PhD Thesis
Evaluation Report

PhD Thesis Title:	**SCHOOL-AGE CHILDREN VISION SCREENING**
Name of Candidate:	**Mila Tonieva Dragomirova**
Qualification Level Sought:	**Acquisition of an Educational and Scientific Degree: Doctor of Philosophy /PhD/**
Scientific Subject of Study /Specialty:	**Optometry**
Examiner:	**Prof. Dr. Iva Todorova Petkova, MD Faculty of Medicine, Medical University of Sofia**

Children's health care topic and in particular the one of children's eye health in Bulgaria has been raised many times during the last years, and it was found that there were many gaps in said system. Separate campaigns organized out of goodwill or based on scientific interests have proven that Bulgarian children rarely take advantage of ophthalmological care benefits in preschool and even in school-age and that malpractice led to serious adverse consequences in professional and social development for some of them. In this sense, Mila Dragomirova's research on school-age children in different settlements in Bulgaria was extremely important and it was made in a timely manner.

Career Development

Mila Tonieva Dragomirova graduated from St. Kliment Ohridski University of Sofia, Faculty of Physics, Department of Optics and Spectroscopy acquiring a Master's Degree in Optometry in 2012.

From 2016 until present, the candidate carries out teaching and research activities in said Department, and in addition to it works directly with students, participates in development and drawing up Bachelor's Degree Program courses in Optometry as well.

Courses of study conducted by the candidate:

- Introduction to Optometry;
- Clinical Refraction – 1;
- Clinical Refraction – 2;
- Contact Lenses – 1;
- Contact Lenses – 2;
- Practice in Optometry;
- Eyeglasses Techniques;
- Optometric Measurements,
- As well as methodical training and management of vision screenings.

Specializations:

- Ruskin University of Cambridge (ARU), Cambridge (UK) in February 2018, and
- Teaching specialization at Dublin Institute of Technology (DIT), Dublin (Ireland) in October 2017.

Public Activity:

Mila Dragomirova has been the President of the Bulgarian Union of Optometrists (BUO) since 2014 until present. Acting in such capacity, she was involved in organizing and conducting Union's activities in the country, participating in organization of national conferences with international participation, organizing membership relationships of BUO as a full member of Bulgarian Chamber of Commerce since April 2018 and organizing membership relationships of BUO in the European Council in Optometry and Optics since 2016.

From 2018 until present, Ms. Dragomirova has been a member of the Accreditation Committee for European Qualification in Optics and European Diploma in Optometry - European Council of Optometry and Optics (ECOO), and in the meantime she used to be a member of the Optics Sub Committee from 2018 to 2020 as well.

PhD Thesis General Characteristics:

The PhD Thesis was developed on 119 pages including:

- Introduction – 3 pages;
- Characteristics of the Child's Visual System - 19 pages;
- Screening Methodology – 21 pages;
- Methodology for Training Students in Optometry, developed and introduced in the Process of working on the PhD Thesis - 10 pages;
- Epidemiology of Myopia in Bulgaria - Chapter 4 and Chapter 5 - 32 pages;
- Knowledge Management in Children's Vision Health Care System - 16 pages;
- Contributions;
- List of publications related to the PhD Thesis;
- Bibliography.

In the First Chapter, representing an overview of the PhD Thesis, were considered in a very synthesized and precise manner the development of the child's visual system and main types of refractive anomalies. Particular attention was paid to the degrees and disorders of binocular vision and amblyopia. The final pages addressed the paediatric vision screening issues: purposes, tests' types and effectiveness. The most important thing in this chapter was the assessment of epidemiological studies in Bulgaria and health care state in the presence of visual disorders in children. All literature sources from the last 20 years containing data on those studies were examined too. The conclusion made in this part of the thesis was that ***there was no effective state policy for timely detection of vision problems in children***.

Regardless of the fact that the purpose of the PhD Thesis was well-founded in the First Chapter, said conclusion was brought out in advance in the introduction of said thesis, namely:

1. To ensure timely detection and prevention of visual disorders in school-age children in Bulgaria, and
2. To propose solutions to several identified problems.

There were set six tasks in order to achieve that goal, and they were corresponding exactly to the number of chapters in the PhD Thesis.

The Second Chapter was examining the screening methodology used in the PhD Thesis. According to the author, selected tests were aimed to ensure the study of maximum number of students, not disrupting the learning process, remaining all the time accessible and convenient to be performed "*in the field*" and being sensitive to a maximum number of visual disorders. A number of strabismus, motility, and cover tests, as well as autorefractometer results, visual acuity and colour vision tests, and stereo vision tests, were considered in detail. A special questionnaire was elaborated and filled out for 1.227 children out of the 15.000 children examined throughout the country.

Already here some very curious and expected results have appeared:

- More than half of the children have never had an eye examination /56.7%/;
- 35% of the children had refractive errors;
- Only 15% of the examined children were having prescribed eyeglasses specifically for them and more than half of them have declared that they were not wearing those eyeglasses;
- 62% of all children were spending more than two hours daily in front of screens, and 11.3% of them - more than five hours.

A description of the organization of work was following both in terms of the distribution of bases for the various tests and the effectiveness of contacts with school management. A logical continuation of the previous chapter was the Third Chapter, which was examining the training of optometry students aimed to teach them practical skills described during the preparation of the PhD Thesis. Practical skills for the correct performance of the mentioned tests and interpretation of obtained results were explained in detail as well.

The Fourth Chapter of the PhD Thesis have examined the risk factors for the presence of refractive anomalies among school-age children, with special attention paid to myopia. Two criteria were set - myopia less than or equal to -0.75 dioptres (D), and visual acuity less than or equal to 0.8. This criterion was introduced to avoid overestimation of myopia. The results in this chapter confirmed the presence of heredity in myopia - 23.46% of the children of parents with myopia were also myopic, in contrast to those ones who did not have parents wearing glasses - 13.47%. Unlike the general population, those children were much better cared for – 71.6% of them have had a previous ophthalmological examination. Unfortunately, only 27.5% of those children were wearing their glasses regularly. Contrary to the expectations, the number of hours spent in front of the computer, did not appear to be a reliable risk factor for the development of myopia. According to the study, age was the most critical parameter for the development of myopia.

The next Fifth Chapter examined the algorithm for finding and investigating Colour Vision Deficiency /CVD/. The Ishihara test was used as screening method, and to specify the type of colour disorder, Farnsworth D-15 and Lanthony Desaturated D-15 Colour tests were used as well. In this first-of-its-kind screening of school-aged children in a small Bulgarian town, a high level of Colour Vision Deficiency /CVD/ in girls was found /9.2% in boys and 4.31% in girls/, in contrast to the generally accepted opinion about a ratio of 8% in boys and 0.8% in girls.

The final Sixth Chapter of the PhD Thesis developed a concept for a Knowledge Management System /KMS/ in Paediatric Vision Care, linking family, school, university, health professionals, non-governmental organizations, researchers and health care administrators. The PhD student considered that the main problems were residing in an insufficient communication between the interested parties, lack of information about existing screenings, lack of epidemiological data, as well as the small number of scientific publications on the subject. The launching of a Knowledge Management System /KMS/ was aimed to assist in the collection, organization and transfer of knowledge in Paediatric Vision Care and collaboration for providing the needed degree of clinical expertise. In the first stage of the establishment of said system, the available resources were identified, and in the second stage the appropriate access to that knowledge were ensured, involving all participants in the maintenance of the knowledge data base as well.

The Conclusions arising from the tasks set at the beginning of the PhD Thesis were presented in each chapter and after a short discussion they were highlighted at the end of it.

The Contributions were five, repeating once again in a more synthesized form the conclusions previously obtained.

The Literary Overview was including 115 titles, for 8 of which was used a Cyrillic script and for 107 of them - a Latin script. 83% of the literary sources used in the PhD Thesis were from the period after the Year 2000.

The thesis was prepared in accordance with the University's requirements.

Publications:

Mila Dragomirova has submitted four scientific publications related to the PhD Thesis, one of which was published in Group I (Q2), the second one - in Group III (SJR), and the remaining two were published in reputed national journals. All four publications have made a significant contribution to the issues and solutions presented in the PhD Thesis. Four participations in scientific conferences (three of them were reports and one - a poster) have been enclosed to the PhD Thesis as well.

Teaching activity

Courses of study conducted by the candidate:

- Introduction to Optometry;
- Clinical Refraction – 1;
- Clinical Refraction – 2;
- Contact Lenses – 1;
- Contact Lenses – 2;
- Practice in Optometry;
- Eyeglasses Techniques;
- Optometric Measurements,
- As well as methodical training and management of vision screenings.

Participation in Projects:

1. **Vision for Vision Project -** financed by the Active Citizens Fund Program under the European Economic Area (EEA) Financial Mechanism 2014-2021;

- **K-TRIO 3 Project** - European Night of Scientists 2018;

- **Formation of a New Generation of Researchers in the Field of Mathematics, Informatics and Computer Sciences by supporting the Creative and Innovative Potential of Doctoral students, Post-doctoral students and Young scientists at the Faculty of Mathematics and Informatics at Sofia University, BG051PO 001-3.3.06.-0052.**

Conclusion:

Mila Dragomirova's **SCHOOL-AGE CHILDREN VISION SCREENING** PhD Thesis examined a current problem of social importance. It included a sufficient amount of clinical data, on the basis of the results of which important conclusions were drawn regarding school-age children eye health problem. A significant contribution of the PhD Thesis was the establishment of a Knowledge Management System in the field of children's eye health protection.

The PhD Thesis and Abstract were developed according to the requirements of the Regulations on the terms and conditions for acquiring scientific degrees and holding academic positions at Sofia University.

Based on the aforesaid, I hereby confirm that the scientific achievements in the PhD Thesis submitted to me have met the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria for the acquisition of the educational and scientific degree ***Doctor of Philosophy in Physical Sciences***.

Sofia, 22nd August 2022

Prof. Dr. Iva Petkova, MD
Examiner