publications.....	49
Participation with reports in international scientific conferences.....	50
Acknowledgements.....	51
Curriculum vitae.....	51

General Description of the Doctoral Thesis

Statistics show that young and reckless men as well as children are at a higher risk of drowning. In Latvia, the drowning rate is more than 6 deaths per 100,000 population which is the highest rate in the European Union, more than six times the average rate. According to the estimates based on the data of the World Health Organisation, 6.83 drownings per 100,000 population were registered in Latvia in 2017, while the number of drowning deaths in 33 countries did not exceed one, and in almost half of the countries (96) the number of drowning deaths was at an average level (LPP, 2018 A, C). This means that Latvia is among the leaders in statistics on the number of drowning deaths both in the European and global context.

Reduction of drowning deaths is one of the objectives of Latvia's National Development Plan for 2021-2027 as drowning is one of the most common external causes of death in Latvia (Olševska, 2020).

Analysis of the latest information shows that in Latvia there were 96 drowning deaths in 2019 and 61 – in the first six months of 2020. While the average death rate from drowning in the EU is 1 per 100,000 population and in our country – 6 per 100,000 population, the Swimming Federation of Latvia has developed a drowning prevention strategy which aims to halve the number of water accidents by 2025 (Olševska, 2020).

In light of the statistical data, it is very important to pay attention to swimming in early childhood and further acquisition of swimming skills in children.

The beneficial effects of water on the human body have been known since ancient times. No other physical activity can be compared to exercise in a water environment as weightlessness and horizontal body position help relieve the spine. Frequent movements in the horizontal position unload the spine, as opposed to the vertical position in which people spend 2/3 of their life, and relieve the back and tension between the nerve endings (Barczyk, Skolimowski & Zawadzka, 2005). In addition, regular swimming lessons have a multifaceted effect on the person's physical development, the CNS and the respiratory system, and help improve posture. Slow and rhythmic movements in water improve blood supply and metabolism as well as strengthen the vascular system (Ahrendt, 1997; Sigmundsson & Hopkins, 2009). Swimming exercises have been recognised as a means of health promotion and disease prevention (Tanaka, 2009). Swimming has a particularly positive effect on children as it both helps prevent drowning and improves emotional health, sense of balance, flexibility, and strength (Protano et al., 2016).

Nowadays, activities involving children and parents are becoming more and more popular. It is a good opportunity to spend time together, socialise and promote healthy infant development (Freedman, 2014), but there is not always time, place, and eagerness for that. At this point, emphasis should be laid on the

child's age as infants, for example, cannot act independently without the help and presence of their parents (Meredith, Hicks & Stephens, 2001). Given the variety of activities, this Doctoral Thesis pays special attention to swimming. Luckily, babies are familiar with water environment and experience certain sensations while growing in the womb (Johnson, 1996). If the infant's parents have an opportunity to attend infant swimming lessons in the pool, they are likely to make use of it. In this process, the way parents feel in this type of activity, their ability to independently perform exercises with the infant and their sense of direction in a specific water environment is of great importance (Ahrendt, 2002; Zhao et al., 2005; Федулова, 2011).

Many parents like infant floating, but they often misunderstand its nature and, as a result, cannot do it in the right manner. Their lack of knowledge, skills and practical skills to properly handle a water environment can generally affect parental competence in infant floating (Stallman, 2014).

In the world, the views on infant floating are rather mixed. The most optimal method and sequence of exercises to ensure proper infant floating has not been determined. In infant floating, two main techniques are distinguished: therapeutic and pedagogical. The latter includes teaching infant floating to parents (Ahrendt, 2002; Zhao et al., 2005; Федулова, 2011).

While the concept of competence can be defined differently, it generally relates to a person's ability to choose the most appropriate means for a given situation or activity based on this person's knowledge, and act suitably (Koçe, 2003).

The knowledge, skills and attitudes of parents during infant floating speak of their competence in this field (Stallman, 2014). When teaching infant floating to parents, it is important to help them learn appropriate infant floating skills so that they can use them safely and confidently in further development of their child (Meredith et al., 2001; Jovanovich, 2002). Hence follows the necessity to ensure that parental competence in infant floating is enhanced in line with the parents' abilities and interests as well as in compliance with the stages of teaching infant floating. Thus, the aim of the research is based on the model to improve parental competence in infant floating.

Research object: Infant floating

Research subject: The structure and improvement of parental competence in infant floating.

Research base: Parents and infants attending lessons in the pool, and infant floating specialists (Riga Health Centre branches: "Kengarags", "Imanta", "Ilguciems" and "Bolderāja". Rehabilitation Department).

Research aim: Development of the model to improve parental competence in infant floating and development of scientifically based recommendations in infant floating.

if: **Research hypothesis:** Parental competence in infant floating will improve

- The infant floating programme content and implementation thereof is suitable to the infants' age and reflexes.
- Conditions are created to ensure gradual autonomy of parents in infant floating.
- Parents are aware of the infant floating conditions, the effects of floating on the infant's body, floating contraindications, water safety and awareness during infant floating.
- Parents are able to ensure a safe floating environment for their infant, responsibly use their infant floating skills and swimming aids depending on the circumstances.

Research objectives:

1. To theoretically study the correlations between the development of infant swimming skills and parental competence in infant floating.
2. To study and analyse the opinion of infant floating specialists on parental competence in infant floating for the purpose of developing infant swimming skills.
3. To study and analyse parental competence in infant floating for the purpose of developing infant swimming skills.
4. To develop the model to improve parental competence in infant floating based on the previous research.
5. To assess the model developed to improve parental competence in infant floating and to develop scientifically based recommendations for its implementation.

Research methods:

1. Literature analysis
2. Survey
3. Modelling
4. Expert opinion method
5. Mathematical statistics

Methodological substantiation of the research:

- Competence is characterised by the ability to use knowledge and skills and express attitudes in solving problems in changing and real-life situations; the ability to adequately apply the learning outcome in a specific context (educational, work, personal or socio-political context). (Koçe, 2003; Maslo, 2003; Хуторской, 2003; Вербицкий, 2004; Duffy, Petrovic & Crespo, 2010, Rauhvargers, 2010).
- Parental competence in infant floating implies: knowledge about infant floating, skills in infant floating, practical skills in infant floating (Committee on Sports Medicine and Fitness and Committee

on Injury and Poison Prevention, 2000; Ahrendt, 2002; Jovanovich, 2002; Tanaka, 2009; Федулова, 2011; Freedman, 2014; Stallman, 2014).

- Infant floating lessons and understanding thereof – the importance of floating, its impact on health and the body, floating contraindications, the use of equipment and aids (Johnson, 1996; Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Meredith, et al 2001; Jovanovich, 2002; Barczyk, Skolimowski & Zawadzka 2005; Zhao et al., 2005; Zelazo & Weiss, 2006; Bernard et al., 2007; [Nystad](#) et al., 2008; Sigmundsson & Hopkins, 2009; Voisin et al., 2010; [Dias](#) et al., 2013; Петрова & Баранов, 2013; [Faerch](#), 2018).
- Water safety in infant floating – water safety knowledge and awareness, ensuring a safe environment, responsible use of infant floating skills depending on the circumstances (Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Ahrendt, 2002; Jovanovich, 2002; [Brenner](#), Gitanjali & Gordon, 2003; Tanaka, 2009; Федулова, 2011; Blitvich et al., 2012; Freedman, 2014; Stallman, 2014).
- Development of infant swimming skills – swimming skills, teaching swimming skills, improvement of swimming skills (Гутерман, 1981; Ahrendt, 2002; Фирсов, 2013; Rich & Giles, 2014; LPF, 2018, G).
- Structure of parental competence in infant floating and structural component sequence: (Mezirow, 1991; Zids, 1997; Bell, Chelf & Geerdes, 2000; Кучугурова, 2000; Bolhuis 2003; Введенский, 2003; Jarvis, 2004; Demers, Woodburn & Savard, 2006; Lyle, 2007; Mallett, 2007; Мухортова, 2008; Bruck, 2009; Vogt & Rogalla, 2009; Baartman & Bruijn, 2011; Baartman, 2011; Коломийченко, 2013; Корнева, 2015; Mileakova – Roman, Dorgan & Vashenko, 2017).

Scientific novelty of the research:

The research accomplishments are as follows:

- Definition of the terms “infant floating”, “infant swimming skills” and “parental competence in infant floating”.
- Development of the structure of parental competence in infant floating and definition of its structural elements.
- Development of the model to improve parental competence in infant floating.

Practical significance of the research:

- A questionnaire for parents “Self-Assessment of Parental Competence in Infant Floating” was developed and tested to determine their competence in infant floating. The developed

questionnaire can be practically used by both infant floating specialists and parents involved in it.

- A questionnaire for infant floating specialists “Assessment of Parental Competence in Infant Floating” was developed and tested for them to assess the competence of parents in infant floating and customise infant floating in line with the assessment obtained.
- To implement the model to improve parental competence in infant floating, a sequence of practical exercises in each phase of model implementation was developed. The said model can be used in infant floating practice and, to implement it, recommendations were given both to swimming specialists and parents.

Theses for the defence of the Doctoral Thesis:

- Content of the floating programme for 3-9 months old infants includes simple exercises in water to be performed with the help of parents (push-off, arm pulling while lying on the stomach, alternate leg bending and straightening, leg kick simulation for breaststroke and backstroke), while for 9-18 months old infants the exercises in water to be performed with the help of parents are more complicated (imitation of jumping into water from the edge, throwing the infant in the air and catching in water, leg kicks for crawl, floating on the stomach with the support of a swimming aid, floating on the stomach, floating on the back, diving exercises). Floating exercises are chosen depending on the development of the infant's natural basic swimming reflexes: the “amphibian reflex”, the “straightening reflex”, and the “breathing reflex”.
- Infant floating reflects successive activity phases. In the initial phase, it is necessary to assess whether there is a need to develop parental competence in infant floating (assessment of the parents' initial knowledge, skills and attitudes towards infant floating). The next step is to improve the knowledge about infant floating under the guidance of specialists. Later, under the guidance of swimming specialists, the knowledge about infant floating is integrated by performing exercises and ensuring a safe environment in water. In the final phase, parents use floating exercises and equipment responsibly and independently, in line with floating contraindications and ensuring a safe water environment.
- Parents know different holding techniques in infant floating, have the knowledge about swimming aids and know when they should be used, can perform infant floating exercises holding the infant in different ways, with different movements, are aware of the effect of infant floating on the infant's body, floating contraindications (wounds, skin abrasions, inflammation, allergic reactions, vaccines, infections, fever), safety rules in the pool, action

in emergency situations (action sequence in dangerous or unforeseen situations – falls, tripping, infant dropping, choking, pulling out of water), first aid (theoretical rescue fundamentals and action sequence, first aid for choking, pulling out of water, basic CPR).

- Safe floating practice for parents and infants – pool entry and exit, infant holding techniques, safe action in emergency situations. Responsible use of infant floating skills in the context of safe practical work of parents under the guidance of specialists and independently, without the presence of specialists: practical performance of individual exercises in different floating positions (vertically, on the back, on the stomach, on the side), in place, in different directions (forward, backward, sideways) and diving, for different body parts (arms, legs, muscles on the back and front of the body). Safe practical use of additional swimming aids during infant floating.

Keywords:

Parental competence in infant floating, structure, model.

Research boundaries

Swimming specialists from the branches of Riga Health Centre where infant floating lessons take place. Parents who attend infant floating lessons by physician's referral, or parents who attend infant floating lessons on their own initiative. Methodologies of different authors and from different countries were integrated mainly based on the US, German and Australian approaches to infant floating. The model to improve parental competence in infant floating that can be used by swimming specialists and parents having access to a specific water environment. Sequence of knowledge integration for the independent use of exercises to practically implement the model to improve parental competence in infant floating. Using the expert opinion method, the insight into the researched phenomenon was fairly and reliably examined resulting in the conclusion that work should be done under the principle of one infant floating model which would facilitate better development of parental competence and enhancement of professional knowledge of young swimming specialists in infant floating.

Research phases

The research was conducted in six phases and lasted from September 2014 to July 2020.

The first phase of the research lasted from September 2014 to September 2015. During this period, the scientific literature on infant floating and competences required for independent floating was studied and analysed, and the most relevant problems and current issues in infant floating were sought. Infant floating lessons in the pool were observed to better substantiate the original problem and hypothesis of the research. The directions for further problem research and the plan of the research implementation were determined.

The second phase of the research lasted from September 2015 to September 2016. The theoretical analysis of literature for the problem raised in the first phase of the research was continued, and the hypothesis was refined. During said period, the research methods that could be successfully used to solve the research problem were sought. Several scientific articles and literature on the research methods used in pedagogy were studied.

The third phase of the research lasted from September 2016 to March 2017. In this phase, the research methodology was chosen, the potential respondents (specialists) involved in the research were selected and approved by survey locations and specialists involved in the research, and preparations for the development of the survey questionnaires were made.

The fourth phase of the research lasted from April 2017 to October 2017. To successfully survey the specialists of Riga Health Centre and conduct the parent survey for the self-assessment of competence in infant floating, questionnaires were developed based on the analysis of special literature and scientific research. Once the questionnaires were developed and the specialists' and parents' self-assessment of the infant floating competence was surveyed, specialists and parents filled out the questionnaires which were then compiled for further processing of the results.

The fifth phase of the research lasted from December 2017 to May 2018. In this phase, all questionnaires and the data obtained were summed up, statistically processed and analysed, and figures were made. Based on the questionnaire results, the theoretical development of the model to improve parental competence in infant floating was started. The questionnaire results were prepared for presentation at scientific conferences and publication in collections of scientific articles.

The sixth phase of the research lasted from June 2018 to July 2020. In the last phase of the research, the results of questionnaire analysis for the Doctoral Thesis were presented at international scientific conferences. The results outlined in different chapters of the Doctoral Thesis were published in international collections of scientific articles, including the model developed to improve parental competence in infant floating and the structure of parental competence components to improve parental competence in infant floating. The specialists who had filled out the assessment questionnaire were invited to assess the model developed to improve parental competence in infant floating and the structure of parental competence components. In the end, all expert opinions were summarised and assessment questionnaires were evaluated.

The Doctoral Thesis was drawn up in line with the requirements as to the technical design and content thereof, and preparations for the pre-defence were made.

Content of the Doctoral Thesis

The theoretical part of the Doctoral Thesis consists of an introduction and analysis of the special scientific and methodological literature. In the introductory

part, the topicality of the research topic is substantiated, and the research object, subject, base, aim, hypothesis, objectives and methods are specified. The concluding part of the introduction provides the scientific novelty, theoretical and practical significance of the research, describes the theoretical and methodological substantiation of the research, puts forward the theses for the defence and the phases of the research. The introduction is followed by a discussion by chapters.

Chapter 1 “Correlation between the Development of Infant Swimming Skills and Parental Competence in Infant Floating” of the Doctoral Thesis

Subchapter 1.1 “Infant Development and Reflexes” examines the physiological development and reflexes of infants. It was found that the static and motor development of a newborn baby depends on the maturation of the central nervous system. These reactions vary with age, but from birth they develop in a strict order, namely, the reflex mechanisms of postural control and maintenance, which allow a person to resist the effect of gravity and maintain balance, develop gradually. It is believed that movements occur not because the organs have become able to perform their functions, but because functioning organs are identified and used appropriately, and the receptors perceiving body posture and movements promote the development of statics and movement. The development of neonatal motor skills is significantly influenced by the formation of postural reflex mechanism: the emergence of postural and equilibrium reactions, transformation of primary primitive synergistic total movements into separate specialised movements, and the development of gradually changing muscle tone to overcome gravity.

Subchapter 1.2 “Positive Effects of Swimming on People” studies the effects of swimming on the general body conditioning along with the psychological and emotional effects. Swimming is generally defined as a water sport done without any artificial aid that can also be done indoors, for example, in pools, and outdoors – in large lakes and rivers. The analysis of literature sources and the research helped find out that swimming as a physical activity has a very beneficial effect on the human body. Swimming promotes skin cleaning, body conditioning, functioning of the cardiovascular system, development of the respiratory organs, preventive treatment of the musculoskeletal system, development and strengthening of the body muscles, beneficial effects on the nervous system, weight loss, treatment and prevention of different diseases. In terms of infant floating, the most important benefit is a great bonding experience for parents and their children. In today's hectic and fast-paced world, one should stop for a bit just to enjoy strenuous activities activity one's child.

Subchapter 1.3 “Theoretical Principles of Infant Floating” examines the theoretical issues of the effect of water on the infant's body, emotional development as well as physiological and psychological processes. The natural swimming reflexes of infants are considered along with the infant floating techniques, and considerable attention is paid to water safety.

In the literature review, the topic of swimming aids that can be successfully used during infant floating lessons was touched upon. Swimming aids of all types promote comprehensive adaptation of infants in a water environment which, in turn, promotes more effective swimming training for infants at the lessons to follow. Swimming aids are also used to make activities more interesting by letting infants perform different tasks with them, use aids to replace holding and teach infants to independently move in water using their legs and arms.

Based on the analysis of literature by different authors, the term infant floating can be defined as follows: it is the teaching of basic swimming movements in water to infants aged 3 to 18 months with the direct assistance of a swimming specialist or a parent in the performance of the basic swimming movements.

According to the unified definition of the swimming skill in the Scandinavian countries, a child or an adult is supposed to swim 200 meters, including 50 meters on the back. A person must be able to jump into a deeper place and pick up an object from a body of water or the bottom of a pool. Based on the content of the infant floating programme offered by different authors, it is possible to define a new term, i.e. infant swimming skills, meaning the infants' ability to perform deliberate basic swimming movements on their own (push-off with the legs, arm pulling, leg kicks for breaststroke and backstroke, jumping into water and short-time diving) with parental holding and support, or independently, without parental assistance, using different swimming aids.

Subchapter 1.4 “Understanding of Competence. Parental Competence in Infant Floating” elucidates the concept of competence and understanding of the professional competence concept as well as discusses parental competence in infant floating. Having analysed the literature sources and researched the definitions of competence, it can be concluded that competence is a parameter of social role which manifests in each person as this person's individual competence depending on this person's standing in the given time. It is the ability to implement activities in line with social requirements and expected needs. Competence can be seen as the ability to make a connection between knowledge and a situation or, more broadly, as the ability to find, see and identify the procedure or action (knowledge – action) that is most optimal for solving a particular problem.

People's activity, regardless of the profession or industry in which they are engaged, is full of value only if people supplement their previously acquired knowledge, additionally acquire and upgrade professional skills, and develop their personality. For the infant floating system to accomplish this complex mission, every parent must be able to professionally create an environment for the teaching of swimming skills where infants are provided with the opportunity to use all their abilities and potential, discover their individuality, fully participate in all floating activities.

By analysing different competence definitions and the literature of different authors on infant floating, it is possible to define the concept of parental competence in infant floating as the ability to responsibly integrate the knowledge,

skills and practical skills in infant floating into practical activities depending on the development of the infant's basic swimming reflexes and the level of acquisition of infant swimming skills.

Chapter 2 “Methods” of the Doctoral Thesis expands the theoretical (scientific literature analysis) and empirical methods used in the research – a questionnaire survey, modelling, the expert opinion method and mathematical statistics, and describes in detail the organisation of the research in phases.

Scientific literature review and analysis

Once the research question and the hypothesis had been formulated and the objectives set, information sources were searched, studied, summarised and analysed to develop a literature review and the theoretical substantiation of the research problem, to interpret further research results. Scientific literature and sources were analysed to study the correlations between the development of infant swimming skills and parental competence in infant floating. When studying the special literature on infant floating and competences, changes in the records were made as new findings and different facts were found during the research. In addition, the analysis of literature sources and the description of Chapter 1 were supplemented throughout the entire research. The analysis of literature sources gave the Author of the Doctoral Thesis extensive information about the research topic under consideration and its connection with other topics, and provided information about the findings reported as a result of the previous research.

During the research, 170 literature sources (54 – in Latvian and 116 – in a foreign language) were studied, analysed and included herein.

Questionnaire survey

The questionnaire survey was conducted from the beginning of September 2017 until the end of October 2017 and organised at different branches of Riga Health Centre LLC: “Kengarags”, “Imanta”, “Bolderāja” and “Iļģuciems”.

The questionnaire survey was used to find out the specialists' evaluation and opinion about the factors affecting parental competence in infant floating and significance thereof. For this very reason, parental competence in infant floating was assessed along with the need for additional components to increase parental competence (McClelland, 1973; Rychen & Salganik, 2001).

At the same time, parents carried out self-assessment of their competence in infant floating. When answering the questions, parents self-assessed the aspects affecting their competence in infant floating, evaluated their competence in this field, and considered the need for additional components to be learned or improved to increase their competence to be able to do infant floating exercises successfully and independently.

To fairly evaluate the specialists' and parents' answers to the self-assessment questionnaire questions and perform mathematical statistics, five answer options were given for each question with a point value assigned to them (Raščevska, 2004; Kroplis & Raščevska, 2010). Such point value helps summarise the answers to the questionnaire questions in numerical terms and, following

mathematical statistics, obtain the average evaluation of all specialists in numerical terms (points). To qualitatively evaluate the answers provided and determine the specialists' and parents' dominant (most often given) answer to each question, mode, being the most frequently occurring value or most common characteristic value, was used (Dravnieks, 2004).

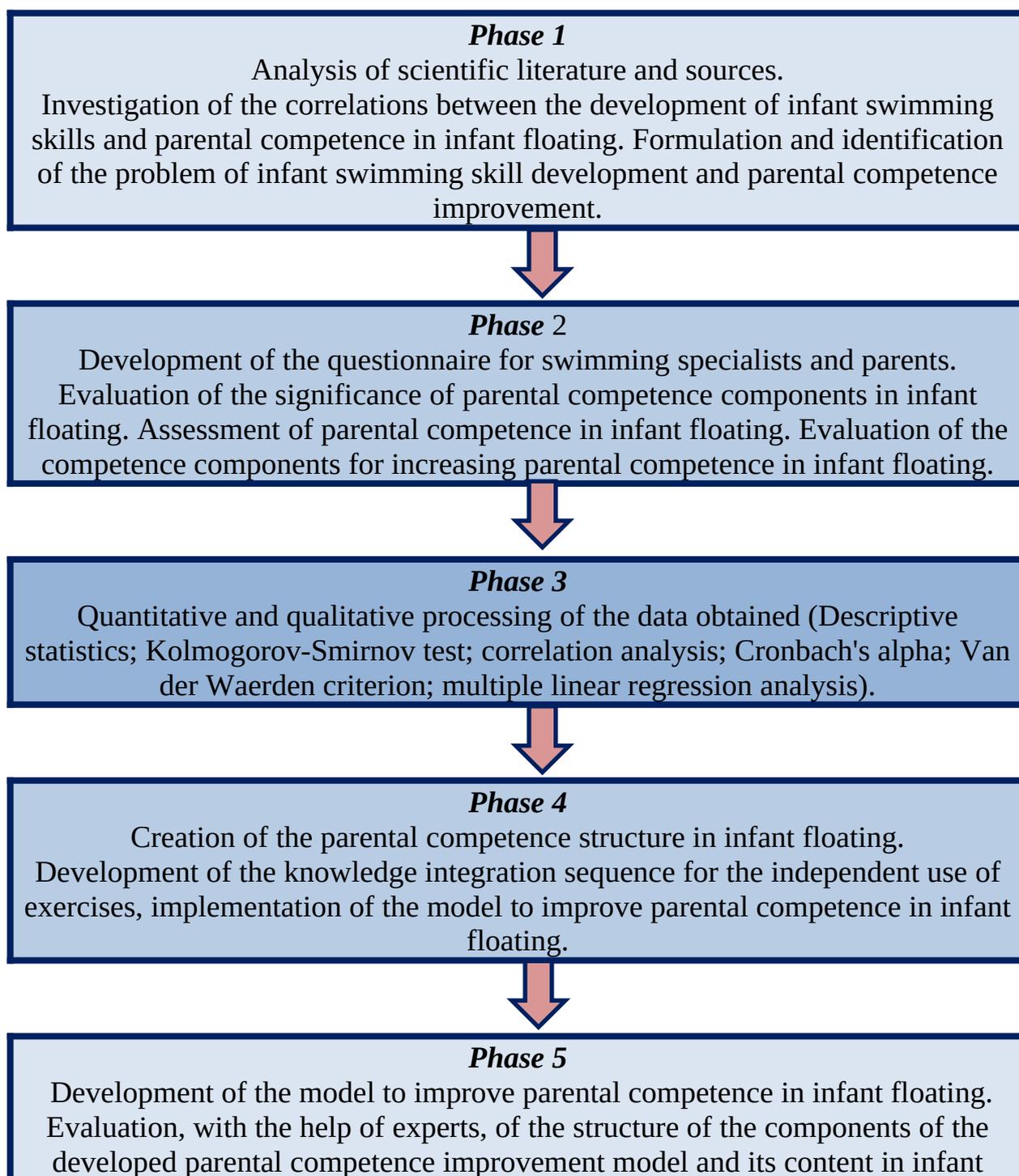
33 respondents (swimming and physiotherapy specialists) participated in the parental competence assessment survey. After the questionnaires were processed, it was found that three questionnaires were invalid because they were not filled out according to the instructions given. As a result, 30 questionnaires were processed and analysed. The respondents (specialists) were on average 40.3 ± 2.8 years old with an average length of service of 15.5 ± 2.6 years. In specialists surveyed, 94.7% were females and 5.3% were males of whom 19 were physiotherapists and 11 – swimming specialists (the first three questions of the questionnaire).

To evaluate and analyse the parents' self-assessment of their competence in infant floating more fairly and statistically reliably, a questionnaire survey in which a total of 112 respondents participated (parents attending pools and infant floating lessons with their infants) was conducted during the research. After the questionnaires were processed, it was found that five questionnaires were invalid because they were not filled out according to the instructions given. In the end, 107 questionnaires were processed and analysed. The respondents (parents) were on average 30.8 ± 0.5 years old. In parents surveyed, 91.8% were females and 8.2% were males representing a wide range of industries (the first three questions of the questionnaire). The selection and compilation of the questionnaire questions was based on the works, opinions and methodological instructions of the scientists and authors as follows:

- Scientific claims regarding infant floating lessons and understanding thereof (Johnson, 1996; Meredith et al., 2001; Ahrendt, 2002; Jovanovich, 2002; Zhao et al., 2005; Sigmundsson & Hopkins, 2009; Федулова, 2011; Freedman, 2014).
- Scientific claims regarding the importance and health effects of infant floating (Johnson, 1996; Ahrendt, 1997, 2002; Zhao et al., 2005; Sigmundsson & Hopkins, 2009; Федулова, 2011; Freedman, 2014).
- Scientific claims regarding the infant floating knowledge parents are expected to have (Johnson, 1996; Meredith, et al., 2001; Ahrendt, 2002; Jovanovich, 2002; Zhao et al., 2005; Sigmundsson & Hopkins, 2009; Федулова, 2011).
- Scientific claims regarding the infant floating skills parents are expected to have (Meredith et al., 2001; Ahrendt, 2002; Федулова, 2011; Freedman, 2014; Stallman, 2014).

- Scientific claims regarding the practical skills in infant floating parents are expected to have (Meredith et al., 2001; Ahrendt, 2002; Федулова, 2011).
- Scientific claims regarding water safety in infant floating (Ahrendt, 2002; Jovanovich, 2002; Федулова, 2011; Freedman, 2014; Stallman, 2014).

Modelling



floating. Development of scientifically based recommendations for the implementation of the model to improve parental competence in infant floating.

Figure 1. **Modelling Phases of the Model to Improve Parental Competence in Infant Floating**

Model type: The model to improve parental competence in infant floating is a structurally functional model and a conceptually mathematical model (Викулина & Половинкина, 2013).

Based on modelling, many activities were performed which, in total, consisted of five phases (Fig. 1).

Expert opinion method

The outcome of the expert opinion is influenced by the careful choice and selection of suitable experts whose competence is determined using a special methodology. For this purpose, experts fill out a special expert questionnaire. The standardised questionnaire offered by the author Albrecht was used as the basis of the expert questionnaire. On grounds of the expert questionnaire data, each expert's competence coefficient is calculated according to the formula, and the chief expert with the highest competence coefficient is designated. The researcher is to respect the chief expert's opinion and justify his or her points of view should they not agree with the chief expert's opinion.

The value of the expert's competence coefficient depends on the expert's scientific degree, scientific work experience (in years), publications, justification of the opinion on the issue evaluated and knowledge about it.

Experts can be pedagogical scientists, methodologists, textbook authors, experienced practicing teachers (Albrehta, 1998).

Once 10 experts had been selected, the structure of parental competence components of the model to improve parental competence was assessed. An assessment questionnaire was developed and then submitted for expert examination. The questionnaire parameters to be assessed by experts were carefully considered, and the assessment criteria were determined. Experts assessed the relevant parameter, awarded the respective number of points and recorded it in the assessment table. Experts filled out a specially designed assessment questionnaire where each component and its content were separately assessed on a 5-point scale. In the assessment questionnaire, experts gave a total of 23 assessments on the developed parental competence improvement model, the structure of parental competence components and content thereof.

Mathematical statistics

The results obtained in the experiment were processed using the STATISTICS add-in for MS EXCEL developed by J. Dravnieks, Professor of the Latvian Academy of Sport Education (Dravnieks, 2004), and the IBM SPSS mathematical statistics software where several statistical analysis solutions were used (IBM, 2020), namely:

- Descriptive statistics

- Kolmogorov-Smirnov test
- Cronbach's alpha
- Van der Waerden criterion
- Correlation analysis
- Multiple linear regression.

Chapter 3 of the Doctoral Thesis analyses the results obtained.

Subchapter 3.1 “Specialists’ Opinion on Parental Competence in Infant Floating and Development of Infant Swimming Skills” assesses and analyses parental competence in infant floating.

The overall consistency of the survey results between different competence blocks, structural components of the blocks and their individual components in infant floating was determined using Cronbach's alpha (0.820).

The assessment of the significance of parental competence components in infant floating after the survey of swimming specialists is shown in Figure 2.

The significance of the competence components was assessed on a 5-point scale, where 1 point – “Unimportant”, 2 points – “Of little importance”, 3 points – “Moderately important”, 4 points – “Important”, 5 points – “Very important”.

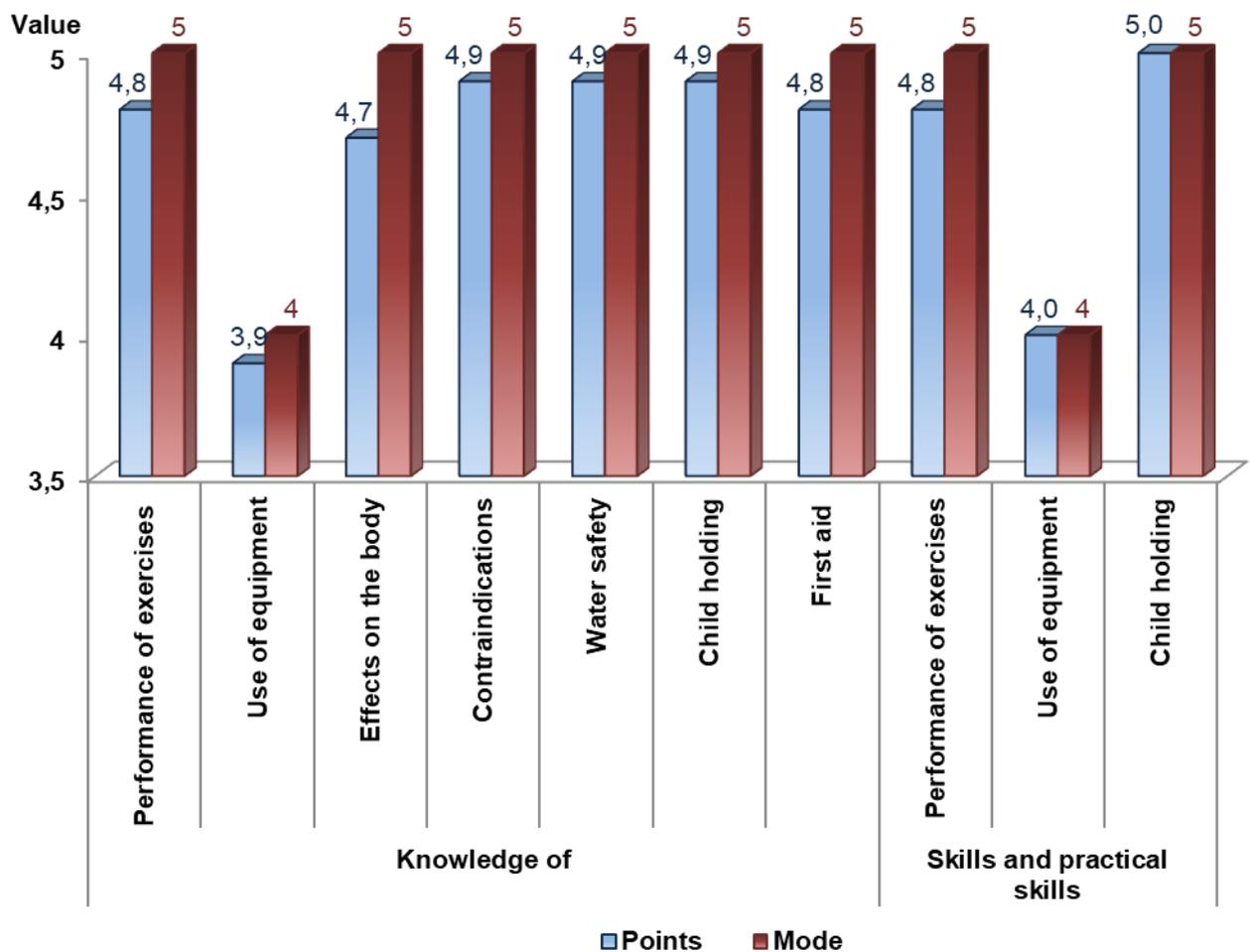


Figure 2. Assessment of the Significance of Parental Competence Components in

Infant Floating from the Point of View of Specialists (n=30)

The analysis of the *assessment of the significance of parental competence components* from the point of view of specialists (Fig. 2) shows that the only obvious difference in the assessment is related to the competence component – the use of additional equipment and aids – because both in terms of knowledge and skills/practical skills specialists rated this component as “Important – 4” giving 3.9 points instead of “Very important” with the value pulling closer to the maximum of five points. The maximum significance rating was given to the component related to the competence of safe holding of the child's body postures in water. This means that all 30 specialists interviewed had unanimously stated that it was a very important competence component having a significant impact on parental competence in infant floating. The assessment of the significance of other competence components ranged from 4.7 to 4.9 points which is generally considered to be quite significant and close to the maximum assessment.

Mode of the competence component significance (Fig. 2) seems to be similar to the mean scores in points. Based on mode, it can be concluded that in the components related to the use of additional equipment and aids (knowledge, skills and practical skills) mode is 4 making “Important” the most frequent answer. In all other competence components, mode is 5 making “Very important” the most frequent answer.

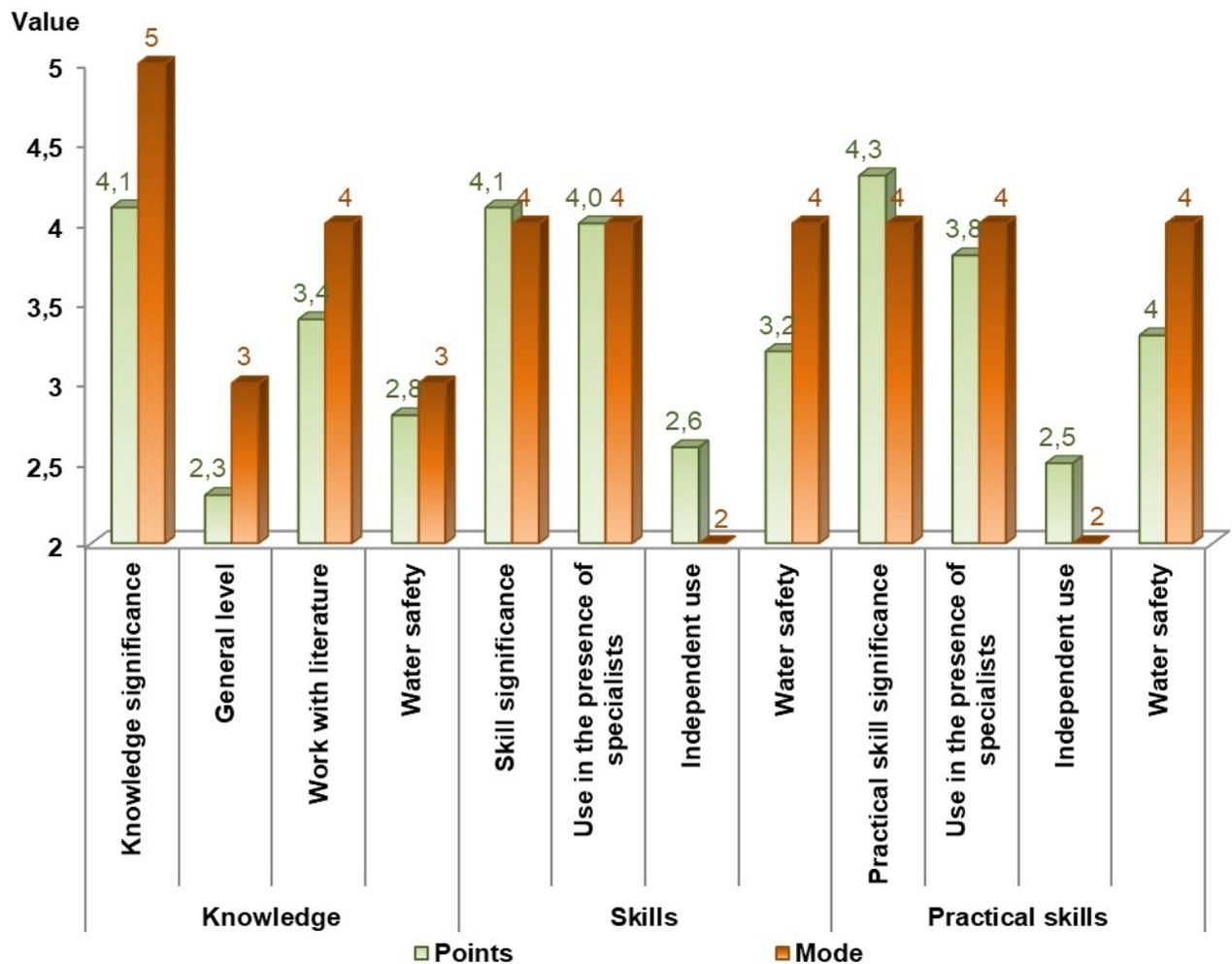


Figure 3. Parental Competence in Infant Floating from the Point of View of Specialists (n=30)

The assessment of parental competence in infant floating from the point of view of specialists is shown in Figure 3.

Parental competence in infant floating was assessed on a 5-point scale, where 1 point – “Very poor”, 2 points – “Below average”, 3 points – “Average”, 4 points – “Above average”, 5 points – “Excellent”.

The analysis of parental competence in infant floating from the point of view of specialists shows that the respondents evaluated the significance of competence (skills, practical skills and knowledge) required of parents higher than “Above average – 4 points” because knowledge, skills and practical skills are rated from 4.1 to 4.3 points. The independent use of the parents’ general knowledge, skills and practical skills in infant floating lessons without the presence of specialists is rated the lowest. The average score ranges from 2.3 to 2.6 points which is between “Below average” and “Average”. The water safety competence components are rated as “Average”, with the mean scores ranging from 2.8 to 3.3 points. The skills and practical skills to use them during independent infant floating lessons in the presence of specialists are assessed as “Above average”, and specialists awarded an average of 3.4 points to the parents' independent work with

infant floating-related literature which is between “Average” and “Above average” (Fig. 3).

In the specialists' assessment of parental competence, modes are similar to the mean score in points (Fig. 3).

It appears from the specialists' answers that the lowest mode 2 is in the competence components related to the skills and practical skills to use them during independent infant floating lessons without the presence of specialists, which corresponds to the answer option “Below average”.

In the competence related to the general theoretical knowledge about infant floating and theoretical water safety knowledge, mode is 3, which allows concluding that the most frequent answer in the assessment of the level of these competence components is the answer option “Average” (Fig. 3).

In the knowledge block, mode of additional independent work with online information and literature as well as skills and practical skills related to water safety, and the significance of skills and practical skills is 4 which means that the most frequent answer in the assessment of these competence components is “Above average” (Fig. 3).

The swimming specialists' general opinion on the use of general knowledge and skills during independent infant floating lessons in the presence of specialists according to mode is 5 once again proving that the level of knowledge and skills is very important (Fig. 3).

The need for the competence components to be additionally learned or improved to increase parental competence according to the specialist survey results is shown in Figure 4.

As it follows from the survey results, a 5-point scale for the improvement of competence was created, where 1 point – “No”, 2 points – “Rather no”, 3 points – “Minimum”, 4 points – “Rather yes”, 5 points – “Yes” (Fig. 4).

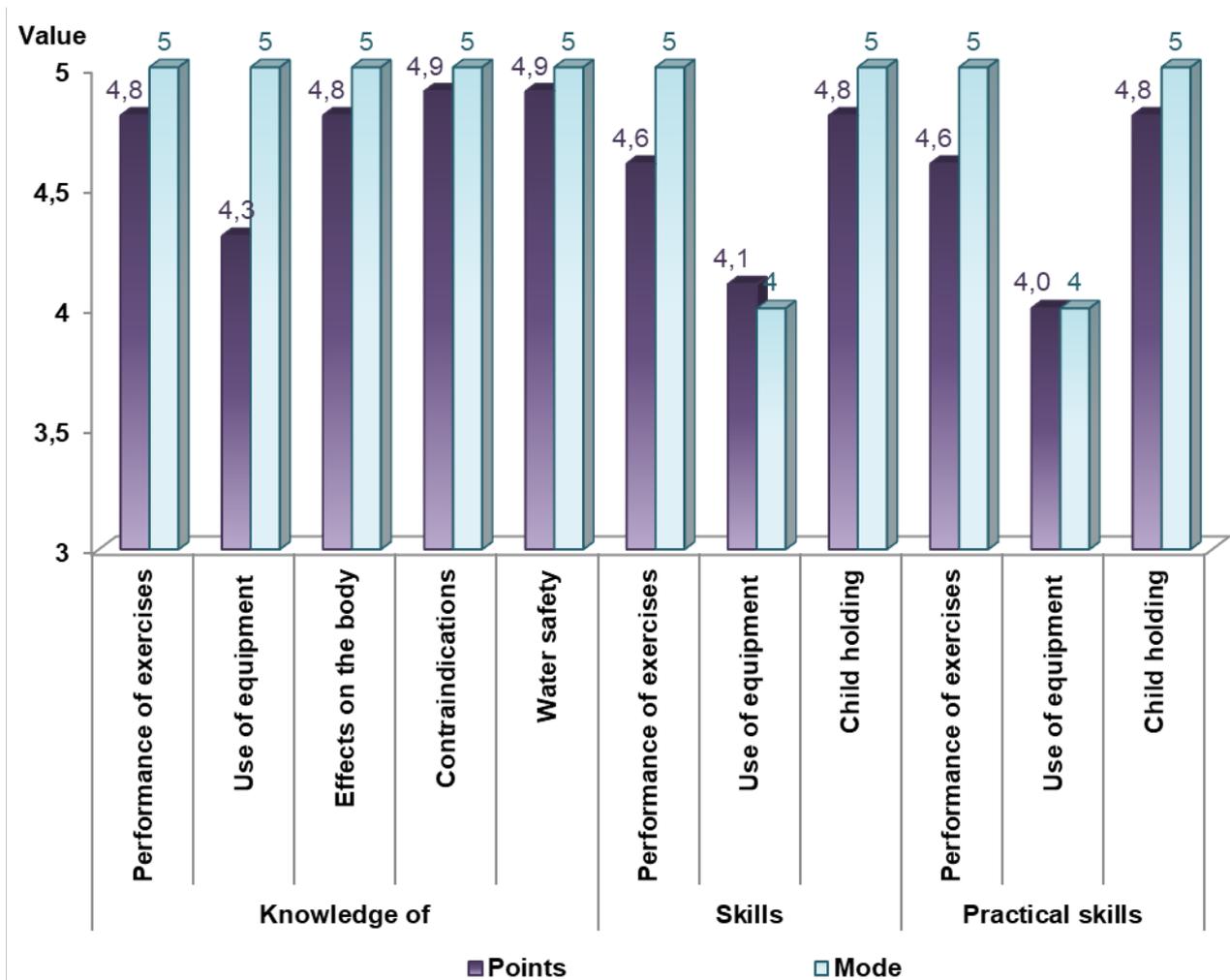


Figure 4. Competence Components for the Improvement of Parental Competence in Infant Floating According to Specialists (n=30)

Having analysed the components of parental competence to be additionally learned or improved to increase parental competence in infant floating, the specialist survey results show that specialists assessed the competence improvement components (knowledge, skills and practical skills) related to the use of equipment and aids within the range from 4.0 to 4.3 points, which corresponds to “Rather yes”. All other competence components are assessed within the range of 4.6 to 4.9 points which, according to the assessment scale, verges to “Yes” – there is a need to additionally learn or improve them (Fig. 4).

When assessing the proposed components to be additionally learned or improved to increase parental competence, it follows from mode that the majority of specialists answered “Rather yes” to the question concerning additional learning and improvement of skills and practical skills of using equipment and aids as mode is 4 (Fig. 4).

In turn, in terms of all other competence components proposed to be additionally learned or improved, the expressed majority of specialists answered

“Yes”. This is also confirmed by mode which, in the answers to the need to improve these competence components, is 5 (Fig. 4).

The swimming specialist survey results make it possible to conclude that all of the proposed components that could potentially affect parental competence in infant floating proved to be of great importance. It can also be stated with confidence that at present the overall level of parental competence in infant floating, according to experts, is mediocre. In general, the opinion of all surveyed swimming specialists is that parents should definitely supplement or additionally acquire knowledge, skills and practical skills in order to increase their competence and be able to effectively use their competence in independent activities with their infants.

Based on the research results it can be concluded that, to increase parental competence in infant floating, attention must be paid to the additional learning or improvement of the key components as follows: knowledge about the performance of exercises, the effects of floating on the body, floating contraindications, water safety, as well as skills and practical skills to perform different exercises in water, knowledge of water safety and awareness, and child holding in water.

Subchapter 3.2 “Parents’ Opinion on Parental Competence in Infant Floating and Development of Infant Swimming Skills” assesses and analyses parental competence in infant floating.

The overall consistency of the survey results between different competence blocks, structural components of the blocks and their individual components in infant floating was determined using Cronbach's alpha (0.820).

The assessment of the significance of parental competence components in infant floating is shown in Figure 5.

The significance of the competence components was evaluated on a 5-point scale, where 1 point – “Unimportant”, 2 points – “Of little importance”, 3 points – “Moderately important”, 4 points – “Important”, 5 points – “Very important” (Fig.5).

The analysis of the assessment of the *competence component significance* from the point of view of parents shows that the only obvious difference in the assessment is about the competence component related to the use of additional equipment and aids, because both in terms of knowledge and skills/practical skills parents rated this component as “Important” rather than “Very important”.

According to parents, the most important infant floating competence components are water safety and awareness and safe holding of the child's body postures in water. This means that practically all 107 surveyed parents pointed out the importance of these components due to their considerable impact on parental competence in infant floating. Likewise, many authors emphasise in their literature that in the infant floating process the parents’ sense of direction in a specific water environment and abiding by water safety rules is of great importance (Ahrendt, 2002; Zhao et al., 2005; Федулова, 2011). The rating of other components’ significance ranges from 4.5 to 4.9 points which is generally considered to be very

significant and is between “Important” and “Very important”, or close to the maximum rating (Fig. 5).

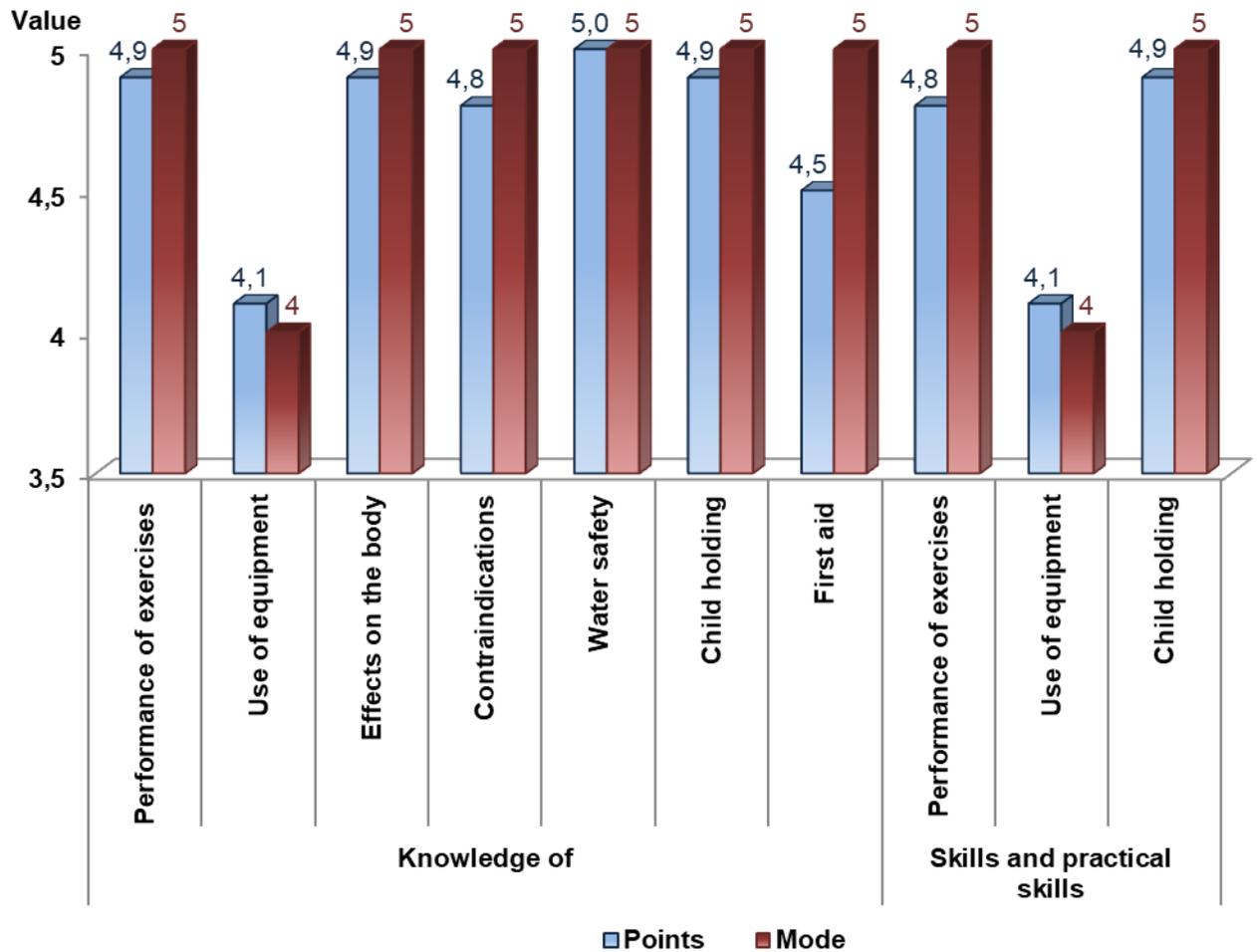


Figure 5. Assessment of the Significance of Parental Competence Components in Infant Floating (n=107)

Looking at the mode value of the assessment of significance of the infant floating competence components (Fig. 5), it can be concluded that mode of the components related to the use of additional equipment and aids (knowledge, skills and practical skills) is 4 making “Important” the most frequent answer. In all other competence components, mode is 5 making “Very important” the most frequent answer.

Parents rate their theoretical knowledge about water safety as mediocre, but consider the level of skills and practical skills to be good. In the parents’ opinion, during independent floating lessons great attention should be paid to water safety. However, before the lessons, specialists give parents just basic instructions on water safety for children.

The assessment of parental competence in infant floating according to the parent survey results is shown in Figure 6.

Figure 6. Parents' Self-assessment of Competence in Infant Floating According to the Parent Survey Results (n=107)

Parental competence in infant floating was evaluated on a 5-point scale, where 1 point – “Very poor”, 2 points – “Below average”, 3 points – “Average”, 4 points – “Above average”, 5 points – “Excellent” (Fig.6).

The analysis of *parental competence in infant floating* from the point of view of parents shows that the respondents evaluated the significance of competence (skills, practical skills and knowledge) higher than “Above average – 4 points” because knowledge, skills and practical skills are rated from 4.3 to 4.4 points (Fig. 6).

The lowest self-assessment of parental competence is for general theoretical knowledge about infant floating. The mean is 2.8 points which is between “Below average” and “Average”. In terms of the knowledge competence, parents assessed their additional independent work with online information and literature (3.1 points) as well as theoretical knowledge about water safety (3.3 points) only slightly above “Average”. A similar self-assessment is observed in skills and practical skills to use them during independent infant floating lessons, without the presence of specialists – 3.4 points and 3.2 points respectively (Fig. 6).

The parents' self-assessment of skills and practical skills in the competence related to water safety during independent infant floating lessons is assessed similarly: 4.1 points for skills, and 4.0 points for practical skills (Fig. 6).

On the other hand, the use of skills and practical skills during independent infant floating lessons in the presence of specialists, according to the parents' self-assessment, is assessed much higher than other competences. Parents assessed their skills to use them in the presence of specialists with 4.5 points, and practical skills – with 4.2 points. This means that the mean score is between “Above average” and “Excellent” (Fig. 6).

Having evaluated the mode values of the parental competence assessment, a picture similar to that in the mean score can be seen (Fig. 6).

The lowest mode 3 is in the competence in general theoretical knowledge about infant floating, additional independent work with online information and literature, theoretical knowledge about water safety, skills and practical skills to use them during independent infant floating lessons without the presence of specialists. Based on the mode value, it can be concluded that “Average” is the most frequent answer in the assessment of said competences (Fig. 6).

The mode of the parents' assessment of their skills and practical skills in the competences related to water safety as well as the use of practical skills during independent infant floating lessons in the presence of specialists is 4 making “Above average” the most frequent answer in the assessment of the above competences (Fig. 6).

The mode of the parents' assessment of the use of their skills during independent infant floating lessons in the presence of specialists is 5. This means that in this assessment "Excellent" is the most frequent answer (Fig. 6).

According to the mode value, the general opinion of parents on the importance of general knowledge, skills and practical skills in infant floating is 5, which reaffirms the importance of this competence (Fig. 6).

Figure 7 shows the components to be additionally learned or improved to improve parental competence according to the results of the parent survey.

As it follows from the survey results, a 5-point scale for the improvement of competence was created, where 1 point – "No", 2 points – "Rather no", 3 points – "Minimum", 4 points – "Rather yes", 5 points – "Yes" (Fig. 7).

Having analysed the *components of parental competence to be additionally learned or improved to increase parental competence in infant floating*, the parent survey results show that in terms of competence improvement parents assess the use of additional equipment and aids within the range from 3.7 to 4.0 points which, according to the mean score of the parents' answers, corresponds to "Rather yes". All other competence components are evaluated by parents within the range of 4.5 to 4.9 points which, according to the assessment scale, is between "Rather yes" and "Yes".

Finally, parents would like to additionally learn or supplement the components of such competence as knowledge about the performance of exercises, floating contraindications and water safety. The mean score is 4.9 points being as close as possible to the parents' assessment "Yes, there is a need to additionally learn or improve them" (Fig. 7).

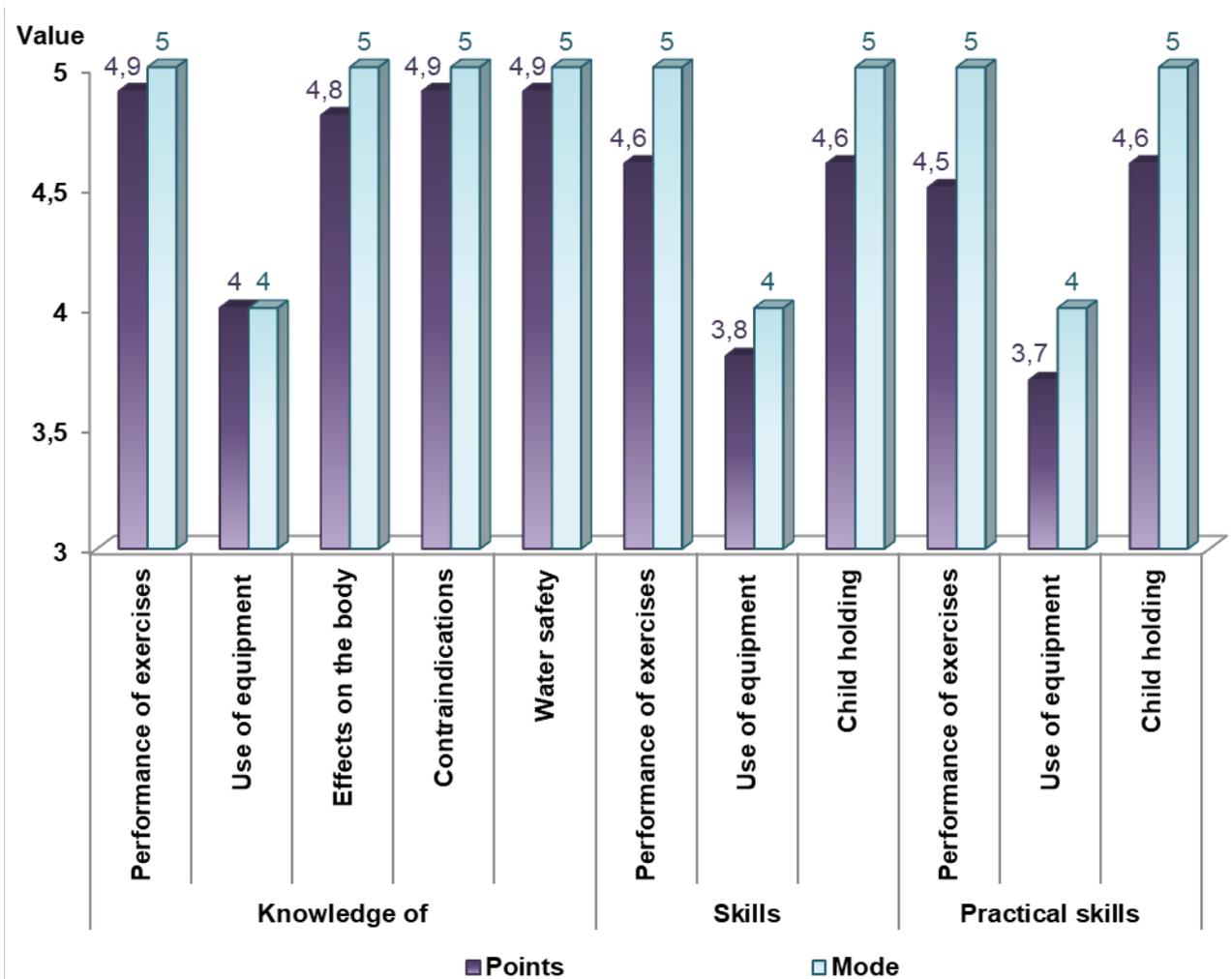


Figure 7. **Infant Floating Competence Components to Improve Parental Competence from the Parents' Point of View (n=107)**

When assessing the proposed components to be additionally learned or improved to increase parental competence, it follows from the mode value that the majority of parents answered “Rather yes” to the question related to additional learning and improvement of skills and practical skills of using equipment and aids as the mode value is 4 (Fig. 7).

At the same time, in terms of all other competence components offered to be additionally learned or improved, the expressed majority of parents answered “Yes”. This is also confirmed by the mode value which in the responses to the need to improve these competences is 5 (Fig. 7).

The results of the research allow concluding that, to increase parental competence in infant floating, attention must be paid to the additional learning or improvement of such key components as knowledge about the performance of exercises, the effects of floating on the body, floating contraindications, water safety, as well as skills and practical skills to perform different exercises in water, knowledge of water safety and awareness, and child holding in water.

Subchapter 3.3. “Development of the model to improve parental competence in infant floating based on the previous research”

3.3.1. Comparison of the parents' and swimming specialists' opinions on parental competence in infant floating

Parental competence in infant floating was assessed on a 5-point scale, where 1 point – “Very poor”, 2 points – “Below average”, 3 points – “Average”, 4 points – “Above average”, 5 points – “Excellent”.

The analysis of parental competence in infant floating by mean (points) and comparison of the parents' and swimming specialists' opinions shows that, according to mathematical statistics, in four competence components the difference in assessments is not significant $\alpha > 0.05$. This means that in these components the parents' and swimming specialists' assessments of parental competence in infant floating are the same or similar. 3 of the 4 competence components, in which the difference in assessment between parents and swimming specialists is insignificant, are related to the importance of general knowledge, general skills and general practical skills in infant floating affecting the ability of parents to do infant floating with their infant independently. In fact, these 3 competence components show more of importance and implicitly point to competence.

Likewise, the competence component in which the difference is insignificant (practical skills to use them during independent infant floating lessons in the presence of specialists) shows that parents can use practical skills only during the lessons conducted by swimming specialists.

In the rest 8 competence components directly showing parental competence, according to mathematical statistics, the difference in assessments is statistically significant $\alpha < 0.05$. This means that in these components parents and swimming specialists have different assessments of parental competence in infant floating.

In 7 out of 8 competence components, parents rated their competence in infant floating higher than swimming specialists, and only in one competence component (additional independent work with online information and literature on infant floating describing exercises and methodological instructions) the specialists' assessment is higher than that of parents.

This could be explained by the fact that swimming specialists are not able to see what is happening out of infant floating lessons and, theoretically speaking, could answer this questionnaire question purely intuitively. At the same time, swimming specialists could observe the rest seven competence components during their infant floating lessons as well as when they were not involved because parents did infant floating independently. Therefore, there is a direct reason to believe that the answers provided by swimming specialists in these competence components related to parental competence in infant floating are fair and justified.

Parental competence in infant floating is assessed by mode on a 5-point scale showing the most frequent answer: modal value 1 – “Very poor”, modal

value 2 – “Below average”, modal value 3 – “Average”, modal value 4 – “Above average”, modal value 5 – “Excellent”.

The analysis of the assessment of parental competence in infant floating by mode along with the comparison of the parents’ and swimming specialists’ opinions shows that 7 out of 12 competence components have the same modal value. This means that in the assessment of parental competence in infant floating the answer given by parents and swimming specialists in these components is the same, while 5 of 12 competence components have different modal values and imply that the most frequent answers are not the same.

In these 5 competence components, where modal values do not match, in 4 components parents rated their competence in infant floating higher than swimming specialists, and only in one competence component (just like according to the mean score in points – independent work with online information and literature on infant floating describing exercises and methodological guidelines is additionally assessed) the specialists’ assessment mode is higher than that of parents. Consequently, the most frequent answers of parents and swimming specialists to these questionnaire questions vary.

3.3.2. Development of parental competence structure in infant floating

To develop the structure of parental competence in infant floating more precisely, apart from processing the survey results, a correlation analysis was performed after the specialist survey to determine the correlation between parental competence components and the most important competence components in infant floating, and the correlation between the parental competence components and the specialists’ opinion on the need of competence improvement (Lasmanis & Kangro, 2004; Web Research, 2020).

The correlation between parental competence components and the most important competence components in infant floating mostly shows that the correlation is insignificant ($| r | < r_{\alpha}$, where $| r_{\alpha} | = 0.196$), and in several cases a weak correlation is also observed ($0.2 < | r | < 0.49$). The correlation between the parental competence components and the specialists’ opinion on the need of competence improvement in infant floating shows a similar picture, as the correlation is found to be insignificant or weak, and only in one case a moderately strong correlation is observed ($0.5 < | r | < 0.69$). It is interesting that a negative correlation is observed in about 50% of these two correlations.

Likewise, after the parent survey, the correlation between the self-assessment of parental competence components and the most important competence components in infant floating, and the correlation between the self-assessment of parental competence components and the parents’ opinion on the need for competence improvement was determined (Lasmanis & Kangro, 2004; Web Research, 2020).

Upon analysis of the correlation between the self-assessment of parental competence components and the most important competence components in infant floating, it can be concluded that there is a strong correlation between the

knowledge about the use of aids, skills and practical skills to use different aids during floating and all parental competence components ($0.7 < |r| < 0.99$). This means that, according to parents, the use of different aids is very important when doing infant floating. The most insignificant correlations are observed in infant floating contraindications. The parents' self-assessment of their competence components shows that the basic knowledge, skills and practical skills have a strong correlation with the required competence components. The next components having many strong and moderate correlations are the skills and practical skills to use them independently in the presence of specialists and to adhere to water safety rules during floating.

The components of the need to improve parental competence in infant floating – knowledge about the use of aids, skills and practical skills to use different aids during floating and all parental competence components – have a strong correlation ($0.7 < |r| < 0.99$). This means that, according to parents, the importance of these components for the development of competence is most essential. There is a strong and moderate correlation between the skills and practical skills to perform exercises and ensure security during floating which implies that these components also play a very important role in improving parental competence. As before, in this case, the parents' self-assessment of parental competence components also shows that the basic knowledge, skills and practical skills mostly have a strong correlation with the need for additional components to increase parental competence. And again, as before, the other components having strong and moderate correlations are the skills and practical skills to use them independently in the presence of specialists and to adhere to water safety rules during floating with the need for additional components to increase parental competence. In the development of the model, all these components must play a key role.

Before development of the parental competence structure and the model to improve competence in infant floating, the multiple linear regression was used for its interpretation. When creating component interactions, the equation used as a basis is as follows:

$$y = a + bx_1 + cx_2,$$

where:

- y – parental competence skills component,
- a, b, c – linear equation coefficients,
- x_1 – parental competence practical skills component,
- x_2 – parental competence knowledge component.

The average value of each factor among the respondents' assessments is calculated according to the question categories: knowledge, skills, and practical skills. Using the multiple linear regression, the competence component interaction equations were worked out and multifactor determination coefficients R^2 were calculated separately for specialists and parents (Appendix 16).

Based on the specialists' assessment, the dependence of the parental competence skills component on the practical skills and knowledge component is described by the equation as follows:

$$y = -1.0432 + 0.7153x_1 + 0.5113x_2.$$

$R^2 = 0.955$ means a strong correlation with the significance level $\alpha = 0.95$.

The assessment of the two correlation curves together shows that the coefficient of determination is higher for the parental competence practical skills component ($R^2 = 0.83$) rather than for the knowledge component ($R^2 = 0.62$) against the parental competence skills component. In both cases, though, it exceeds the 0.5 threshold and shows a strong correlation. In both equations, the coefficient a is close to 1 implying a proportional increase in the curve – the assessment of skills will proportionally increase with the increase in the assessment of practical skills or knowledge. It is also significant that the coefficient b in the skills-practical skills equation is 0.1911 and, if the practical skills' rating is "3", the skills' rating will be close to "3" (also considering the coefficient a 3.05). In turn, in the skills-knowledge equation, the coefficient b is 0.61, so, if the practical skills' rating is "3", the skills' rating will be less than "3" (also considering the coefficient a 2.66).

The skills-practical skills, skills-knowledge correlation curves were also created and shown in the figures (Figure 8 and Figure 9).

According to the multiple linear regression for the specialist survey results, it was concluded that, according to specialists, the parental competence skills component is equally related to both the practical skills and knowledge components, while the knowledge component has a slightly smaller impact on the skills component. It was also concluded that, according to specialists, the parents' knowledge about infant floating must be higher than their practical skills to be able to achieve a similarly high level of competence skills in infant floating.

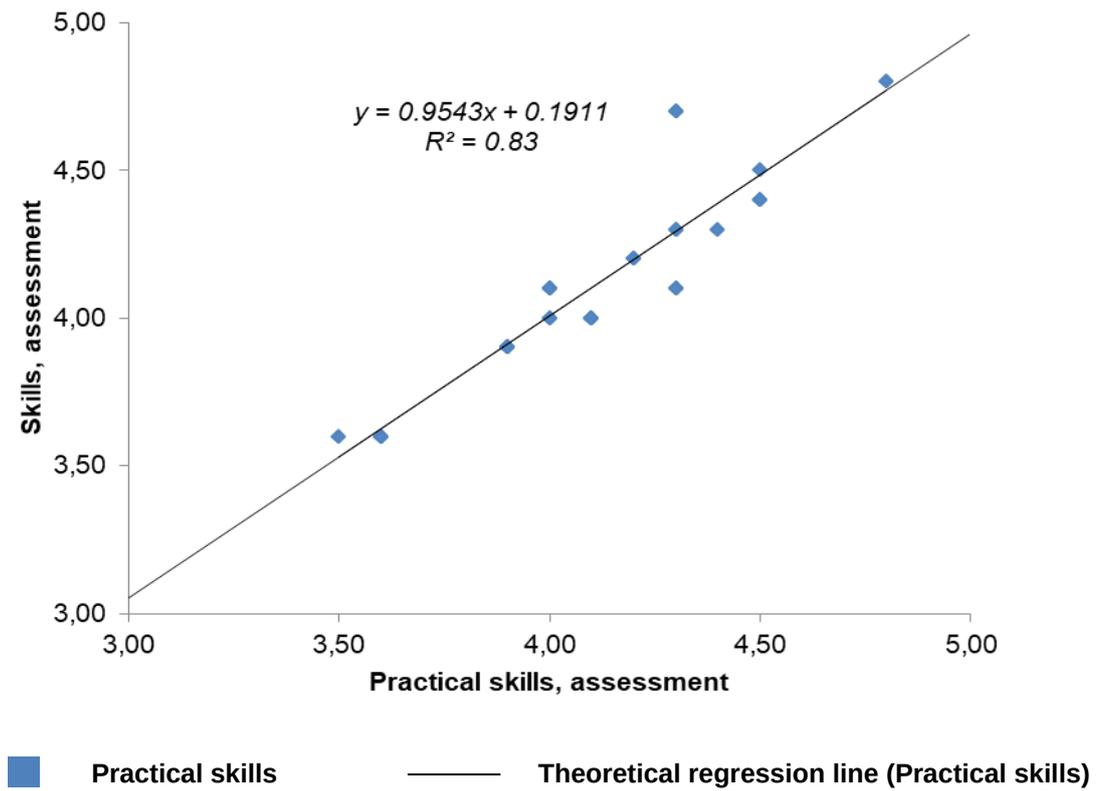


Figure 8. **Correlation Curve of Parental Competence Skills and Practical Skills in Infant Floating (Specialists' Opinion)**

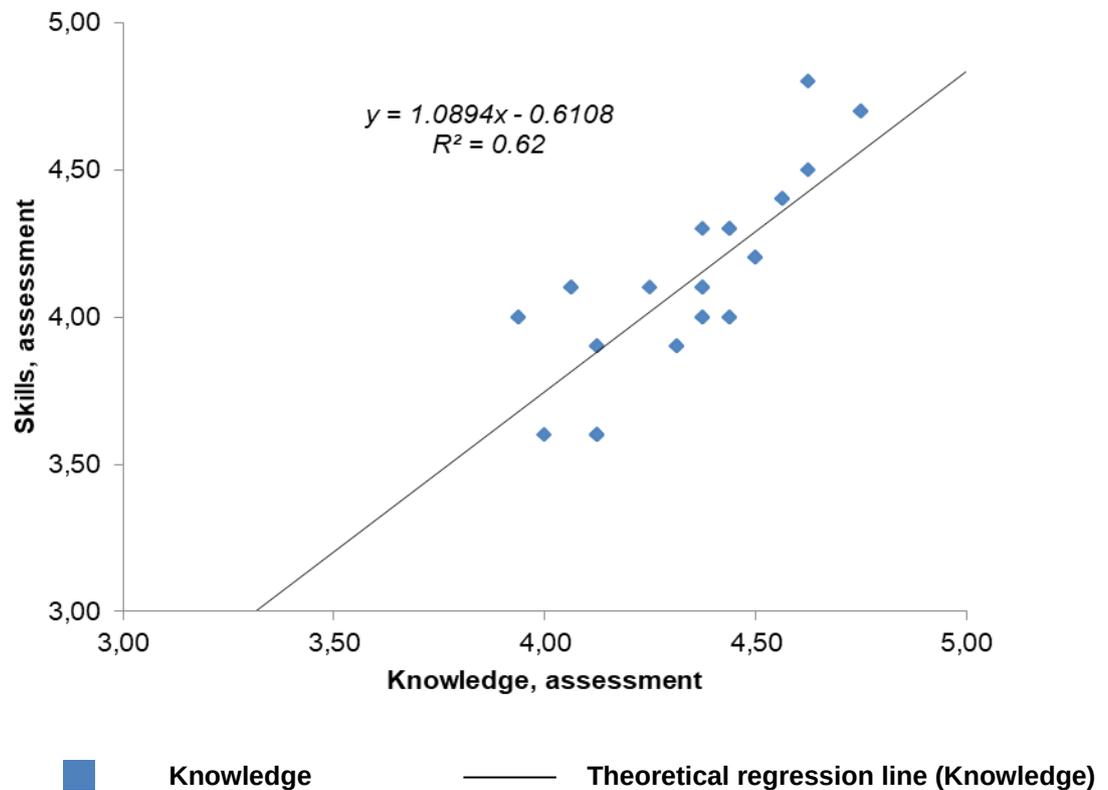


Figure 9. **Correlation Curve of Parental Competence Skills and Knowledge**

in Infant Floating (Specialists' Opinion)

Based on the parents' assessment, the dependence of the parental competence skills component on the practical skills and knowledge components is described by the equation as follows:

$$y = 0.1905 + 0.976x_1 - 0.0107x_2$$

R² = 0.992 shows a strong correlation with the significance level $\alpha = 0.95$. The skills-practical skills, skills-knowledge correlation curves were also created for parents and are shown in the figures (Figure 10 and Figure 11). Assessing the two correlation curves together, it is observed that the coefficients of determination for both the practical skills and knowledge components against the skill components are almost equally high – 0.98 and 0.95, respectively. In both equations, the coefficient a is close to 1 implying a proportional increase in the curve – the assessment of skills will proportionally increase with the increase in the assessment of practical skills or knowledge. It is also significant that the coefficient b in the skills-practical skills equation is 0.178 and, if the practical skills' rating is "3", the skills' rating will be close to "3" (also considering the coefficient a 3.08). In turn, in the skills-knowledge equation, the coefficient b = – 1,092, so, if the practical skills' rating is "3", the skills' rating will be less than "3" (also considering the coefficient a 2.61).

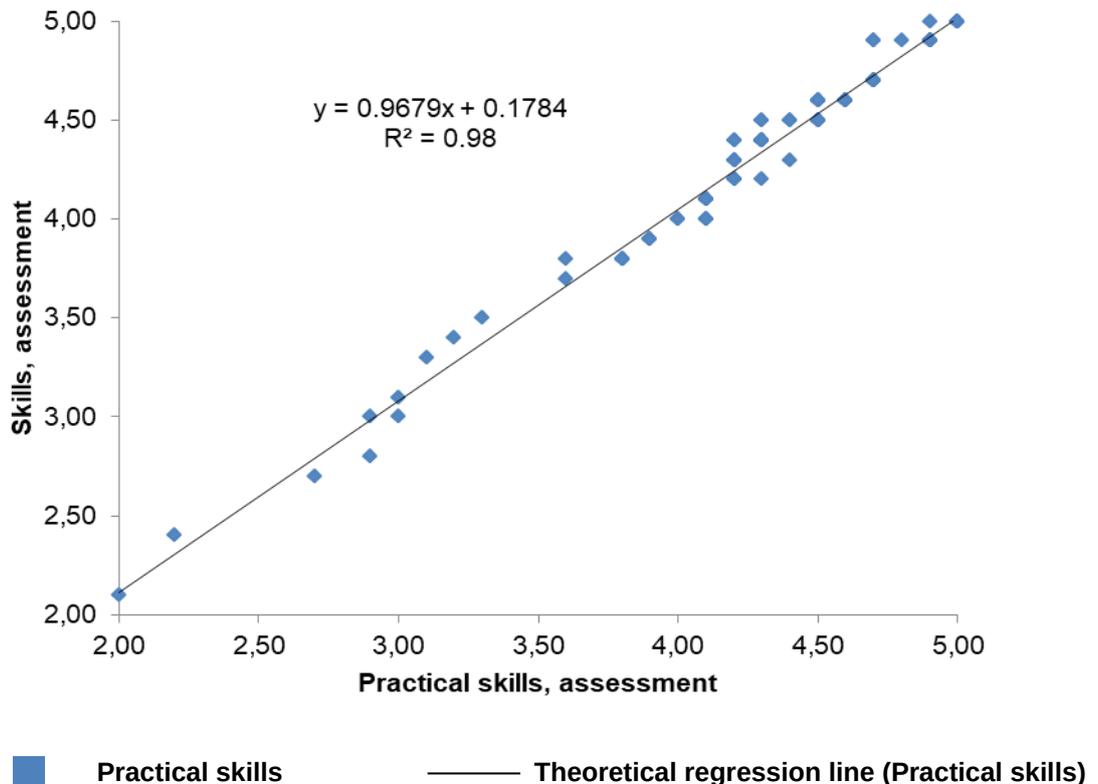


Figure 10. Correlation Curve of Parental Competence Skills and Practical Skills in Infant Floating (Parents' Opinion)

Based on the parents' opinion, a trend similar to that in specialists is observed: the parents' knowledge about infant floating must be higher than the practical skills to achieve a similarly high level of skills in infant floating.

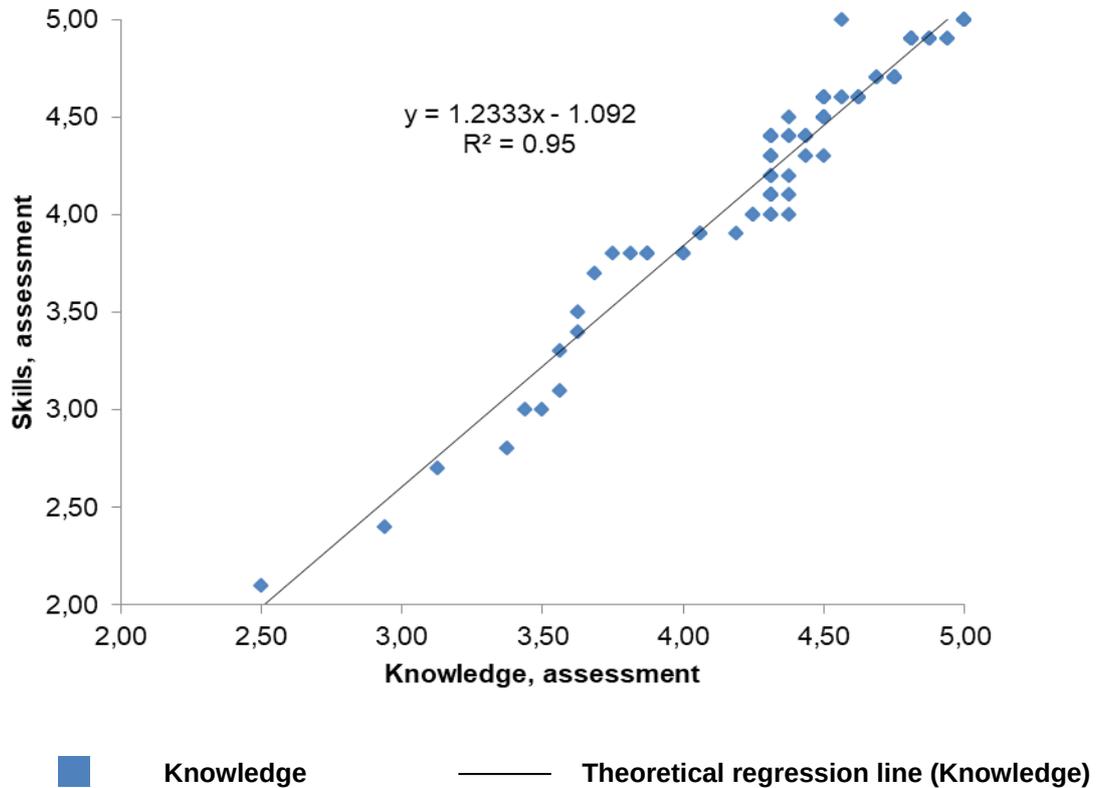


Figure 11. **Correlation Curve of Parental Competence Skills and Knowledge in Infant Floating (Parents' Opinion)**

Based on the survey results summarised in Figures 8, 9, 10, 11, as well as the summary of the correlation analysis, the parental competence structure in infant floating developed by the Author of this Doctoral Thesis includes the structural components of knowledge, skills and attitudes (Table 1).

Parental competence in infant floating is characterised by the following four knowledge components: knowledge about infant floating, the effects of floating on the infant's body, floating contraindications, and water safety knowledge and awareness when doing infant floating.

Below is the content of the first knowledge component – knowledge about infant floating (Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Tanaka, 2009; Freedman, 2014):

- Holding techniques and methodological guidelines for the performance of activities (vertically, on the back, on the stomach, on the side, with one arm, with two arms, submersion).
- Swimming aids for infant floating and the need to use them (soft items, balls, boards, pool noodles, rings, watering cans).

- Infant floating exercises using different holding techniques and methodological guidelines for the performance of activities (different body movements, in place, with arms, with legs, jumping into water, push-offs, submersion).

Table 1

Parental Competence Structure in Infant Floating

Parental competence in infant floating	
Knowledge	Skills and attitudes in infant floating
Knowledge about infant floating	Ensuring a safe environment
Knowledge about the effects of floating on the infant's body	Responsible use of infant floating skills depending on the circumstances
Knowledge about floating contraindications	Use of aids and equipment depending on the circumstances
Water safety and awareness during infant floating	

The content of the second knowledge component includes: the effect of floating on the infant's body (physiological development of infants – physiological reflexes, development of postural and equilibrium reactions, motor development, muscle tone development, and psychological development) (Barczyk et al., 2005; Zelazo & Weiss, 2006; [Nystad](#) et al., 2008; Sigmundsson & Hopkins, 2009; [Dias](#) et al., 2013; [Faerch](#), 2018).

The third knowledge component includes content on floating contraindications (wounds, skin abrasions, inflammation, allergic reactions, vaccines, infections, fever) (Bernard et al., 2007; Voisin et al., 2010).

The fourth knowledge component includes content on water safety and awareness during infant floating ([Brenner](#), Gitanjali & Gordon, 2003; Blitvich et al., 2012):

- Safety rules in the pool (hygiene, equipment, pool entry and exit, movement in water, depth change, dangerous situations and causes thereof, medical examinations);
- Action in emergency situations (action sequence in dangerous or unforeseen situations: falls, tripping, child dropping, choking, pulling out of water);
- First aid (theoretical rescue fundamentals and action sequence, first aid for choking, pulling out of water, basic CPR).

Parental competence in infant floating is characterised by three skills and attitudes components in infant floating.

The first skills and attitudes component manifests itself in ensuring a safe environment during infant floating: performance of practical activities (pool entry and exit, infant holding techniques, action in emergency situations) (Brenner et al., 2003; Blitvich et al., 2012).

The second skills and attitudes component – responsible use of infant floating skills depending on the circumstances – is characterised by the practical activity of parents under the guidance of specialists and independent activity without the presence thereof. The practical activity of parents (Wielki, 1983; Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Tanaka, 2009; Freedman, 2014) includes:

- Practical performance of individual exercises in different floating positions (vertically, on the back, on the stomach, on the side).
- Practical performance of individual exercises in place, in different directions of movement (forward, backward, sideways), and diving.
- Practical performance of individual exercises for different body parts (arms, legs, muscles on the back and front of the body).

Responsible use of infant floating skills depending on the circumstances also includes improvement of the technical performance of the previously learned exercises during infant floating (Wielki, 1983; Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Tanaka, 2009; Freedman, 2014):

- Practical performance of exercise combinations in different swimming positions (vertically, on the back, on the stomach, on the side).
- Practical performance of exercise combinations in place, in different directions and at different speeds (forward, backward, sideways), and diving.
- Practical performance of exercise combinations for different body parts (arms, legs, muscles on the back and front of the body).

The third skills and attitudes component represents the use of aids and practical use of equipment during infant floating (soft items, balls, boards, pool noodles, rings, watering cans, etc.) (Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000).

3.3.3. Development of the model to improve parental competence in infant floating

The development of the model to improve parental competence in infant floating takes into consideration the recommendations of scientists and scientific researches on the of infant floating components that can contribute to the improvement of parental competence (Mezirow, 1991; Zīds, 1997; Bell et al., 2000; Кучугурова, 2000; Bolhuis, 2003; Jarvis, 2004; Demers et al., 2006; Lyle, 2007; Mallett, 2007; Мухортова, 2008; Bruck, 2009; Vogt & Rogalla, 2009; Vaartman & Bruijn, 2011; Коломийченко, 2013; Корнева, 2015; Mileakova – Roman et al., 2017).

In the first phase of the research, the problem that may hinder the acquisition of infant swimming skills and improvement of parental competence in infant floating was identified and formulated (according to Geske & Gr̄infelds, 2006). In the second phase of the research, the necessary facts were clarified, and the situation was analysed considering the acquisition of infant swimming skills and improvement of parental competence in infant floating. The study of infant floating theory and parental competence in infant floating allowed understanding the nature of the research problem more deeply and accurately.

For the needs of competence improvement, the correlations between the parental competence components and the specialists' opinion, and the correlations between the self-assessment of parental competence components and the parents' opinion were considered according to the track chart.

The correlations between the parental competence components and the specialists' and parents' opinion on the need to improve competence according to the track chart show that, from the point of view of specialists and parents, more attention should be paid to the correlations as follows:

- Parental competence components required of parents: basic knowledge about infant floating; basic skills in infant floating; ability to independently use infant floating skills in the presence of specialists; basic practical skills in infant floating; ability to independently use practical skills in infant floating in the presence of specialists.
- Required parental competence improvement components: the parents' knowledge about the use of different aids during infant floating; the parents' skills and practical skills to properly perform exercises during infant floating; the parents' skills and practical skills to use different aids during infant floating; the parents' skills and practical skills in relation to proper water safety and awareness during infant floating.

Parental competence in infant floating can be improved if the developed model is pursued at all three levels: elementary level (with the help of specialists), independence level, independence and responsibility level.

The model consists of four scientifically based, interrelated and dependent components which are prerequisites for the improvement of parental competence in infant floating (Figure 12).

Having analysed the parental competence self-assessment and the opinion on the infant floating components (Kurmeļeva & Fernāte, 2019, A, B), the current situation could be evaluated and the model to improve parental competence in infant floating could be developed. The aim of the developed model is to promote the improvement of parental competence in infant floating by enhancing each of the seven components in the structure of parental competence in infant floating.

The model developed to improve parental competence in infant floating includes a structured and purposeful improvement of parental competence in

various learning situations, thus promoting the growth of competence in infant floating, and reflects successive stages of activity.

Stage 1. Assessment of the need to develop parental competence in infant floating

At the initial stage, it is necessary to assess the need to develop parental competence in infant floating (assessment of the parents' initial knowledge, skills and attitudes in infant floating). At this point, it is possible to use the questionnaires designed for specialists and parents to assess parental competence in infant floating, which can also help obtain information about the reasons and the need to attend infant floating lessons.

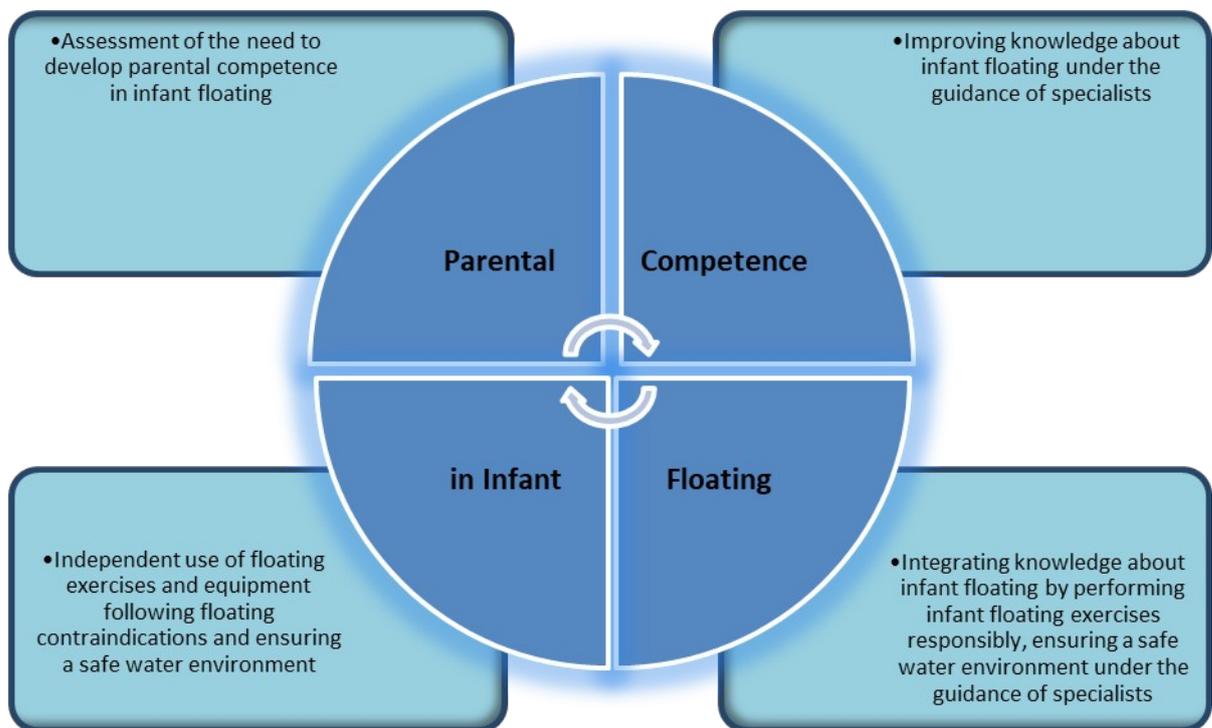


Figure 12. Model to Improve Parental Competence in Infant Floating

Stage 2. Improving knowledge about infant floating under the guidance of specialists

This stage of the parental competence improvement model is related to the development of knowledge about infant floating under the guidance of specialists. At this activity stage, parents undergo theoretical training on the main topics of infant floating as follows:

Topic “The Effects of Swimming on the Infant’s Body and Infant Floating Contraindications”

Topic “Water Safety and Awareness during Infant Floating”

Topic “Infant Holding Techniques during Floating”

Topic “Infant Floating Exercises”

Topic “Equipment Use and Necessity”

Stage 3. Integrating knowledge about infant floating by performing infant floating exercises responsibly, ensuring a safe water environment under the guidance of specialists

At this stage, the knowledge about infant floating is integrated by performing exercises and ensuring a safe water environment under the guidance of swimming specialists.

Also, practical training takes place in the pool under the guidance of specialists during which exercises are performed gradually with the increase in their complexity and in accordance with the infant's developmental reflexes and criteria for the exercise mastery level. The exercises are performed at the following stages: holding techniques during infant floating in the initial training phase; exercises in the initial infant floating training phase; exercises in the swimming skill harnessing and improvement phase; diving training exercises in infant floating.

Stage 4. Independent use of floating exercises and equipment following floating contraindications and ensuring a safe water environment

At the final stage of activity, parents use floating exercises and equipment responsibly and independently, follow floating contraindications and ensure a safe water environment. Also, parents try to float their infants independently applying the acquired knowledge and skills from the previous stages of implementing the competence improvement model.

Subchapter 3.4. Assessment of the developed model and development of scientifically based recommendations for the implementation of the model to improve parental competence in infant floating

3.4.1. Assessment of the model developed to improve parental competence in infant floating

To assess and analyse the structure of the parental competence improvement model components and their content in infant floating, the expert opinion method was used. 12 experts (swimming specialists) participated in the model structure assessment survey. For this purpose, a questionnaire containing the parental competence structure with 2 blocks in infant floating (the knowledge block and the skills and attitudes block) was developed. All in all, the parental competence structure consisted of 7 components. Together with the assessment questionnaire, the experts were offered to fill out a standardised and adapted expert questionnaire to determine their competence coefficient (Albrecht, 1998). According to the questionnaire survey results, it was decided that 2 expert assessments – one with the lowest competence coefficient and the other with the highest competence coefficient – would not be considered. According to the author's (Albrecht, 1998) standardised expert questionnaire, the maximum competence coefficient is 1. In the case under consideration, the average competence ratio of all 10 experts is 0.56 which means that the total expert competence is above average. Thus, after the expert opinion results under the

assessment questionnaire were subjected to mathematical statistics, the average evaluation results of all experts in numerical terms and modal value in each assessment position were determined.

The competence component structure and content thereof was evaluated on a 5-point scale (Albrecht, 1998), where: 1 point – a component or content thereof is not acceptable; 2 points – there are serious claims, the proposed component or content thereof needs to be modified; 3 points – there are claims, but a component or content thereof is generally acceptable; 4 points – there are minor claims against a component or content thereof; 5 points – there are no claims against a component or content thereof.

The knowledge block components and content thereof:

Both the average expert rating and mode for *Component No. 1* is 5 points. This means that all experts rated it with the highest score.

The average expert rating for Content No. 1.1 is 4.9 points, and mode – 5. This means that one expert gave a 4-point rating.

The average expert rating for Content No. 1.2 is 4.4 points, and mode is 4. This means that the most experts' rating is 4 points.

The average expert rating for Content No. 1.3 is 4.7 points, and mode is 5. This means that three experts gave a 4-point rating.

The average expert rating for *Component No. 2* is 4.8 points, and mode is 5. This means that two experts gave a 4-point rating.

The average expert rating for Content No. 2.1 is 4.4 points, while mode is only 4. This means that most experts gave a 4-point rating.

The average expert rating for *Component No. 3* is 4.7 points, and mode is 5. This means that three experts gave a 4-point rating.

The average expert rating for Content No. 3.1 is 4.7 points and mode is 5. This means that only three experts gave a 4-point rating.

The average expert rating for *Component No. 4* is 5 points, and mode is 5. This means that all experts rated it with the highest score.

The average expert rating for Content No. 4 is 5 points, and mode is 5. This means that all experts rated this content section with the highest score.

The average expert rating for Content No. 4.2 is 5 points, and mode is also 5. This means that all experts rated this content section with the highest score.

Again, the average expert rating for Content No. 4.3 is 5 points, and mode is also 5. This means that all experts rated this content section with the highest score.

The skills and attitudes components and content thereof:

The average expert rating for *Component No. 1* is 5 points, and mode is 5. This means that all experts rated it with the highest score.

The average expert rating for Content No. 1.1 is 4.9 points, and mode is 5. This means that one expert gave a 4-point rating.

The average expert rating for *Component No. 2* is 4.8 points, and mode is 5. This means that two experts gave a 4-point rating.

The average expert rating for Content No. 2.1 is 4.8 points, and mode is 5. This means that two experts gave a 4-point rating.

The average expert rating for Content No. 2.2 is 4.6 points, and mode is 5. This means that four experts gave a 4-point rating.

The average expert rating for Content No. 2.3 is 4.8 points, and mode is 5. This means that two experts gave a 4-point rating.

The average expert rating for Content No. 2 is 4.9 points, and mode is 5. This means that one expert gave a 4-point rating.

The average expert rating for Content No. 2.5 is 4.8 points, and mode is 5. This means that two experts gave a 4-point rating.

The average expert rating for Content No. 2.6 is 4.9 points, and mode is 5. This means that one expert gave a 4-point rating.

The average expert rating for *Component No. 3* is 4.7 points, and mode is 5. This means that three experts gave a 4-point rating.

The average expert rating for Content No. 3.1 is 4.3 points, and mode is 5. This means that the majority of experts gave a 4-point rating.

3.4.2. Recommendations for the implementation of the model to improve parental competence in infant floating

Recommendations for the implementation of the parental competence knowledge block components and content thereof:

- 1. Holding techniques during infant floating.*
- 2. The need to use equipment.*
- 3. Infant floating exercises.*
- 4. The effects of swimming on the infant's body.*
- 5. Infant floating contraindications.*
- 6. Water safety and awareness during infant floating.*

Recommendations for the implementation of the parental competence skills and attitudes block components and content thereof:

- 1. Ensuring a safe environment during infant floating.*
- 2. Practical activity.*
- 3. Responsible use of infant floating skills depending on the circumstances.*
- 4. Practical performance of exercises.*
- 5. Exercise combinations.*
- 6. Use of resources and equipment depending on the circumstances.*

Discussion

In general, all studies (Freedman, 2014; Faerch, 2018) comparing water activities with land activities confirmed the positive effects of water on a child's physiological development, coordination and diversity of movements, concentration, mood, and other characteristics.

Specialists believe that one of the main reasons why parents attend infant floating lessons is on the recommendation of their family doctor or other health

professionals. According to specialists, the level of the parents' knowledge significantly affects their ability to do floating independently, while the level of the parents' knowledge about infant floating is insufficient. Skills and practical skills also affect the parents' ability to do practical activities (Stallman, 2014). In the infant floating process, the way parents feel in this type of activity, their ability to independently perform exercises with their infant and their sense of direction in a specific aquatic environment is of great importance (Ahrendt, 2002; Zhao et al., 2005; Федулова, 2011).

The opinion of specialists on whether the knowledge acquired by parents needs to be supplemented is “Yes”; therefore, it must be supplemented. Specialists believe that while attending lessons with their infant, parents can practically use the acquired knowledge and received information, and repeat the lesson with their infant independently. In other words, the more classes they attend, the better their practical skills in infant floating will be. Specialists are sure that parents should improve their skills and practical skills in performing exercises in water, water safety and awareness, different holding techniques. Many authors believe that there are two main approaches to infant floating: therapeutic and pedagogical. The latter includes teaching parents how to do infant floating (Ahrendt, 2002; Zhao et al., 2005; Федулова, 2011).

From the specialists' point of view, when doing floating independently, parents should pay considerable attention to water safety. Nevertheless, before starting the lesson, specialists give them just basic instructions on water safety for children. According to specialists, the level of the parents' theoretical knowledge, skills and practical skills in water safety ranges from “Average” to “Rather good”. Given the current situation in Latvia, parental competence in water safety should undoubtedly be much higher. In recent years, the number of drowning deaths in Latvia is more than 6 people per 100,000 population, which is the highest rate in the European Union (LPF, 2018 A, C). The latest information shows that 96 Latvians died this way in 2019, but in the first six months of 2020 the number of drowning deaths was already 61, while in the European Union the average drowning rate is one death per 100,000 population (Olševska, 2020).

In general, the opinion of all surveyed swimming specialists is that parents should supplement or additionally acquire knowledge, skills and practical skills to increase their competence and be able to effectively use their competence in independent activities with their infants.

Such specialists' opinion confirms the information found in literature, namely, that in the process of teaching parents how to do infant floating, it is important to help them acquire appropriate infant floating skills so that parents can further use them safely and confidently in their child's future development (Meredith et al., 2001; Jovanovich, 2002).

The analysis of the results of the parent self-assessment survey shows that parents pay the most attention to both individual and group lessons in the pool which they attend together with their infants at least twice a week. It is possible

that the higher cost of individual lessons may be the reason why parents prefer group lessons. On the other hand, parents may be too confident in their infant floating competence and think that they are able to achieve their goals and objectives in infant floating at a sufficiently high level.

In the parents' answers, one of the main reasons why they attend infant floating lessons is on the recommendation of their doctor or other health professional. These parental responses fully meet the opinion of specialists. Likewise, modern paediatricians also claim that water has positive aspects and recommend or even refer children to hydrotherapeutic procedures (Jovanovich, 2002; Faerch, 2018).

From this it can be concluded that the main goal of parents in infant floating is to improve their infant's health on the advice of doctors rather than to learn swimming skills. However, the Author of the Doctoral Thesis thinks that parents should also understand that infant swimming skills will play a very important role in their child's later life as they will allow them to feel safer in open water.

For example, according to the common definition of swimming skills in the Scandinavian countries, a child or adult is expected to be able to swim 200 meters, including 50 meters on the back. A person must be able to jump into a deeper place and pick up an object from a body of water or the bottom of a swimming pool. In Scandinavia, trainings are also organised in the open air – in rivers, lakes, by the sea. The Finns stipulate that a child must learn to jump in cold water while clothed. They understand that people drown in open water because they do not know what to do in such a situation (LPF, 2018, G).

According to the parents' self-assessment, they do not deny the need to improve their skills and practical skills in performing exercises in water, water safety and awareness, different holding techniques. Parents rated their skills during independent infant floating lessons in the presence of specialists as good, and during lessons without the presence of specialists as "Average". Similarly, the authors (Meredith et al., 2001; Jovanovich, 2002) believe that in these joint activities with an infant floating specialist, it is important to make sure that parents learn the correct infant floating skills.

Comparing the results of the parent survey and the swimming specialist survey by the means (points), it can be concluded that, at present, the parents' self-assessment of their competence in infant floating in all components that directly determine parental competence (except one), is higher than the specialists' assessment. This is justified by mathematical statistics, because it can be seen that in the main components proposed by the Author of this Doctoral Thesis (Johnson, 1996; Ahrendt, 1997, 2002; Meredith et al., 2001; Ahrendt, 2002; Jovanovich, 2002; Zhao et al., 2005; Sigmundsson & Hopkins, 2009; Федулова, 2011; Freedman, 2014; Stallman, 2014), which determine parental competence in infant floating, the difference between specialist and parental assessment is statistically significant $\alpha < 0.05$. Comparing the results of the parent survey and the swimming

specialist survey by *mode*, it can be concluded that in this variant, the parents' self-assessment of their competence in infant floating in the components that directly determine parental competence (except for three) is similar.

To more accurately develop the structure of parental competence in infant floating, correlation analysis (Lasmanis, 2004) was performed after the specialist survey in addition to the processing of the survey questionnaire results where correlations were determined.

After the parent survey, the same correlation analysis (Lasmanis, 2004) to determine correlations was performed. The correlation between the self-assessment of parental competence components and the most important competence components in infant floating with the parents' views on the need to improve the infant floating competence shows that in these cases a strong correlation is observed ($0.7 < |r| < 0.99$). Slightly less than 50% of the cases have a moderate correlation ($0.5 < |r| < 0.69$), and a weak correlation ($0.2 < |r| < 0.49$) is the least observed. Unlike the comparison according to the specialist survey, in these cases no value is observed at all – the correlation is insufficient.

A significant difference in the correlation between the results of the parent survey and the specialist survey is that no negative correlation is observed in parents and, as discussed above, the correlation in specialists is significantly weaker than in parents. The Author of this Doctoral Thesis thinks that this could be explained by the fact that after the questionnaire survey results were compared it became clear that parents rated their infant floating competence higher than specialists. At the same time, in terms of importance of the competence required and in terms of supplementing the required competence, the assessments are quite similar.

Nevertheless, regardless of such differences in the correlation results, and while performing the multiple linear regression analysis between specialists and parents, an almost identical picture is observed showing a strong correlation with the confidence level of $\alpha = 0.95$ in the opinions of specialists and parents.

So, when performing the multiple linear regression analysis of the parents' opinion, a similar trend was observed as in the specialists' opinion. The parental competence skill component is equally related to both the skill and the knowledge component which is characterised by the fact that parental knowledge in infant floating must be higher than the skill in order to be able to achieve a similarly high level of competence in infant floating.

The equality of the results of such a linear multifactor regression analysis is due to the fact that specialists and parents have concurring opinions and shows equally proportional trends in the development of infant floating skills.

Such a research related to the assessment by parents of their competence in infant floating has been conducted in Latvia for the first time. In the analysis of different scientific literature sources in the course of writing this Doctoral Thesis, no similar research related to the study of parental competence in infant floating

has been found. Therefore, this research is a new way to obtain information and compare parental competences in infant floating.

Apart from that, before the parental competence structure and the competence improvement model in infant floating were developed, a multiple linear regression was taken into account for the interpretation thereof.

The structure of parental competence in infant floating developed in the course of the research consists of 7 structural components of knowledge, skills and attitudes which were substantiated by the results of other authors' researches, opinions and information in scientific literature:

- Knowledge about infant floating (Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Tanaka, 2009; Freedman, 2014);
- Knowledge about the effects of floating on the infant's body (Barczyk, Skolimowski & Zawadzka 2005; Zelazo & Weiss, 2006; [Nystad](#) et al., 2008; Sigmundsson & Hopkins, 2009; [Dias](#) et al., 2013; [Faerch](#), 2018);
- Knowledge about floating contraindications (Bernard et al., 2007; Voisin et al., 2010);
- Knowledge about water safety, holding techniques ([Brenner](#) et al., 2003; Blitvich et al., 2012);
- Ensuring a safe environment ([Brenner](#) et al., 2003; Blitvich et al., 2012);
- Responsible use of infant floating skills depending on the circumstances (Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000; Tanaka, 2009; Freedman, 2014);
- The use of resources and aids depending on the circumstances (Committee on Sports Medicine and Fitness and Committee on Injury and Poison Prevention, 2000).

The model developed to improve parental competence in infant floating consists of four successive phases. At the beginning, it is necessary to assess the need for the improvement of parental competence in infant floating. The next step is the improvement of knowledge about infant floating under the guidance of specialists followed by the integration of knowledge about infant floating through the responsible performance of the infant floating exercises, ensuring a safe water environment under the guidance of specialists. The final phase is the independent doing of swimming exercises and use of equipment following floating contraindications and ensuring a safe water environment.

The exercises were developed based on personal experience and information found in literature sources (Ahrendt, 2002; Jovanovich, 2002; Янушанец, 2003; McKay & McKay, 2005; Мухортова, 2008; Чертов, 2010; Федулова, 2011; Петрова & Баранов, 2013; Faerch, 2018; Ayton & Holden,

2019; Napolski, 2019) which indicated that parents faced difficulties in holding techniques, choice of exercises, water safety and awareness, practical performance of exercises, choice of exercise combinations, use of resources and aids depending on the circumstances during infant floating.

Based on the expert assessment, the model developed to improve parental competence in infant floating according to Albrecht's questionnaire survey sample (1998) is positive. The experts' greatest attention with the maximum ratings is in the water safety-related section. This largely coincides with the current poor situation with drownings in Latvia (Olševska, 2020). The parent and swimming specialist survey results show that the opinion of all research participants on this issue is unequivocal – safety must be the basis for the successful implementation of future activities.

The same picture is seen in the expert assessment of the parent and swimming specialist survey results on the use of additional equipment during floating lessons. The opinion of all research participants on the use of additional equipment is similar and proved by the mean scores which are lower than 4.5 points with the *mode* value of 4. The use of additional equipment is important, but only when all preceding model phases have been implemented.

When implementing the model to improve parental competence in infant floating, parents can use their knowledge and skills during independent infant floating lessons. The duration of the infant floating lessons, which is up to 30 minutes, must be also taken into account. However, to successfully implement that, parents need to be able to use knowledge of safety rules and act correctly depending on the situation. Regardless of whether parents do infant floating independently, without the presence of specialists, or under their guidance, parents must be able to use the appropriate exercises in the correct order. Parents need to be able to perform different exercises independently applying different holding techniques. Parents need to be able to use additional equipment for certain exercises correctly. For independent infant floating, parents should first choose simple combinations consisting of two movements, and then supplement them by adding the third or even the fourth movement, combining them into more complex combinations.

Conclusions

1. Theoretical research of the correlations between the development of infant swimming skills and parental competence in infant floating, the essence of infant floating, infant swimming skills and parental competence in infant floating was defined.

Infant floating is the teaching of basic swimming strokes in water to infants aged 3 to 18 months with the direct assistance of a swimming specialist or a parent while performing the basic swimming strokes.

Infant swimming skills are the ability to do the basic swimming strokes (push-off from the wall with feet, arm pulling, leg kick simulation for front crawl and back crawl, jumping into water and short swims underwater) at least with parental support and safety awareness, or independently, without parental assistance and using various swimming aids..

Parental competence in infant floating is the ability to responsibly integrate knowledge, skills and practical skills into the practical infant floating activities in accordance with the development of the basic infant swimming reflexes and the level of acquisition of infant swimming skills.

2. The swimming specialist questionnaire has a good significance value (the overall Cronbach's alpha is 0.820) and is theoretically well-argued (Table 2). The results of the swimming specialist survey allow concluding that all the competence components proposed herein (10 components), which could affect parental competence in infant floating, proved to be of great importance. The mean of the components ranges from 3.9 to 5 points, with the mode value of 4 in two components and the mode value of 5 in the rest components.

According to specialists, the current total parental competence (12 components) in infant floating is mediocre. The mean of the competence components ranges from 2.3 to 4.3 points, while the mode value fluctuates from 2 to 4, except for one component with the mode value of 5.

The opinion of all surveyed swimming specialists is that parents should supplement or additionally acquire knowledge, skills and practical skills to improve their competence (11 components) and be able to effectively use their competence while doing infant floating independently. The mean of the competence components ranges from 4 to 4.9 points, and the mode value in two components is 4, while in the other components the mode value is 5.

3. The parent questionnaire has a good significance value (the overall Cronbach's alpha is 0.984) and is theoretically well-argued (Table 2). The results of the parent questionnaire allow concluding that all the competence components proposed herein (10 components), which could affect their competence in infant floating, proved to be of great importance. The mean of the components ranges from 4.1 to 4.9 points, with the mode value of 4 in two components and the mode value of 5 in the rest components.

Parents rated their overall competence (12 components) in infant floating slightly higher than average. The mean of the competence components ranges from 2.8 to 4.5 points, while the mode value fluctuates from 3 to 5.

The opinion of the surveyed parents is that they need to supplement or additionally acquire knowledge, skills and practical skills to increase their competence (11 components) in infant floating and be able to effectively use their competence in independent floating activities with their infants. The mean of the competence components ranges from 3.7 to 4.9 points, the mode value in three components is 4, while in the rest components the mode value is 5.

4. The structure of parental competence in infant floating includes 7 components of the knowledge, skills and attitudes structure: knowledge about infant floating, knowledge about the effects of floating on the infant's body, knowledge about floating contraindications, knowledge about water safety and awareness, ensuring a safe environment, responsible use of infant floating skills depending on the circumstances, use of swimming aids and equipment depending on the circumstances.

The model developed to improve parental competence in infant floating consists of 4 interrelated and dependent components: assessment of the need for the development of parental competence in infant floating; knowledge improvement in infant floating under the guidance of specialists; integration of knowledge about infant floating while responsibly performing infant floating exercises, ensuring a safe water environment under the guidance of specialists; independent performance of floating exercises and use of equipment following floating contraindications and ensuring a safe water environment.

The model was developed with the aim to promote the improvement of parental competence in infant floating by improving each of the 7 components in the structure of parental competence in infant floating.

To implement the parental competence improvement model and integrate knowledge about infant floating into practice, it is necessary to use the exercises developed for independent performance with 4 exercise sections: holding techniques in the initial training phase; the sequence of exercises in the initial infant floating training phase; the sequence of exercises in the infant swimming skill strengthening and improving phase; sequence of underwater swimming exercises in infant floating.

Comparing the results of the parent and swimming specialist surveys on parental competence in infant floating according to the mean score (points), it can be concluded that parents assess their competence in infant floating higher than swimming specialists. Of the 9 direct infant floating competence components, in one component the difference is not statistically significant, but in terms of the rest 8 components with statistically significant differences in 7 components there are significant differences in favour of the parents' assessment (parents rated themselves higher).

Comparing the results of the parent and swimming specialist surveys by *mode*, it can be concluded that in this variant the parents' assessment of their competence in infant floating in the components that directly determine parental competence (except for three) is similar.

The analysis of the results of the parent and swimming specialist surveys using the correlation matrix allows arriving at the conclusion that, according to the specialist survey results, the correlations between parental competence components with the most important competence components in infant floating show a mean correlation only in one case ($0.5 < |r| < 0.69$), and no cases show a strong correlation ($0.7 < |r| < 0.99$). The correlation observed is mostly insignificant ($|r|$

$<r_\alpha$, where $|r_\alpha| = 0.196$), and a weak correlation is observed in several cases ($0.2 < |r| < 0.49$).

The correlation between parental competence components and the specialists' views on the need to improve competence in infant floating shows a similar picture to that discussed earlier. According to the correlation matrix, the correlation is found to be insignificant or weak, and only one case shows a moderately strong correlation ($0.5 < |r| < 0.69$).

According to the parent survey results, the correlations between the self-assessment of the parental competence components and the most important competence components in infant floating show that in most cases there is a strong correlation ($0.7 < |r| < 0.99$) and a moderate correlation ($0.5 < |r| < 0.69$), while a weak correlation ($0.2 < |r| < 0.49$) is least observed.

The correlations of the self-assessment of the parental competence components with the parents' views on the need to improve competence in infant floating show that in this case a strong correlation is also observed ($0.7 < |r| < 0.99$). Slightly less than 50% of cases have a moderate correlation ($0.5 < |r| < 0.69$), while a weak correlation ($0.2 < |r| < 0.49$) is least observed.

Summarising the results of the correlation matrix on the correlations between parental competence components and the views of specialists and parents on the need for competence improvement (according to the track chart), it was concluded that the strongest correlations ($0.7 < |r| < 0.99$) are observed in the parental competence components as follows: the role of basic knowledge in infant floating; independent work with literature sources; the role of basic skills in infant floating; independent use of skills in the presence of specialists; the role of general basic practical skills; independent use of practical skills in the presence of specialists; practical skills to follow water safety during floating.

In turn, the strongest correlations ($0.7 < |r| < 0.99$) are observed for the competence components to be additionally learned by parents as follows: knowledge about the use of aids; the effects on the body; skills and practical skills to perform exercises; use of aids, and water safety awareness.

In the process of development of the parental competence structure and the model to improve parental in infant floating, the results of correlation analysis and multiple linear regression were taken into account to interpret them. When constructing correlations between parental competence components and the opinions of specialists and parents, the multiple linear regression equation $y = a + bx_1 + cx_2$ was used as a basis, where y – the skills component of parental competence; a , b , c – linear equation coefficients; x_1 – the practical skills component of parental competence; x_2 – the knowledge component of parental competence.

Assessing both correlation curves of the specialists' opinion, it is observed that the practical skills component of parental competence shows a higher coefficient of determination ($R^2 = 0.83$) and the knowledge component shows a lower coefficient of determination ($R^2 = 0.62$), while for the parents' opinion, the

coefficients of determination are almost equally high for both the practical skills and the knowledge components: $R^2 = 0.98$ and $R^2 = 0.95$ respectively, against the parental competence skills component. In all cases, the coefficient of determination exceeds the 0.5 threshold value and shows a high correlation. In all equations, the coefficient a is close to 1 which indicates a proportional increase in the curve: as the assessment of practical skills or knowledge increases, the assessment of skills will increase equally proportionally. This means that the skills component of parental competence is equally related to both the practical skills component and the knowledge component. Therefore, it follows that the parents' knowledge about infant floating must be higher than their practical skills to achieve a similarly high level of competence skills in infant floating.

5. Upon evaluation of the model developed to improve parental competence in infant floating using the expert opinion method, and after the evaluation of the parental competence's knowledge block components and their content in infant floating under the expert survey, the mean score ranges from 4.4 to 5 points, while the mode value fluctuates from 4 to 5.

According to the expert survey, the mean of assessment of the parental competence's skills and attitudes block components and their content in infant floating ranges from 4.3 to 4.9 points, while the mode value varies from 4 to 5.

In total, out of 23 assessments, the mode value of 4 is only found in 3 cases, and in the rest cases the mode value is 5.

This means that in terms of the model and its parental competence structure in infant floating the experts had no claims whatsoever as to the competence components and their content. Based on the results obtained by the expert opinion method, the developed model can be regarded as valid for implementation.

For the successful implementation of the model to improve parental competence in infant swimming, the below developed recommendations should be taken into account:

- Basic recommendations for ensuring a safe environment when starting infant floating in the bath or pool for parents and infant floating specialists.
- Recommendations for the implementation of parental competence's knowledge components and content thereof.
- Recommendations for the implementation of parental competence's skills and attitudes components and their content.

In the course of the work, the *aim of the research*, i.e. development of the model to improve parental competence in infant floating and development of scientifically based recommendations in infant floating, has been achieved.

Research hypothesis: Parental competence in infant floating will improve if:

- The infant floating programme content and its implementation are suitable to the infants' age and reflexes.

- Conditions are created to ensure gradual autonomy of parents in infant floating.
- Parents are aware of the infant floating conditions, the effects of floating on the infant's body, floating contraindications, water safety and awareness when floating their infant.
- Parents are able to provide a safe floating environment for their infants, are able to responsibly use infant floating skills and use swimming aids depending on the circumstances.

The research hypothesis is confirmed as evidenced by the multiple linear regression correlation curves – infant floating skills will proportionally increase with the increase in parental competence knowledge or practical skills in infant floating, which is shown by the value of the multiple linear regression equation coefficient a approaching 1. According to the specialist survey results, the coefficient of determination between the parents' skills and practical skills is ($R^2 = 0.83$), and between the parents' skills and knowledge it is ($R^2 = 0.62$). According to the parent survey results, the coefficient of determination between the parents' skills and practical skills is ($R^2 = 0.98$), and between their skills and knowledge it is ($R^2 = 0.95$).

The hypothesis is also confirmed by the results of the correlation analysis where, according to the swimming specialist survey results, the parents' skills in observing water safety during infant floating lessons are on average correlated with the knowledge about the performance of exercises ($|r| = 0.518$), the parents' independent work with literature sources on average correlates with the knowledge about the effects of floating on the infant's body ($|r| = 0.503$). According to the parent survey results, the parents' theoretical knowledge about the swimming aids, the effects and significance of floating are strongly correlated with the knowledge about the use of swimming aids ($|r| = 0.755$) and first aid ($|r| = 0.706$), with the skills and practical skills in using different aids during floating ($|r| = 0.737$); the parents' basic knowledge about infant floating is strongly correlated with the knowledge about the performance of exercises ($|r| = 0.709$), use of swimming aids ($|r| = 0.792$), effects on the infant's body ($|r| = 0.721$), water safety ($|r| = 0.736$) and first aid ($|r| = 0,828$), with the skills and practical skills in using different aids during floating ($|r| = 0,785$).

List of scientific publications

1. Kurmeļeva A., Fernāte A. (2019). Parents competence in infant floating from a specialist perspective. Proceedings of the International Scientific Conference „Society. Integration. Education”, Vol.4, pages 207. – 216, DOI: <https://doi.org/10.17770/sie2019vol4.3769>

2. Kurmeļeva A., Fernate A. (2019). *Self – assessment of parents competences in infant floating*. LASE Journal of Sport Science, 2019 Vol 10, No1, pages 15 – 46, DOI: https://journal.lspa.lv/files/2019/1/LASE_2019_1.pdf
3. Kurmeļeva A., Fernāte A. (2020). Promotion of parent's competence in infant floating. Proceedings of the International Scientific Conference „Society. Integration. Education”, Vol.6, pages 273. – 281, DOI: <https://doi.org/10.17770/sie2020vol6.5089>

Participation with reports in international scientific conferences

1. Kurmeļeva, A. (2020). *Zīdaiņu peldināšanas veicināšana*. LSPA 12. doktorantu un maģistrantu zinātniskajā konferencē Sports 2020-Dzīve ir kustība, kustība ir sports. 2020. gada 1. jūnija, Rīga, Latvija.
2. Kurmeļeva, A. (2019). *Comparison of parents and swimming specialists competence components evaluation in infant floating*. Sport science for sports practice, teacher training and health promotion. 12th Conference of the Baltic Sport Science Society. April 25 – 26, 2019, Vilnius, Lithuania.
3. Kurmeļeva, A. (2019). *Assessment of competence components in infant floating to increase parents competence level*. Rīga Stradiņš University International Conference on Medical and Health Care Sciences, Knowledge For Use in Practice. April 1-3, 2019, Riga, Latvia.
4. Kurmeļeva, A. (2018). *Infant swimming specialist opinion about parental competence in infant floating*. Integrated Effects of Exercise: From Performance to Health and Prevention. 11th Conference of the Baltic Sport Science Society. April 25 – 27, 2018, Tartu, Estonia
5. Kurmeļeva, A. (2017). *Main challenges and aspect of parental competence in 2 – 12 months aged infant floating*. Multiplicity of sport science in practice. 10th Conference of the Baltic Sport Science Society. April 26 – 28, 2017, Riga, Latvia.
6. Kurmeļeva, A. (2017). *Vecāku viedoklis un kompetence zīdaiņu peldināšanā*. Indivīds sabiedrībai un sabiedrība indivīdam. LSPA maģistrantu 9. zinātniskajā konferencē. 2017. gada 23. martā, Rīga, Latvija.
7. Kurmeļeva, A. (2016). *Main challenges and aspect of parental competence in infant floating*. Current Issues and New Ideas in Sport Science. 9th Conference of Baltic Society of Sport Sciences. April 27-29, 2016, Kaunas, Lithuania.
8. Kurmeļeva, A. (2016). *Speciālistu viedoklis par vecāku kompetenci zīdaiņu peldināšanā*. Sporta un veselības medicīniski bioloģiski aspekti. LSPA Starptautiskā konference Sporta zinātnē. 2016. gada 23. martā, Rīga, Latvija.
9. Kurmeļeva, A. (2015). *Zīdaiņu peldināšanas metodika*. Zinātne sportam, veselībai un labklājībai. LSPA 7.doktorantu un maģistrantu zinātniskajā konferencē. 2015.gada 26.martā, Rīga, Latvija.

Acknowledgments

Charles Dickens once said, “Reflect upon your present blessings, of which every man has plenty; not on your past misfortunes, of which all men have some”.

For this very reason, I would like to add a small section hereto to thank everyone who supported and helped me during my PhD study. I could not possibly imagine that going through with it would take so much effort and time. Luckily, the time invested in achieving the goal and the difficulties overcome are always highly appreciated.

They say that the world is full of good and helpful people, and I have seen it for myself. I am very grateful to my family for their undying support: mom, dad and my two sisters, and all relatives who encouraged and inspired me along the way. There were times when I couldn't cope on my own. It was then when my friends helped. Their help is invaluable, that is why I would like to say a “big thank you” to my best friend Jūlija. I am extremely grateful to Māris for the design of my thesis and his massive support. I am grateful to all my friends who knew the reason why I was sometimes unavailable and respected that. I am endlessly thankful to my colleagues for always being there for me and respecting my work.

In particular, I would like to thank my supervisor Professor Andra Fernāte for her motivation, invaluable advice, and continuous support. I would also like to say “thank you” to Zinta Galeja for her suggestions to help me improve my thesis and her positive attitude no matter what. I am grateful to the thesis examiners for their energy and time as well as valuable recommendations in the improvement of my scientific work. I would also like to say a “huge thank you” to Professor Žermēna Vazne for her suggestions to improve the quality and validity of my Doctoral Thesis.

I express my respect and gratitude to all of you for your responsiveness, understanding, and individual contribution throughout the writing of my Doctoral Thesis!

Curriculum vitae

Personal information

Name, Surname: Alina Kurmeleva

Date of birth: 02.05.1989.

e-mail: kurmeleva@inbox.lv

Position

Physiotherapist – Riga Health center ‘Kengarags’

Guest lecturer – Latvian Academy of Sport education

Head of practice in physiotherpahy – Riga Stradins University

Education

2014. – 2018. Academic Doctoral higher education programme "Sport Science".
Latvian Academy of Sport Education, Brivibas str.333, Riga

2012. – 2014. Professional Master higher education programme „Sport Science” and education and sport specialist with qualification – swimming coach.

2008. – 2012. Professional bachelor degree in sport science with qualification-physiotherapist. Latvian Academy of Sport Education, Brivibas str.333, Riga

2000. – 2008. Secondary school, Private school ‘Laisma’

1996. – 2000. Elementary school. Riga 72. secondary school

Professional work experience

2018. – to this day. Guest lecturer. Latvian Academy of Sport education

2017. – 2020. Physiotherapist. ESF project „ We care about health in Riga’

2016. – to this day. Head of practical work physiotherapy, RSU

2015. – 2016. Physiotherapist. Society with limited responsibility „Aprūpes birojs”

2014. – to this day. Physiotherapist. Health centr „Julya”

2012. – to this day. Physiotherapist. Riga Health center ‘Kengarags’

2012. – to this day. Swimming coach. Riga 72. secondary school.