Visual Screening Competencies Questionnaire (VSCQ) and Orthoptic Practice

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ABSTRACT

The identification of core competencies which are important for undertaking accurate visual screening by orthoptists is considered in this study. The aim was to construct and validate a questionnaire for orthoptists to assess visual screening competency. This study comprised three steps. The first step involved a 69-item self-assessment questionnaire constructed to assess orthoptists' perception of their competencies in visual screening programs for children. This questionnaire was constructed with statements from the Orthoptic Benchmark Statement for Health Care Programmes (Quality Assurance Agency for Higher Education, United Kingdom) and included three competency dimensions: interpersonal (IP), instrumental (IT) and systemic (ST). The second step involved questionnaire translation. Statements were translated into Portuguese and survey items were then reviewed by two experts. The third step involved questionnaire validation for internal consistency (n = 36 orthoptists) and factorial dimension analysis (n = 58 orthoptists). Questionnaire dimensions presented the following internal consistency: α (ST) = 0.916; α (IP) = 0.949; α (IT) = 0.892. After performing the factorial analysis of principal components, results showed a total explained variance of 61.21% (KMO = 0.795). The IP dimension demonstrated 35.88% of the variance and IT 14.45% of the variance. Each dimension item was shown to be a good measure of ST, IP and IT. The questionnaire provides a method of measurement of orthoptists' perception of their competencies in the visual screening of children.

Keywords: orthoptists, children's visual screening, competencies, factorial analysis of principal components, validation

INTRODUCTION

In recent years there has been a growing interest in the study of competency-based performance of health professionals for enhancing organisational and individual practice.[1] The concept of professional competence arose in the early 1970s when mass produced goods were in decline and a need for a different type of workforce with differing skills emerged. Workers needed to be more adaptable to changing demands, able to solve problems, work as a team and take responsibility for the quality of their work.[2] This more dynamic way of working questioned the importance of learning environments. In this changing model it was considered that the work environment should be linked with the educational environment so that learning is better integrated into the workplace. Formal learning programs were no longer the only access route to professional qualifications.[2] Learning through experience becomes an important factor in acquired competencies.

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Subject benchmarking was designed in the United Kingdom[3] to provide a means of describing the nature and characteristics of higher education programs and training in health care. This also represented general expectations about standards for the award of qualifications and provided general guidance for articulating the learning outcomes associated with the training program.[3] The subject specific statements for orthoptics is outlined in three main headings:[3] 1. the expectations of the health professional in providing patient services; 2. the application of practice in securing, maintaining or improving health and well-being; and 3. the knowledge, understanding and skills that underpin the education and training of health care professionals.

Orthoptics is a health profession concerned with the study of the visual system and the development and management of binocular vision and ocular motility. Orthoptists work with patients of all ages but are recognised for their expertise in the assessment of vision in children and in the field of paediatric vision screening.[4] Orthoptists play an essential role in visual screening of children and the detection of strabismus, amblyopia and ocular motility defects. In Portugal a large group of orthoptists are employed in the National Health Care Service. According to the Portuguese

Government Health Department there are approximately 400 registered orthoptists.[5] The visual screening of children requires technical proficiency, technical skills and interpersonal skills.

In Portugal visual screening is commonly undertaken by registered orthoptists. A core competency model to guide strategic visual screening improvement programs does not exist and there is no method available to assess this subject. Within the context of this study we adopted the professional competencies definition of Janssen-Noordman et al,[6] where a meaningful task is performed in professional practice with the integration of knowledge, skills and attitudes.

The aim of this study was to construct and validate a questionnaire to define a competency model for the visual screening of children. The intent was to provide a method of skills measurement for effective performance applied to visual screening and to identify core competencies in visual screening. This approach may then inform guidelines, providing suggestions and advice on how to design a competency-based educational program for orthoptists.

METHODS

Ethics approval for this study was obtained from the Portuguese Professional Society Committee. All participants gave fully informed consent. This study comprised three steps that are summarised below.

FIRST STEP

The first step involved the development of a 69-item self-assessment questionnaire called the Visual Screening Competencies Questionnaire (VSCQ). This questionnaire was developed in 2009, based on statements from the Orthoptic Benchmark Statement for Health Care Programmes document of the Quality Assurance Agency for Higher Education.[3] The questionnaire aimed to assess orthoptists' perception of their competencies and professional practice in visual screening programs for children.

The constructed model (VSCQ) or theoretical framework was divided into three competency dimensions: interpersonal (IP), instrumental (IT) and systemic (ST). These dimensions were identified according to the Tuning Methodology of Educational Structures in Europe.[7] The systemic competencies category described the orthoptists' understanding and knowledge of key orthoptic concepts. It was composed of three subcategories: knowledge and understanding; skills; and problem-solving. The interpersonal competencies category described the orthoptists' communication with the patients and the healthcare team. It also included descriptions of expectations about safe and competent practice according to four subcategories: professional autonomy and accountability; professional relationships; personal and professional skills; and profession and employer context. The instrumental competencies category relates to the decision-making process in healthcare within a range of skills and behaviours. It was composed of four subcategories: identification and assessment of health and social care needs; formulation of plans; strategies for meeting health and social care needs; practice and evaluation. The described dimensions contained statements mutually exclusive and functionally different from each of the others to avoid duplication and confusion.[8]

SECOND STEP

The second step involved the translation and validation of the questionnaire. The questionnaire was translated into Portuguese by the authors. Questionnaire items were then reviewed by two experts; one expert in orthoptics and one in competency-based education. The experts analysed the statements in a four-step sequence: items translation evaluation and accuracy in the original language; concordance/discordance with the sentence introduction in the questionnaire; pertinence in competencies evaluation; and introduction of commentaries or changes in an objective way.

THIRD STEP

The third step involved the evaluation of the questionnaire's internal consistency (n = 36 orthoptists) and factorial dimension (n = 58 orthoptists). The questionnaire was administered to orthoptists who had to rate the degree of agreement with the competency statements and frequency of application in professional practice. All responses to individual items were organised in a Likert scale of 5 levels. To evaluate the degree of agreement with the statement, 1 on the Likert scale was totally disagree, 2-disagree, 3-undecided, 4-agree and 5-totally agree. To evaluate the frequency of the competency in professional practice on a Likert scale, 1 was never, 2-rarely, 3-sometimes, 4-often and 5-always.

A pre-test was undertaken and Cronbach's alpha reliability coefficient (α) was calculated for each competency dimension. This study also used factorial dimensional analysis. The questionnaire responses were analysed using factorial analysis with principal components. The data adjustment was analysed according to communalities, Kaiser-Meyer-Olkin (KMO), Bartlett's test and correlation matrix. To identify the correct dimensions, three different methods were taken into account: screeplot graph analysis, component matrix analysis (eigenvalues greater than 1 were used)[9] and parallel analysis[10].

RESULTS

After expert validation of the translated Portuguese version, three items were eliminated due to lack of pertinence in competency evaluation and seven items were rewritten according to the experts' suggestions related to translation evaluation and accuracy in the original language. The questionnaire was therefore reduced to 66 items.

QUESTIONNAIRE VALIDATION WITH INTERNAL CONSISTENCY

To determine the questionnaire's internal consistency, a pre-test was undertaken using a convenience sample of 36 respondents. Cronbach's alpha scores were used to evaluate internal consistency for each dimension. Deletion of 19 items of the scale improved Cronbach's alpha. The internal consistency estimated for reliability of each dimension was as follows: systemic competencies ($\alpha = 0.916$); interpersonal competencies ($\alpha = 0.949$); instrumental competencies ($\alpha = 0.892$). Following the consistency evaluation, the questionnaire was developed with 47 statements to identify the perception of orthoptists about their competencies and the frequency of their application in professional practice (Table 1).

Table 1. Questionnaire dimensions after the pre-test

Competencies	Items (no of questions)
Systemic Eg. I am able to demonstrate knowledge and understanding of human anatomy and physiology, emphasising the dynamic relationships of human structure and function and focusing on the central nervous system, brain and ocular structures.	14 Q.1 - Q.14
Interpersonal Eg. I am able to educate others in the promotion of visual health such as the training of health visitors in the practice of visual screening.	21 Q.15 - Q.35
Instrumental Eg. I am able to conduct my performance of appropriate, prioritised health promoting/health educating/caring/diagnostic activities..	12 Q.36 - Q.47

Statements 1 to 14 were grouped as representing systemic competencies, statements 15 to 35 were grouped as representing interpersonal competencies and statements 36 to 47 were grouped as representing instrumental competencies.

FACTORIAL DIMENSIONAL ANALYSIS

A convenience sample of 58 Portuguese orthoptists (44 female and 14 male) completed the validated questionnaire. Their median age was 28.48 years (SD = 7.57). According to respondents, they spent between 5 and 50 hours per week in visual screening in their professional practice.

The questionnaire responses were analysed using factorial analysis with principal components. The data adjustment was analysed according to communalities, Kaiser-Meyer-Olkin (KMO), Bartlett's test and correlation matrix. Thirty-two items with low communalities were deleted (items below 0.7). Kaiser-Meyer-Olkin was greater than 0.6 (KMO = 0.683) and Bartlett's test was significant at a level of 5% ($\chi^2_{(190)} = 554.779$; $p<0.05$). The correlation matrix also showed a good data fit with all correlations above 0.3.

To identify the correct dimensions, eigenvalues greater than 1 were used.[9] The screeplot graph was also analysed. Exploratory analysis identified eight competency dimensions with a total explained variance of 80.82%.

FINAL QUESTIONNAIRE COMPETENCY DIMENSIONS

As described previously, identification of the correct dimensions used three complementary methods. The questionnaire was developed with three dimensions and although the model identified eight competency dimensions the authors reviewed the suitability of the data regarding three competency dimensions. Three steps were taken: screeplot graph analysis, parallel analysis and component matrix analysis.

The screeplot graph involves plotting each of the eigenvalues of the dimension and inspecting the plot to find a point at which the shape of the curve changes direction.[9] Dimensions above the elbow or break in the plot should be retained. The screeplot graph analysis showed a clear break after the third dimension. This was further supported by the results of parallel analysis of Watkins[10] which showed

Table 2. Total explained variance for the competency dimensions

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.383	35.884	35.884	5.383	35.884	35.884	4.278	28.518	28.518
2	2.167	14.446	50.329	2.167	14.446	50.329	2.714	18.096	46.614
3	1.632	10.881	61.210	1.632	10.881	61.210	2.189	14.596	61.210

Extraction Method: Principal Component Analysis

only three dimensions with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix (dimension 1 = 5.798>2.217; dimension 2 = 2.320>1.967; dimension 3 = 1.652<1.781). The three-dimension solution as in the initial classification explained a total of 61.21% (KMO = 0.795) of the variance. The first dimension contributes with 35.88% of the variance and the second dimension contributes with 14.45% of the variance (Table 2).

Table 3 shows the questionnaire: the initial classification of the sentences (before validation); the final classification (after validation) and; the total scores for each dimension.

To analyse the competencies score, the classification shown in Table 3 can be used. The sum of the responses (1 to 5 Likert scale) allows a scale of maximum competencies which equals a score of 75 (total score of 40 for ST; total score of 20 for IP; and total score of 15 for IT).

Table 3. Final classification of competency dimensions

Final classification: Competency dimensions	**Items**	**Initial classification**
1 - Interpersonal Maximun score = 40 Medium score = 24 Minimum score = 8	1. I am able to contribute to the well-being and safety of all people in the screening environment (team and patients).	Systemic
	2. I am able to respect the patients and preserve their integrity and human rights.	Interpersonal
	3. I am able to demonstrate knowledge and understanding of a professional code of conduct, values and beliefs.	Interpersonal
	4. I am able to act with responsibility in a healthcare setting adopting an ethical approach with patients and the screening team.	Interpersonal
	5. I am able to understand the legal responsibilities and ethical considerations of my profession.	Interpersonal
	6. I am able to be committed to continuing professional development as recommended by the professional body.	Interpersonal
	7. I am able to contribute to the well-being and safety of all people in the screening work-place.	Systemic
	8. I am able to respect the professional orthoptic practice.	Interpersonal
2 - Instrumental Maximun score = 20 Medium score = 12 Minimum score = 4	9. I am able to apply measurement techniques to assess binocular vision and other ocular conditions.	Instrumental
	10. I am able to identify the socioeconomic context factors that impact on the practice of Orthoptics such as the need for screening specific patient groups.	Interpersonal
	11. I am able to educate other orthoptists in the promotion of visual health such as training in the practice of visual screening.	Interpersonal
	12. I am able to select and use appropriate orthoptic assessment techniques within my own practice accurately.	Interpersonal
3 - Systemic Maximun score = 15 Medium score = 9 Minimum score = 3	13. I am able to use a range of assessment techniques appropriate to the situation and make provisional identification of relevant determinants of health and physical, psychological, social and cultural needs/problems.	Interpersonal
	14. I am able to demonstrate knowledge and understanding of binocular vision and its disruption.	Systemic
	15. I am able to carry out an appropriate orthoptic investigation, using suitable methods for age and intellectual ability of the patient, eg. clinical examination by subjective and objective means.	Instrumental

The varimax method was used to arrive at the final designation of dimensions. The initial designation of the three dimensions was preserved: systemic competencies (ST), interpersonal competencies (IP) and instrumental competencies (IT). The final questionnaire presented a total of 15 items, with eight items in the ST dimension, four items in the IP dimension and three items in the IT dimension.

DISCUSSION

There has been little investigation regarding orthoptists' professional competencies. For the purposes of this study a self-assessment tool was considered the most appropriate. The use of critical reflection of professional practice is positively related to quality of care and it is a

powerful method for assessing performance and clinical competence.[11]

In order to guarantee the quality of competencies measurements the instrument was subjected to a process of validation. Carefully performed translation alone does not ensure validity of the translated instrument.[12] The findings of the current study provide preliminary support for the use of the VSCQ instrument in a sample of Portuguese orthoptists. Our study provides a valid questionnaire to measure perception of competencies in visual screening. Statistical analysis was undertaken on the quantitative data. The rationale for the survey was to elicit data on orthoptists' competencies in order to develop a competency matrix. Despite recommendations, vision screening still varies in the United Kindom. It is important to clarify who undertakes such screening, on what age group of children and what tests are performed.[13] The development of competency frameworks is important to clarify role boundaries and promote professional accountability.[14] In addition, the authors consider that they have constructed an instrument to consider individual/team capabilities that are expected for the workforce to be effective in the visual screening of children.

The results are considered good evidence that all items measured the same underlying construct and that the items were internally consistent. In this study reliabilities for the scales were excellent and therefore validity has been demonstrated. The dimensionality of the questionnaire was also assessed using factor analysis. These results supported the original theoretical classification used for constructing the VSCQ. The findings revealed that the three common factors resulting from the analysis explained 61.21% of the total variance. This suggests that the questionnaire has stable dimensions that can be used to assess orthoptists' visual screening competencies. The survey showed broad acceptance for final items. It is important to note that 35.88% of the variance is explained by the interpersonal competencies, supporting the importance of this domain to perform visual screening in children.

The validated version of the VSCQ is going to be used by a random sample of Portuguese orthoptists. This version has an introduction, with investigation objectives and completion instructions. The questionnaire has three sections and items will be presented randomly to avoid order presentation bias. The last section requests personal data about the respondent orthoptists.

CONCLUSION

During the past decade in Portugal, many visual screenings have been performed without a core competency model to guide strategic improvement programs. A 15-item self-assessment questionnaire was constructed to obtain orthoptists' perceptions about their professional competencies and frequency of application in professional visual screening practice with children.

The questionnaire will enable us to study and rate the competencies and frequency of application in professional practice of orthoptists who screen children. Although we assume validity, further studies should be done to validate this scale with a larger sample to confirm the findings of this study. A model will be constructed and developed to provide a common language and framework to guide health professionals in the field of visual screening. Suggestions for further research include the application of this questionnaire to determine more frequently applied competencies and intervention studies to determine which training methods promote effective competencies.

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