Development and validation of a Children's Visual Function Quality of Life (CVF-QoL) instrument for rural school-going children with visual impairment within a South African context



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DECLARATION

I, Mr Tshubelela Sello Simon Magakwe, hereby declare the following:

- The work described in this thesis has not been submitted to the University of KwaZulu-Natal (UKZN) or any other tertiary institution for the purpose of obtaining an academic qualification, either by myself or by any other party.

My contributions to the project were as follows:

- Formulating the research idea, developing the research protocol, applying for ethical clearances, conducting the various phases of the research, drafting all the manuscripts, submitting them to journals as the corresponding author, and compiling the entire thesis.

The contributions of others to the project included:

- Prof. Hansraj and Dr. Xulu-Kasaba supervised the entire project, edited the research protocol and the manuscripts, supervised data collection, and reviewed the final structure of the thesis.

Signed  Date 20 February 2025

As supervisors, we agreed to this submission of the thesis.

Prof Hansraj R _____ Date_____

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Figure 1**:** PRISMA 2020 flow diagram for new systematic reviews, which included searches of databases and registers

LIST OF ACRONYMS

VI = Visual Impairment

RE = Refractive error

QoL = Quality of Life

VA = Visual Acuity

CVF-QoL = Children's Visual Function Quality of Life

HRQOL = Health-Related Quality of Life

VR-QoL = Vision-Related Quality of Life

WHO = World Health Organisation

LogMAR = Logarithmic Minimum Angle of Resolution

ETDRS = Early Treatment of Diabetic Retinopathy Study

PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews

PCC = Population (or Participants) Concept and Concept

FGDs = Focus Group Discussions

SL= School and Learning

MO = Mobility and Orientation

DLS = Daily Living Skills

HLS = Hobbies Leisure and Sport

SI = Social Interaction

PEF = Psychological and Emotional Function

T = Treatment

SC = Sociocultural

I-CVI = Item-Content Validity Index

UA = Universal Agreement

PR = Proportion Relevance

S-CVI Ave = Score-Content Validity Index Average

S-CVI Ave (based on **PR**) = Score-Content Validity Index based on Proportional Relevancy

S-CVI UA = Score-Content Validity Universal Average

ABSTRACT

Background: Vision problems that arise early in life can significantly impact children's performance in school, sports and recreation, and social interactions. Evaluating visual function and quality of life in children with visual impairments is crucial for understanding the effects on their lives and assessing interventions' effectiveness. Although several tools exist to measure these aspects in children, they have been compiled largely within developed countries, resulting in a lack of similar instruments specifically designed for rural school-going children, particularly in middle- to low-income countries.

Purpose: This study aimed to develop and validate an instrument measuring Children's Visual Function Quality of Life (CVF-QoL) for rural school-going children aged 6 to 17 in South Africa with uncorrected refractive errors, visual impairments and blindness.

Methods: The development of the CVF-QoL instrument involved several steps. First, items were generated through a literature review. Next, focus group discussions were conducted to explore the role of vision in children's lives, involving experts and the children themselves. The readability of the instrument was assessed, leading to the creation of two versions of the CVF-QoL instrument, one for 6-9-year-olds and the other for 10-17-year-olds. The content of both versions underwent validation by experts, and pretesting with children was carried out for each version. Each version was administered to 40 learners, after which internal consistency was evaluated using the Cronbach alpha test. Additional questionnaires were taken home for completion 10 days later, and the results were compared to assess the stability of the versions. The validated English versions of the CVF-QoL instruments were then translated into Sepedi using a forward-backwards translation method. Further validation was achieved by comparing the original English versions with the Sepedi versions of the CVF-QoL instrument.

Results: 769 items were identified from the literature review, while 477 statements were generated from the focus group discussions and converted into items. After merging similar items and eliminating duplicates, 91 items were retained and classified into eight domains based on the literature. These items were divided into two versions of the CVF-QoL: Version 1.1 for ages 10-17 years and Version 2.1 for ages 6-9 years. Both versions demonstrated clarity, coherence, and relevance, with item content validity indices (I-CVI) of 0.85 for Version 1.1 and 0.86 for Version 2.1. Following pretesting, the version for ages 10-17 years contained 89 items, while the version for ages 6-9 years included 63 items. After administering the two versions, the overall Cronbach score was 0.946 for Version 1.1 and 0.777 for Version 2.1. Test-retest results indicated stability for both versions, with Cronbach alpha scores of 0.940 for Version 1.1 and 0.800 for Version 2.1. The Sepedi versions of the CVF-QoL were also found to be valid, with internal consistency scores of 0.930 for Sepedi Version 1.1 and 0.762 for Sepedi Version 2.1. The English versions of the CVF-QoL were compatible with the translated Sepedi versions.

Conclusion: The CVF-QoL instruments are valid for assessing the quality of life-related to visual function in rural school-going children with visual impairments within the South African context.

CHAPTER 1: INTRODUCTION

1.1 Introduction

Visual impairment (VI) is a common cause of disability in childhood, and it is the second leading cause of childhood blindness[1, 2]. Moreover, it limits the ability of a child to perform well at school, as 85% of learning depends on vision[3]. Moreover, affected children cannot participate in many sporting and social activities that require good vision[4]. The broader impact, however, is ultimately a negative effect on the socioeconomic security of affected individuals[3, 5]. Thus, not surprisingly, VI has been reported to impact the quality of life (QoL) of affected individuals[3]. Moreover, the impact of VI with onsets before or during school-going age is significantly more significant compared to onset in adulthood, considering the number of years that they will likely carry these conditions in the case of the former[6].

Refractive error (RE) is an eye disorder that affects the optimal focusing of objects on the retina and may be a result of physiological or pathological variations in the shape and or size of the eyes[7]. It can further be classified into myopia, hyperopia, and astigmatism. Often, learners with uncorrected RE complain of eye strain, tearing, and headaches but more significantly have VI due to reduced visual acuity[8]. Visual impairment is the best-corrected visual acuity (VA) of less than 0.30 LogMAR but better than 1.00 LogMAR, as defined by the International Statistical Classification of Diseases, Injuries, and Causes of Death[9]. In defining VI, it is always recommended to include low vision, which is defined as VA of worse than 0.50 LogMAR but better or equal to 1.30 LogMAR, or corresponding visual field loss of 20 degrees in the better eye, with the best correction. Furthermore, blindness needs to be considered, which is defined as the VA of worse than 1.30 LogMAR and/or visual field restrictions where the widest diameter is 20 degrees or more in the best-seeing eye with the best correction[10]. Visual impairment can be further classified as mild, moderate, and severe[11], as outlined in Table 1.

Table 1: Visual Impairment Classification[12]

Degree of Visual Impairment	Presenting VA ranges
Mild VI	0.30 LogMAR to 0.50 LogMAR
Moderate VI	Worse than 0.50 LogMAR to 1.00 LogMAR
Severe VI	Worse than 1.00 LogMAR to 1.30 LogMAR
Blindness	Worse than 1.30 LogMAR

VI=Visual impairment, LogMAR= Logarithm of the Minimum Angle of Resolution, VA=Visual Acuity

Quality of Life is defined by the World Health Organisation (WHO) as: "the perception an individual has of their position in life in the context of the culture and values in which they live and concerning their goals, expectations, standards, and concerns."[13]. Vision-related QoL can be defined in the context of vision[14]. Essentially, vision-related QoL is the degree to which vision impacts how an individual can carry out daily living activities in addition to their socioeconomic, emotional, and social well-being. Increasingly, health services are focusing on capturing patient perceptions of their vision status[15]. Even in ophthalmic research, the measurement of QoL is being recognised as a key supplemental indicator[16]. Traditionally, eye care professionals have relied on the results of clinical examinations to determine the impact of vision problems on children, or sometimes from the observations of parents (proxies) or teachers[17]. This has been a vital method to rely on since it has always been difficult for the child to express when they have vision problems[18]. However, it is questionable whether measurements like visual acuity, contrast sensitivity, visual field, etc, can accurately represent the child's perspective[17].

It has been reported that QoL tools serve as a cost-effective, reliable and relevant method of assessing the extent of visual impairment in children[19]. Furthermore, the self-reported ones were regarded as better than the proxy ones. Children can answer any Health-Related Quality of Life (HRQOL) questionnaire reliably if their reading skills, cognitive capacity, and mental development were considered during the development of those questionnaires[20, 21]. The National Eye Institute Visual Function Questionnaire (NEI-VFQ) is currently the most used visual function quality of life questionnaire globally, and it has been successful as a measure of QoL in individuals with vision anomalies[22]. However, it has been found to have limited usefulness in children as it includes items that do not apply to young children, such as driving, while not including items like seeing from the blackboard, writing along a straight line, and perception of colours which are key activities that children are engaged in and considered important in their growth and development. While a few validated instruments have been developed specifically for use in children[17, 18, 23–28], most of these were developed using children in developed countries, rendering some items like driving and reading traffic signs irrelevant for children in the developing countries, while omitting items familiar to the children in the developing countries like walking home through unpaved roads, playing soccer on uneven-gravel playgrounds and learning under poor illumination such as candlelight. Moreover, due to expected differences in socioeconomic status and cultural differences between developed and developing countries, like those in Africa, the effectiveness of these instruments is somehow unreliable when used with African children. Furthermore, most of these instruments were developed with a focus on the developed countries, where the children's hobbies may often include reading and video games in contrast to the "outside-of-school" activities of their counterparts in most rural parts of Africa, which may consist of tending to domestic animals and crops, playing games outside and fetching water from the river. While the highest prevalence of children living with VI is found in developing countries[29,

30], only four instruments have been designed for children in developing countries. The four instruments were the two versions of LV Prasad Functional Vision (LVP-FVQ)[18, 23] and, the Visual Function Questionnaire for Children with Visual Impairment (CHVI-VFQ)[31] for children in India, and lastly, the Children's Vision for Living Scale (CVLS)[32].

Evidence emerging from the literature showed that no instrument had been developed to measure vision-related QoL of school-going children living with RE and/or VI developed within an African context, which exists currently. This makes using some of the existing instruments challenging without first modifying them for relevancy. The aim of this study was, therefore, to develop a suitable, Context-relevant, reliable, and validated instrument to measure the visual function of QoL among school-aged children in South Africa. The development of this instrument was guided by the study protocol for the WHO project to design a QoL instrument[33] in conjunction with the available literature.

1.2 Problem Statement

Vision problems that occur early in life can significantly affect children's performance at school, in sports or recreation, and in their social experiences. Recent epidemiological studies have shown an increase in the prevalence of refractive errors, VI, and blindness among South African schoolchildren. However, little is known about how these visual problems impact the QoL of children. Gathering the perspectives of patients on their visual status has become a priority in global health services. In ophthalmic research, measuring QoL is increasingly recognised as an important supplementary measurement. While several tools have been developed to assess the impact of refractive errors, VI, and blindness on the QoL, these tools may have limitations when used with South African children without modification. Modifying the content to be relevant to South African children could compromise the tool's quality, validity, and reliability. Therefore, this study aims to develop a validated tool to assess the impact of VI on the QoL of South African school-going children using relevant content.

1.3 Research Question

How to develop and validate the children's visual function quality of life instrument for rural school-going children with visual impairment within a South African context?

1.4 Aim and Objectives

Aim: To develop a reliable and validated instrument for assessing the Quality of Life related to Visual Function in Children (CVF-QoL) aged 6-17 years in South Africa living with uncorrected RE, VI, and blindness.

Study objectives:

i. To systematically review previous studies focused on QoL and respective measurement tools for school-going children to identify domains and items.
ii. To conduct focus group discussions with experts and children to generate items for the CVF-QoL instrument.
iii. To draft the first version of the instrument using content from existing tools and focus group discussions.
iv. To validate the contents of the CVF-QoL instrument using a panel of experts
v. To evaluate the clarity, relevance, and format of the CVF-QoL instrument with the consent of school children.
vi. To test the reliability of the CVF-QoL instrument
vii. To translate the CVF-QoL instrument into the Sepedi language.
viii. To assess the reliability of the translated instrument against the English version.

1.5 General Methodology

The CVF-QoL instrument was developed as a self-reported measure of the QoL of visual function for school-going children aged 6 to 17 years in rural areas of South Africa. It had qualitative and quantitative components, so a mixed methods research design was used. The study adhered to the Declaration of Helsinki's principles regarding research involving humans, and ethical clearance was obtained from the Biomedical Research Ethical Committee (**BREC/00003939/2022**) of the University of KwaZulu-Natal (see **Appendix A** and **Appendix B** for recertification). Additionally, it received ethical approval from the Limpopo Department of Education's ethical committee (**Ref:2/2/2**) (see **Appendix C**). The phases and their respective steps of the study are summarised below:

1.5.1 Phase 1: Item Generation (Structure and Content of the Questionnaire)

Step 1: Deductive Method

Items for the CVF-QoL were adopted from a scoping review that evaluated 20 instruments related to vision-related QoL. The list of Items and domains generated can be found in **Appendix D.**

Step 2: Inductive Method

Additional items were generated from focus group discussions (FGDs) with experts and children.

Step 3: Domain Selection

The CVF-QoL's domains were based on the 20 instruments reviewed in Step 1 and served as the main domains for this instrument. Items from the scoping review and FGDs were reviewed, merged as necessary, and classified according to these domains.

Step 4: Rating Method Review

The rating methods utilised by existing validated QoL tools were reviewed to develop the ratings or scores for the proposed QoL instrument. All rating methods from the validated tools were examined and combined, if needed, to create a rating scale for the new CVF-QoL instrument. Consideration was given to the limitations highlighted by current tools regarding their ratings.

Step 5: Drafting CVF-QoL Instruments

Two versions of the CVF-QoL instrument were created: one for ages 10-17 years and another for ages 6-9 years. Drafts of the CVF-QoL domains, items, rating scales, and instruments were subjected to content and construct validity assessments by experts. They rated the entire instrument based on the following:

1. The clarity of each item on a scale of 1 to 4, with 4 indicating that the item is clear, understandable, and well-structured.
2. The coherence of each item in measuring the aligned domain of the CVF-QoL instrument on a scale of 1 to 4, with 4 indicating that the item is completely related to the domain it measures.
3. The relevance of each item in measuring the domain of the CVF-QoL instrument on a scale of 1 to 4, with 4 indicating that the item is very relevant and should be included.

Spaces were provided for experts to comment on the items or suggest revisions. Finally, the experts rated the instructions, presentability, and font size of both versions of the CVF-QoL instrument. The rubric for the CVF-QoL version for ages 10-17 years is included in **Appendix E**, while the version for ages 6-9 years is included in **Appendix F**.

Step 6: Finalization of the First Draft

The two versions of the CVF-QoL were modified according to the experts' recommendations. The first draft of the CVF-QoL instrument included all items agreed upon in Step 5.

1.5.2 Phase 2: Operationalism (Assessing Comprehensibility, Relevance & Format)

In this phase, the initial drafts of the CVF-QoL were face-validated by two groups of normally sighted learners to evaluate the instrument's comprehensibility, formatting, and relevance of the items. Items to be included were those where more than 70% of the learners agreed that they perform the task and that the task is crucial for them to be able to do. This method was guided by the work of Angeles-Han et al. (2011) in developing a vision-related QoL instrument for children aged 8-18 years with juvenile idiopathic arthritis associated with uveitis.

In addition to the items generated in Phase One, the learners were encouraged to suggest tasks they rely on vision for and perform daily, which were not included in the initial draft. After this process, the versions were further modified. A sample of the rubric used by the learners is included in **Appendix G**.

1.5.3 Phase 3: Piloting the Two Versions of the CVF-QoL Instrument

In this phase, the two versions of the CVF-QoL instrument were administered to 80 learners, both with and without refractive errors, visual impairments, or blindness. These children were from the rural areas of the Sekhukhune district in Limpopo province, South Africa. Learners aged 10 to 17 years completed version 1.1 of the CVF-QoL questionnaire, while those aged 6 to 9 years completed version 2.1.

To assess the visual status of the learners, they underwent a series of eye tests, which included visual acuity testing using the Early Treatment of Diabetic Retinopathy Study (ETDRS) chart and a LogMAR near chart. Additionally, visual field testing was performed using a handheld arc perimeter alongside a fundus examination via direct ophthalmoscopy. Pupil dilation and cycloplegic measurements were conducted using 1% cyclopentolate eye drops, followed by final cycloplegic auto-refraction. The visual status was used to determine the CVF-QoL instrument's sensitivity to the visual impairment's level or severity. Those with normal sight were expected to have a higher mean score than those living with severe VI or blindness.

After collecting data from the learners, the Cronbach alpha test was conducted to evaluate the instrument's internal consistency. To test reliability, the same groups of learners were asked to complete an additional questionnaire at home 10 days after their initial attempt. The results from the first and second attempts were then compared. Based on the validation results, the instrument's versions were further modified.

1.5.4 Phase 4: Translation of the Two Versions of the CVF-QoL Instrument

The English versions of the CVF-QoL instrument were translated into Sepedi using the forward-backward-forward method, as outlined by the International Quality of Life Assessment group of the World Health Organization (WHO)[34, 35]. The choice of language was based on the study setting in the Sekhukhune district of Limpopo province, where Sepedi is the dominant language (Sekhukhune - Profile data - Wazimap, 2021).

Two independent translators translated versions 1.1 and 2.1 into Sepedi. The principal investigator (PI), a native Sepedi speaker, combined these translations into a single version for both versions 1.1 and 2.1. The combined Sepedi translations were subsequently sent to a third translator for translation back into English. The translated English versions were compared to the original English versions. Any discrepancies found between the two were addressed through team meetings involving the PI and the third translator. Therefore, the Sepedi versions were modified accordingly.

The validity of the Sepedi versions was tested by administering them to learners. Internal consistency was measured using the Cronbach alpha test, and a test-retest procedure was conducted, similar to what was done with the English versions. Finally, the Cronbach scores of the English and Sepedi versions were compared to examine correlations.

1.6 Outline Of The Dissertation

Chapter 1: Outlines the Introduction, problem statement, research questions, aims and objective, and summary of the methodology

Chapter 2: This chapter discusses the systematic review of literature, which uses a scoping review methodology. It comprises two publications.

- Protocol for scoping review: Instruments for assessing vision-specific health-related quality of life in children and adolescents with visual impairment.
- Vision-specific tools for assessment of health-related quality of life (HR-QoL) in children and adolescents with visual impairment

This chapter addresses objective (i), which is to systematically review previous studies focused on QoL and respective measurement tools for school-going children to identify domains and items.

Chapter *3*: Published manuscript: Impact of Vision Problems on Children's Daily Activities: Insight from a Focus Group Discussion

This chapter addresses objective (ii), which is to conduct focus group discussions with experts and children to generate items for the CVF-QoL instrument.

Chapter 4: Published manuscript: Development of children's visual function quality of life (CVF-QoL) instrument for rural school-going children with visual impairment within a South African context: Item generation and validation.

This chapter addresses the objective:

iii. To draft the first version of the instrument using content from existing tools and focus group discussions.

iv. To validate the contents of the CVF-QoL instrument using a panel of experts

v. To evaluate the clarity, relevance, and format of the CVF-QoL instrument with the consent of school children.

Chapter 5: Formatted manuscript: Reliability and validity of the children's visual function quality of life (CVF-QoL) instrument. The manuscript is currently under review with the Scientific Reports Journal (Manuscript ID: f8c5391b-8fb1-4ff7-8067-472d56f94aac).

This chapter addresses the objective (vi) to test the reliability of the CVF-QoL instrument

Chapter 6: Formatted manuscript: Translation of the children's visual function quality of life (CVF-QoL) instrument from English to Sepedi language. The manuscript is currently under review with Ophthalmic and Physiological Optics (Manuscript ID: OPO-OA-5271)

This chapter focuses on the following objectives:

vii. To translate the CVF-QoL instrument into the Sepedi language.

viii. To assess the reliability of the translated instrument against the English version.

Chapter 7: Synthesis Chapter

This chapter focuses on the synthesis and discussion of the contents and the findings presented throughout the entire project. It will provide specific suggestions for future research paths, highlighting areas that warrant further exploration. Moreover, the chapter will outline the limitations encountered during the project, addressing any factors that may have influenced the results. Lastly, it will conclude with a summary that captures the central points and findings of the study, emphasising their importance and potential implications.

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CHAPTER 2: SYSTEMATIC SCOPING OF LITERATURE

This chapter addresses objective number one, the systematic review of literature on tools related to vision quality of life. It includes two published manuscripts, which are as follows:

- "Protocol for scoping review: Instruments for assessing vision-specific health-related quality of life in children and adolescents with visual impairment". This paper is published by 'F1000Research' journal and can be accessed via the link below: https://f1000research.com/articles/13-740/v1
- Vision-specific tools for assessment of health-related quality of life (HR-QoL) in children and adolescents with visual impairment. This paper is published by the 'International Journal of Environmental Research and Public Health' and can be accessed via the link below: https://www.mdpi.com/1660-4601/21/8/1009

The first manuscript was a protocol which preceded the second manuscript, which was the main scoping review paper. Twenty resources were reviewed, and all items and domain and rating scales were adopted to be used in the development of the CVF-QoL instrument. The list of domains and items can be found in **Appendix 4**.

Check for updates

STUDY PROTOCOL

Protocol for scoping review: Instruments for assessing vision-specific health-related quality of life in children and adolescents with visual impairment. [version 1; peer review: awaiting peer review]

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Abstract

Childhood visual impairment (VI) is less common than in adults, but research has demonstrated that it can have significant long-term negative impacts on the health-related quality of life (HR-QoL) of children and adolescents. Unfortunately, there is currently a lack of vision-specific instruments available for accurately assessing HR-QoL in children and adolescents with VI, particularly in resource-limited settings.

The objective of this scoping review is to methodically evaluate the evidence pertaining to (1) the accessibility and usage of instruments specifically designed to assess HR-QoL in children and adolescents who have VI, (2) summarise studies on HR-QoL in children and adolescent with VI, and (3) describe the psychometric properties of vision-specific instruments used for assessing HR-QoL in children and adolescents with VI.

The review will be conducted in accordance with the Joanna Briggs Institute (JBI) guideline (2020) for scoping reviews, utilizing frameworks by Arksey and O'Malley, and methodological enhancements suggested by Levac (2010). A systematic search will be performed through various databases, including PubMed, Science Direct, Scopus, Web of Science, and EBSCOhost, to identify peer-reviewed articles published in English from inception until 31 December 2023. The EBSCOhost platform will include several

Open Peer Review

Approval Status *AWAITING PEER REVIEW*

Any reports and responses or comments on the article can be found at the end of the article.

databases, such as Academic Search Complete, APA PsycINFO, Health Source-Consumer Edition, Health Source: Nursing/Academic Edition, and Open Dissertations. The extracted data will be analysed narratively using QualCoder 1.9 version, and the study's findings will be reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).

The researchers anticipate that the literature will assist in exploring and relating various types of HR-QoL tools used globally.

This review's conclusion will help researchers ascertain research gaps in vision-related QoL instruments based on different economies, countries, and environments. This will further aid researchers in planning and developing tools suitable for African contexts and languages.

Keywords
Visual impairment, vision-related quality of life instruments, health-related quality of life, children's eye health, adolescents

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Author roles: Magakwe TSS: Conceptualization, Methodology, Resources, Writing – Original Draft Preparation, Writing – Review & Editing; **Hansraj R**: Conceptualization, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing; **Nkambule SJ**: Methodology, Writing – Original Draft Preparation; **Xulu-Kasaba ZNQ**: Conceptualization, Resources, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

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1. Introduction

The Classification of Diseases, injuries, and Causes of Death, of the World Health Organization (WHO) defines visual impairment (VI) as having a best-corrected visual acuity (VA) that is less than 0.30 LogMAR but better than 1.00 LogMAR.[1] It is recommended to include low vision, which is defined as VA worse than 0.50 LogMAR but better than or equal to 1.30 LogMAR, or corresponding visual field loss of 10 degrees in the better eye, with the best correction, as well as blindness, which is defined as the VA of worse than 1.30 LogMAR and/or visual field restrictions where the widest diameter is 20 degrees or less in the better-seeing eye with the best correction, in the definition of VI.[2] Moreover, VI can be further categorized as mild, moderate, or severe.[3] Visual impairment can significantly impact a child's performance in school, as 85% of learning depends on vision.[4] Children with VI also face limitations in participating in sporting activities that require good vision.[5] The negative effects of VI extend beyond academic and athletic performance to the socio-economic security of affected individuals.[2,4] Thus, not suprisingly, VI has been shown to impact children's quality of life (QoL).[4]

Globally, there are approximately 19 million children with visual impairments,[2] 12.8 million of whom suffer from uncorrected refractive error (URE),[6] with eight million children classified as blind due to URE.[7] It is noteworthy that 90% of these children reside in low to middle-income countries.[8,9] The impact of VI is significantly greater when it occurs before or during school-going age, as these children are likely to carry these conditions for a greater number of years.[10] It has been reported that visual impairment affects the quality of life (QoL) of the affected individuals.[2,4] According to the WHO, QoL can be defined as the state of complete physical, mental, and social well-being, and not merely the absence of disease.[11] The WHO group that focuses on the QoL of individuals elaborates further by indicating that QoL is also concerned with the personal perception of an individual's position in life in the context of the culture and value systems in which they live, and concerning personal goals, expectations, standards, and concerns.[12,13] Therefore, the vision-related QoL can be defined in the context of uncorrected refractive error and visual impairment.[14]

The assessment of HR-QoL is currently an important expansion that is used to evaluate the impact of any disease or health condition on an individual's QoL and the effectiveness of treatment on those individuals, moreover, it can also be used to determine the effectiveness of treatment on the affected individuals.[15,16] These self-reporting instruments have been accepted as important tools in ophthalmic research too,[17] and are considered better than the traditional way of relying on the signs, symptoms, morbidity, and mortality.[18] Moreover, studies have shown that children can answer any HR-QoL questionnaire reliably if their reading skills, cognitive capacity, and emotional development were considered during the development of those questionnaires.[19,20] Many vision-specific instruments for assessing HR-QoL in adults have been reviewed,[21] yet despite the high prevalence of VI due to URE among children in recent years, very few similar instruments for children and adolescents have undergone review.

Furthermore, there is a notable absence of clear understanding regarding the accessibility and implementation of specialized tools designed to evaluate the HR-QoL in visually impaired children and adolescents. These instruments are currently developed using English and utilised by individuals whose first language is not English, and these instruments have been developed amongst individuals primarily in developed countries with varying social, economic, and cultural backgrounds. Therefore, this review will aim to map the availability of the vision-specific HR-QoL instruments that measure the QoL of children and adolescents with visual impairment (VI) taking the aforementioned gaps into account.

We conducted the preliminary search on three different platforms, namely the Open Science Framework, the Cochrane Database of Systematic Reviews, and JBI Evidence Synthesis. No systematic or scoping reviews related to the topic were found at present.

1.1 Objectives

This scoping review aims to accomplish three main objectives. Firstly, it will involve a systematic mapping of available evidence on the use and accessibility of vision-specific instruments that assess the Health-Related Quality of Life (HR-QoL) in children and adolescents with VI. Secondly, it will synthesize the findings of studies that focus on HR-QoL in children and adolescents with VI. Lastly, it aims to provide a description of the psychometric properties of the currently available vision-specific instruments that evaluate HR-QoL in children and adolescents with VI.

2. Methods

A scoping review study uses systematic methods to examine literature and evidence related to a specific research subject, with the ultimate goal of informing practice in a given field. This particular review is part of a larger study that aims to create a context-specific HR-QoL instrument for children in an African setting, utilizing existing data. Using the scoping review framework guidelines established by Arksey and O'Malley (2005),[22] and recommended methodological enhancements by

Levac et al. (2010),[23] this scoping review will consist of five steps. According to Arksey and O'Malley (2005), conducting a scoping review involves five distinct stages as follows: (1) defining the review question and establishing criteria for selecting studies, (2) searching for studies that address a particular review question, (3) selecting studies that meet specific inclusion criteria for the review, (4) charting data from included studies, and ultimately (5) collating, summarizing, and reporting all findings. Thereafter, review results will be aligned with the PRISMA extension for scoping reviews (PRISMA-ScR) checklist and explanation[24] in the final report. This review protocol was registered on the Open Science Framework, reference **(9hw8c-v1)** and access link https://archive.org/details/osf-registrations-9hw8c-v1 (https://doi.org/10.17605/OSF.IO/9HW8C). This protocol adhered to the PRISMA-ScR checklist.[35]

2.1 Review question

What is the evidence regarding the availability and usage of vision-specific instruments to assess health-related quality of life in children and adolescents with visual impairment?

Sub-questions:

1. What are the findings of studies examining HR-QoL in children and adolescents with visual impairments?

2. What are the psychometric properties of current vision-specific instruments for assessing HR-QoL in children and adolescents with visual impairments?

The main research question was determined using the PCC nomenclature framework, recommended by the JBI Manual for Evidence Synthesis: 2020 Edition as outlined in Table 1.[25]

2.2 Search strategy

To ensure a thorough and replicable search for relevant studies, a systematic search will be conducted in reputable bibliographic databases, including PubMed, Science Direct, Scopus, Web of Science, and EBSCOhost. The EBSCOhost platforms will encompass various databases, such as Academic Search Complete, APA PsycInfo, Health Source-Consumer Edition, Health Source: Nursing/Academic Edition, and Open Dissertations. These databases and platforms will be explored to identify peer-reviewed articles published in English from the date of inception up to 31 December 2023, as well as other supplementary information sources like Google Scholar. The primary and supplementary systematic searches will be performed by TSS, the principal investigator, according to a pre-defined search strategy developed in collaboration with two subject librarians from the University of KwaZulu Natal and the University of Free State.

The comprehensive search strategy was co-developed by the first author and the two subject specialists. The draft was reviewed by all authors to ensure the appropriate use of indexing terminology and Medical Subject Headings (MeSH) descriptors before it was tested on a subset of records from the PubMed database. The search strategy descriptors and truncation details are presented in appendix I and II, and are deposited on Zenodo,[36] while Table 2 shows the number of records returned from the consulted PubMed database.

Table 1. PCC framework for determining the eligibility of the research questions.

Criteria	Determinant
Population	The study population will be children and adolescents aged 5-18 years of age as classified by L. Berk (2013) living with any form of visual impairment.[26]
Concept	Visual function quality of life OR Vision-related quality of life OR Functional vision quality of life
Context	Globally

Table 2. Search strategy pilot search result from PubMed database.

Date of Search	The search engine used (Database)	Keyword search used	No. of articles retrieved
08/06/2023	PubMed	(((((vision-related) OR (visual function)) OR (functional vision)) AND ((quality of life) OR (QOL))) AND ((child) OR (adolescent))) AND ((((visual impairment) OR (refractive error)) OR (low vision)) OR (blindness))	679

Table 3. Eligibility criteria according to the PCCd-T nomenclature criteria.

Criteria	Inclusions	Exclusions
Population	Any study involving children or adolescents, regardless of location or setting, will be included. Reported participants of any gender, ethnicity, culture, race, or comorbidity will also be included.	Research studies involving non-children as participants
Concept	Studies reporting the development of visual function quality of life instruments, vision function quality of life questionnaires, vision-related quality of life instruments, or functional vision quality of life questionnaires.	Research studies that report on any other instruments in health or other field.
Context	Globally	None
Study Design	Original, qualitative study designs published in English, peer-reviewed, regardless of publication year, will be considered.	In this review, systematic reviews and other reviews are excluded (although reference lists of relevant reviews will be examined for primary studies). Furthermore, quantitative studies, case reports, anecdotal reports, modelling studies, and conference abstracts are excluded.
Time	While there are no restrictions, the initial review period will consider articles published until 31 December 2023	

2.3 Eligibility criteria

This scoping review will include all studies conducted worldwide that report on the development of vision-related quality-of-life assessment tools for children and adolescents between 5 and 18 years of age as outlined in Table 3.

Types of sources

The scope of this review encompasses a range of study designs, both experimental and epidemiological. This includes randomized controlled trials, non-randomized controlled trials, quasi-experimental studies, before and after studies, prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies. To avoid any duplication of data, we will exclude HR-QoL instruments/questionnaires utilized in reviews and conference abstracts. Similarly, we will not be including gray literature in this review, as it is outside the scope of our focus, which is on quantitative questionnaires and instruments that have been psychometrically tested and validated for use on children and adolescents living with VI.

Study/source of evidence selection

After conducting the search, all citations that are identified will be compiled and uploaded into Mendeley version 2.76.0/2023, and any duplicates will be removed. The titles and abstracts of these citations will be independently screened by TSS and HC to determine their relevance to the review's inclusion criteria. Any sources deemed potentially relevant will be retrieved in full, and their citation details will be imported into the JBI System for the Unified Management, Assessment, and Review of Information (JBI SUMARI) (JBI, Adelaide, Australia).[27] The full text of the selected citations will be thoroughly assessed against the inclusion criteria by two or more independent reviewers. Any sources not meeting the inclusion criteria will be excluded, with reasons for their exclusion, and will be recorded in this scoping review. In the event of any disagreements between the reviewers during any stage of the selection process, they will be resolved through discussion or with the help of an additional reviewer/s.

2.4 Data extraction

Two independent reviewers will utilize a data extraction tool, which was created via google form, and includes authors and year of study, title, country, ages of the participants, ethnicity, sample sizes, concept measured, domains, rating scales, list of items, outcome measurers, conclusion, and recommendations. This tool has been developed by the PI and pretested for compatibility to extract data from the papers included in the scoping review. A draft extraction form is provided represented in Appendix III, which can be found in Zenodo.[36] Zenodo The data extraction tool will be modified as needed for each source. Any changes or alterations made during the scoping review process will be clearly outlined.

Any discrepancies or conflicts that arise between the reviewers will be resolved through open discussion and, if needed, with the assistance of an additional reviewer. If any information is missing or incomplete in a paper, the authors will be contacted to provide any necessary data.

2.5 Data analysis and presentation

The complete findings of the literature search and study selection process will be fully disclosed in the final scoping review, accompanied by a PRISMA-ScR flow diagram as depicted in Figure 1.[24] The extracted data will be analysed using Qualcoder 1.9 computer software in a narrative format. A comprehensive table will be presented, detailing the frequency of usage and components assessed for each narrative account of the existing literature. Furthermore, each questionnaire will be summarized narratively to provide additional context.

Quality assessment

We will evaluate the quality of the included studies to ensure that the study design aligns with our research objectives and that studies are accurately reported to minimize bias, we will use the Mixed Methods Appraisal Tool (MMAT) version 2018[28] to assess the appropriateness of the aim, methodological and study design accuracy, recruitment strategies, data collection, data analysis, findings, discussions, and conclusions of the authors. Additionally, we will use the Grading of

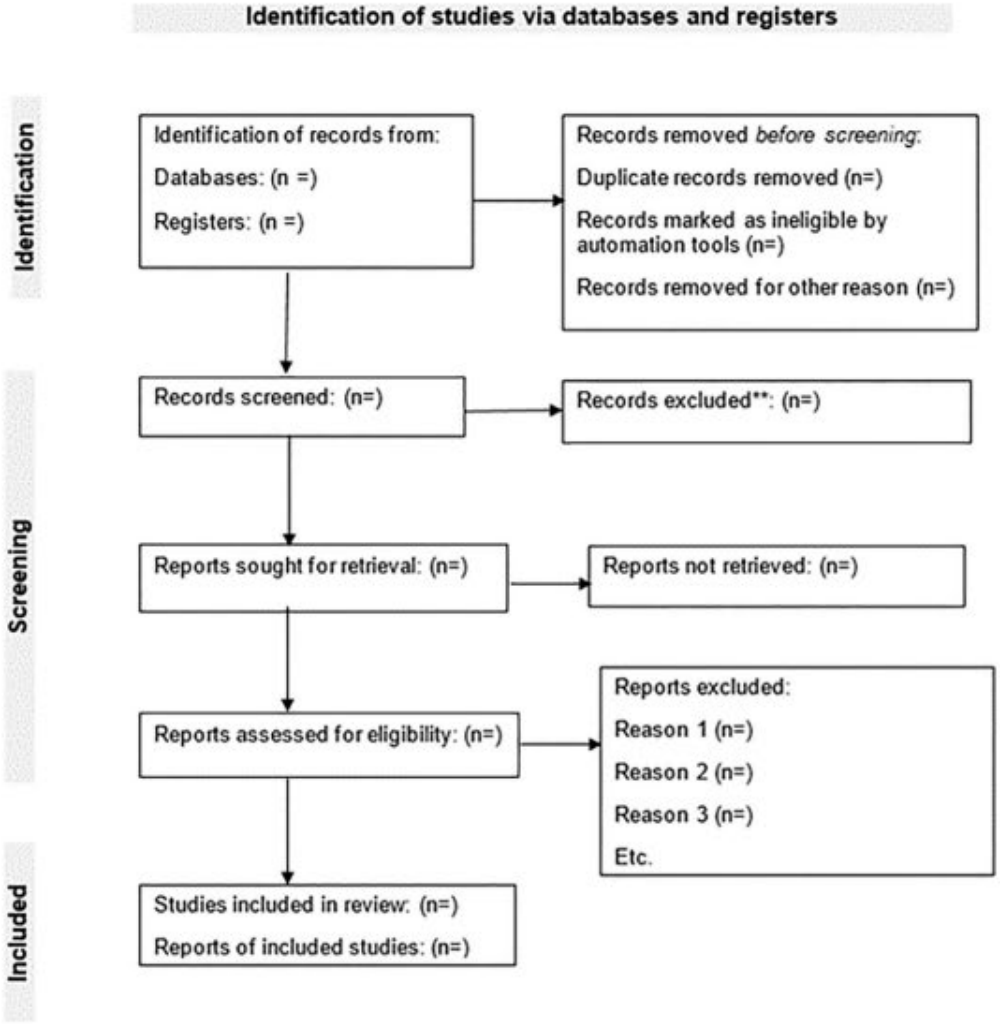


Figure 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers.

Recommendations, Assessment, Development and Evaluation (GRADE) tool[29] to assess the confidence in each finding of the study.

3. Discussion

Increasingly, health services are focusing on capturing patient perceptions of their vision status.[30] Even in ophthalmic research, quality of life measurement is being recognized as a key supplemental indicator.[17] Traditionally, eye care professionals have relied on the results of clinical examinations to determine the impact of vision problems on children, or sometimes from the observations of parents (proxies) or teachers.[31] This has been an important method to rely on since it has always been difficult for the child to express their vision problems.[32] However, it is questionable whether measurements like visual acuity, contrast sensitivity, visual field, etc. can accurately represent the child's perspective.[29] Quality-of-life tools have been reported to serve as reliable, relevant, and cost-effective methods to assess, to an extent, the impact of vision problems on children.[33] It is self-reported, and it is better than the proxy. Moreover, studies have shown that children can answer any HR-QoL questionnaire reliably if their reading skills, cognitive capacity, and emotional development were considered during the development of those questionnaires.[19,33]

Several instruments to measure the quality of life (QoL) in adults have been developed and validated elsewhere and found to exhibit good reliability. However, not enough has been done to develop these instruments for school-aged children.[30] In most cases, these tools designed for adults need to be modified first before being used in children, and the process of modifications may compromise the already established reliability and validity. The WHO QoL group recommended that ideally, each country should develop its own instrument to measure the impact on any disease and treatment, which is culture-sensitive and age-appropriate.[13] This will help the learner to honestly evaluate himself, rather than be evaluated by the test results from the eye care practitioner. The QoL instrument can also be used in assessing the effectiveness of management strategies or even disease progression. Therefore, this review aims to map all available vision-specific HR-QoL instruments used for children.

4. Conclusion

The literature analysed in this study will assist in developing quality-of-life tools tailored to specific contexts, including Africa. Furthermore, the results of this study will be critical to guiding practice, informing social security policies, and guiding practices related to children.

Author contributions

TSS, RH, and ZXK conceptualized the project, TSS and SJN developed the methodology, ZXK administered the project, and TSS and SJN drafted and edited the manuscript. All authors have reviewed and approved the final manuscript.

Ethics and consent

While ethical clearance is not mandatory for this study, we have obtained it from the Biomedical Research Ethics Committee of the University of KwaZulu Natal under the reference BREC/00003939/2022, which covers the larger study of which this review is a part. The findings of this scoping review and meta-analysis will be shared through various channels, including electronic and print media, conference presentations, and key stakeholder meetings.

Data availability

No data are associated with this article.

Extended data

OSF: Vision-specific instruments for the assessment of Health-Related Quality Of Life (HR-QOL) for children and adolescents with visual impairment: A Scoping Review. https://doi.org/10.17605/OSF.IO/9HW8C.[34]

Zenodo: PRISMA-ScR checklist for 'Protocol for scoping review: instruments for assessing vision-specific health-related quality of life in children and adolescents with visual impairment'. https://zenodo.org/doi/10.5281/zenodo.11485472.[35]

Zenodo: Supplementary Documents instruments for assessing vision-specific health-related quality of life in children and adolescents with visual impairment. Scoping review protocol. https://zenodo.org/doi/10.5281/zenodo.11642275.[36]

This project contains the following extended data:

- MeSH terms
- Search strategies with MeSH descriptors and truncation
- Data extraction instrument

Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

Acknowledgments

This study would like to express its gratitude to two librarians, namely Elma Van Der Merwe, Chief Officer of Library & Information Services at the University of Free State, and Pravina Laljeeth, Information Specialist & Senior Research librarian at the University of KwaZulu Natal. They provided invaluable assistance with the search strategies used in this study.

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Review

Vision-Specific Tools for the Assessment of Health-Related Quality of Life (HR-QoL) in Children and Adolescents with Visual Impairment: A Scoping Review

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Abstract: Vision-related quality-of-life (QoL) measures offer a comprehensive evaluation of the impact of eye conditions and the effectiveness of treatment on important aspects of QoL. A substantial number of tools for assessing health-related quality of life (HR-QoL) in adults have been reviewed. However, despite the high prevalence of uncorrected refractive errors causing visual impairment (VI) in children, there is a notable lack of similar tools for this vulnerable population. This review aimed to systemically map evidence on the availability and use of vision-specific instruments for assessing HR-QoL in children and adolescents with VI. This review follows the Joanna Briggs Institute (JBI) guidelines (2020) and the framework by Arksey and O'Malley and Levac et al. (2010). We conducted systematic searches through databases PubMed, Science Direct, and Scopus and search platforms Web of Science and EBSCOhost to source reviews published in English from the date of their inception to December 2023. The findings are reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR). We reviewed twenty tools, nine of which were developed for children in the United States and three of which were developed for children in developing countries; no tools specifically developed for children in Africa were found. In the reviewed papers, the tools were presented to children, parents, or proxies in an interview or questionnaire format. For most of the tools, reliability was assessed using internal consistency (n = 12) and test–retest reliability (n = 12). The most dominant measures of validity were construct (n = 16), content (n = 8), internal (n = 4), and criterion (n = 4). There appears to be a need for more tools developed for children in middle–low-income countries, especially for African children.

Keywords: vision-specific instrument; health-related quality of life; visual impairment; children; adolescents

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1. Introduction

Visual impairment (VI) poses a serious threat to the quality of life (QoL) of children, as 85% of their daily activities depend on vision [1]. Moreover, it was reported that most children with early-onset severe VI have delayed motor, language, emotional, social, and cognitive development [2]. The World Health Organization (WHO) estimates that 18.94 million children are visually impaired, of which 1.42 million children are blind [3]. They further state that childhood blindness accounts for 3.64% of the total population of blind people globally [3]. However, these data ignore the impact of blindness in childhood because it compares children with adults, while children live with blindness for a longer time [4]. Visual impairment is associated with a decreased QoL, which has been defined as one of the complex traits that includes visual functioning, patient's symptoms, emotional well-being, and social relationships [5]. In children, VI decreases QoL in various ways, including causing difficulty in reading from the board in classrooms and reading books, restrictions on activities, limitations in mobility, and decreased chances of employment in the future [6]. Furthermore, children with VI show reduced engagement in social and

pleasurable activities [5]. It has also been well established that VI and blindness are risk factors for both anxiety and depression [7,8].

In research and clinical care, progress in addressing visually impairing disorders is primarily measured and understood using objective visual function tests: for example, tests of visual acuity or the visual field, both of which can be insensitive to the presence of eye disease and therefore fail to capture visual disability completely [9]. An in-depth understanding of the impact of visually impairing disorders and treatment is required [6], including subjective complaints, which are challenging to measure and thus often receive less attention, particularly amongst children and adolescents, while they are of utmost clinical importance to guide progress in addressing visually impairing disorders and access to care rehabilitation [10]. The need for patient-reported information has led to the development of numerous questionnaires, often referred to as instruments or tools [6]. These tools have been reported to serve as reliable, relevant, and cost-effective methods to assess, to an extent, the degree of VI that children and adolescents experience in their daily activities [10]. Moreover, studies have shown that children can answer any health-related quality-of-life (HR-QOL) questionnaire reliably if their reading skills, cognitive capacity, and emotional development were considered during the development of those questionnaires [1,11].

Vision-related quality-of-life (QoL) measures offer a comprehensive evaluation of the impact of eye conditions and the effectiveness of treatment on other important aspects of QoL [10]. Despite the high prevalence of uncorrected refractive errors causing VI in children, a substantial number of tools for assessing health-related QoL in adults have been reviewed [9]. However, similar assessments for children and adolescents are lacking [1]. In addition, there exists a lack of clarity regarding the availability and use of vision-specific instruments for assessing HR-QoL in children and adolescents with VI, and the benefits and appropriateness of the currently available vision-specific instruments for use in resource-limited settings remain uncertain.

2. Objective

We conducted a scoping review of published peer-reviewed literature to (1) systematically map evidence on the availability and use of vision-specific instruments for assessing HR-QoL in children and adolescents with VI; (2) synthesize the findings of studies addressing HR-QoL in children and adolescents with VI; and, finally, (3) describe the psychometric properties of currently available vision-specific instruments for assessing HR-QoL in children and adolescents with VI.

3. Materials and Methods

The design and conduct of this review were guided by the scoping review framework suggested by Arksey and O'Malley (2005) and the guidelines by Levac et al. (2010) for methodological enhancement in conducting a scoping review project [12,13]. According to the framework suggested by Arksey and O'Malley (2005), there are five different stages in undertaking a scoping review: (1) defining the review question and developing criteria for including studies; (2) searching for studies addressing the review question; (3) selecting studies meeting the criteria for inclusion in the review; (4) charting the data from the studies meeting the criteria for inclusion; and (5) collating, summarizing, and reporting the results.

The review results are reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) [14]; the completed checklist can be accessed on the Zenodo repository via the following link: DOI: 10.5281/zenodo.11537654 [15]. Before the study commenced, the review protocol was registered on the Open Science Framework at https://doi.org/10.17605/OSF.IO/9HW8C [16], and it is currently under review for publication in the *F1000Research* journal (manuscript ref # 151839).

3.1. The Review Question and Criteria for Including Studies

To determine the research question's eligibility for a scoping review project, we applied the PCC (Population (or Participants), Concept, and Context) nomenclature framework recommended by the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis: 2020 Edition [17], as illustrated in Table 1.

Table 1. PCC framework for determining the review question and criteria for including studies.

Types of Participants
The participants that were included in this review were children and adolescents 18 years and younger living with visual impairment (VI). Visual impairment is defined as having a visual acuity worse than 6/12 that cannot be corrected with spectacles, contact lenses, medication, or surgery [18].
Concept
Vision-specific instruments used to assess the HR-QOL of children and adolescents living with VI were identified and reviewed. The instruments utilized in these studies were those developed and published in English. Components of the questionnaires assessed included frequency of use, age parameters, respondents, and domains assessed. "Respondent" refers to a person who completes the questionnaire. For younger children, the parent may act as a surrogate respondent or a structured interview may be conducted with a trained interviewer. The questionnaire format was stratified into the number of items, scale, scoring system, and reported time to completion. The number of items refers to the number of questions present in the questionnaire. In addition, HR-QoL instruments' psychometric assessments were addressed according to validity and reliability. The assessment of psychometric testing was based on the article by Solans et al. [19]. Validity was divided into three components: construct validity, content validity, and criterion validity. Construct validity ensures that the instrument measures the intended domain and not other related variables [20]. Content validity refers to the appropriateness of the items used to measure the construct of interest [21]. Criterion validity refers to how well the instrument compares to an external "gold standard" marker [20]. Reliability refers to the consistency and reproducibility of results obtained from an instrument [21]. This is determined by the instrument's test–retest reliability and internal consistency. A value of 0.7 or higher is considered acceptable according to Cronbach's alpha [22].
Context
The context of this review will be open: studies from any setting will be considered because the quality-of-life questionnaire can be used in any setting, from primary healthcare to specialized psychological care.

3.2. The Research Questions Addressed in This Scoping Review

The following research questions are addressed in this scoping review:

1. What evidence exists on the availability and usage of vision-specific tools for assessing health-related quality of life (HR-QoL) in children and adolescents with visual impairments?
2. What are the research outcomes of assessing HR-QoL in children and adolescents with visual impairments?
3. What are the psychometric properties of current vision-specific tools for assessing HR-QoL in children and adolescents with visual impairments?

The eligible studies were included only after two independent reviewers, T.S.S. and A.K., had thoroughly evaluated them and confirmed their eligibility based on the criteria outlined in the PCC framework.

3.3. Search Strategy for the Identification of Studies Addressing the Review Question

Systematic, comprehensive, and reproducible searches of reputable bibliographic databases and indexing services (and platforms), followed by other supplementary information sources, were used to find primary studies addressing the main review question, which were thereafter screened for their eligibility for inclusion in this review. T.S.S. (an

optometrist by profession) and A.K. (a social worker by profession) performed all of the primary electronic and supplementary systematic searches using a pre-defined search strategy with the assistance of professional librarians based at the University of Free State and the University of KwaZulu-Natal.

The first author and a subject specialist co-developed the comprehensive search strategy. All authors reviewed the draft to ensure the correct use of indexing terminology and Medical Subject Headings (MeSH) descriptors before it was piloted on a subset of records from the PubMed database.

3.4. Electronic Search Sources

Various databases, such as PubMed, Science Direct, Scopus, Web of Science, and EBSCOhost, were systematically searched for peer-reviewed articles published in English between the date of their inception and December 2023. The EBSCOhost platform included databases such as Academic Search Complete, Health Source: Consumer Edition, Health Source: Nursing/Academic Edition, and Open Dissertation. The searches used both free text and controlled vocabulary terms (e.g., MeSH) to extract relevant articles.

To gather more resources, the first author performed a manual search by browsing through the "Related Articles" link to find additional studies. Only primary research studies were included, while systematic reviews and other formats of published literature review papers, whether peer-reviewed or not, were excluded. However, the reference lists of relevant reviews, preprints, conference abstract papers, and full-text articles were screened to find more primary studies. After completing the search, all of the citations found were uploaded into Mendeley version 2.76.0/2023.

3.5. Study Selection and Eligibility Screening

The process of selecting studies involved multiple steps and was conducted by two independent reviewers, T.S.S. and A.K., to reduce errors and bias following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for scoping reviews (PRISMA-ScR). The study selection process consisted of three screening stages: title screening, the screening of abstracts, and full-text article screening. Both reviewers independently screened the titles and abstracts of the references retrieved through the search strategies based on predetermined inclusion and exclusion criteria. Any discrepancies were resolved through discussion and, if necessary, referred to a third reviewer.

After completing the title and abstract screening process, the full-text articles were retrieved for studies that met the inclusion criteria or where there was uncertainty. These articles were then screened in greater depth to determine their eligibility for inclusion. T.S.S. and A.K. independently assessed the full texts of potentially relevant studies for eligibility. Any study that did not meet the inclusion criteria was excluded. Once the full-text screening stage was completed, the two reviewers conducted a secondary search of the reference lists of all included studies in order to identify any relevant articles that were missed during the initial database search.

3.6. Data Items and Data Charting Methods

After screening the full text of the articles, two independent reviewers, T.S.S. and S.S. (both optometrists by profession), performed the data extraction process using a standardized form or checklist to ensure a systematic data extraction process. The screening tools used can be found in the Supplementary File which can be access from Zenodo repository for free using this link DOI: 10.5281/zenodo.11537918 [23]. The first author extracted quantitative data, which was then checked by another reviewer. Any discrepancies were resolved by discussion, and a third reviewer was available if needed. Two reviewers worked separately to extract qualitative data such as the study aim, sample, type, and nature of the intervention/programme, theoretical approach, and methods used to collect data, and analytical processes. This was performed in duplicate to identify inter-rater errors and reduce data errors and bias. Various components of each vision-specific instrument

were then extracted and summarized, including the frequency of its use in studies, age parameters, profiles of the respondents, the number of items assessed, scale, scoring system, domains assessed, validity, and reliability.

4. Results

A total of 20,561 resources were searched across various databases and platforms using the initial search strategy. After title screening, 20,382 resources were excluded as they did not provide any information regarding the development, reliability, validity, or translation of the tool. Out of the 179 resources imported to Mendeley, 132 resources remained for abstract screening after removing duplicates. Two reviewers, T.S.S. and A.K., agreed on including 32 resources for full-text screening and excluded 98 resources for reasons such as not reporting on children, reporting on the validation or reliability of already-included tools, or being duplicates. After full-text screening, T.S.S. and A.K. excluded 20 resources as they reported validations of tools but had no evidence of tool development, or were outside the definition of children and adolescents. Hence, a total of 14 resources met the inclusion criteria. Additionally, 6 resources were retrieved from a manual search, bringing the total number of resources up to 20. A PRISMA flowchart of the selection process is shown in Figure 1, and the results were analyzed and synthesized based on the three aforementioned themes.

4.1. Characteristics of Sources of Evidence

All eighteen peer-reviewed journals and two peer-reviewed theses reported on developing, validating, and testing the reliability of vision-related QoL and/or functional vision assessment tools for children and adolescents. According to Table 2, most of these tools were developed in the United States of America (n = 9), while Australia, China, Saudi Arabia, and Italy developed only a single tool each. African countries were not targeted for the development of these tools. Even though we were focused on tools covering children 18 years and younger, we decided to include one tool that covered the age group of between 10 and 20 years because it was the only study that focused on refractive error tool development (Student Refractive Error and Eyeglasses Questionnaire (SREEQ)). A total of 14 studies used questionnaires or surveys as the most common method of data collection, while 4 studies combined questionnaires with interviews. Almost all of the studies (n = 18) used the English language to develop the tool (from 1999 to 2020). However, at least four tools have been translated into more than one language in addition to English.

Table 2 shows that eight of the studies did not have any race limitations, while two of them did not report on their targeted race. The highest number of respondents were children (n = 12), followed by children in conjunction with their parents (n = 6), and then proxy respondents (which were either parents alone or parents and caregivers) (n = 2). Most of the studies measured vision-related QoL (n = 10), followed by functional vision (n = 6), and health-related QoL (n = 2). The tools used in these studies covered various eye conditions, including VI (n = 9), amblyopia (n = 3), refractive error (n = 2), uveitis, allergic conjunctivitis, convergence insufficiency (n = 1), and intermittent exotropia (n = 1). Additionally, two of the studies were not limited to any specific eye conditions. The most used mode of administration in this review was noted to be self-reporting (n = 13); the interview format was the least used (n = 3), and 4 studies utilized both modes.

The majority of the tools were created through the following methods: extracting information from a literature review (n = 9), conducting focus group discussions with children and/or experts (n = 7), consulting with experts through interviews (n = 7), interviewing children and their parents (n = 7), and constructing new tools by using existing ones as a basis (n = 2), as indicated in Table 3 below. The 5-point task difficulty scale was the commonly used rating scale (n = 7), followed by the frequency rating scale, and the level-of-happiness scale, which was utilized in only a single paper. In all of the tools, the number of domains measured ranged from 1, being the least, to 12, with the number of items ranging from 11 to 90, as shown in Table 3.

Table 2. List of tools used for assessing vision-related quality of life or visual function in children and adolescents.

Instrument	Source	Country	Age of Respondents, in Years	Language	Ethnicity of Respondents	Concepts Measured	Ocular Condition Studied	Respondents	Mode of Administration
(VRQOL-JIA)	[17] A1	USA	8–18	English	Various	Vision-related QoL and/or visual function	Uveitis associated with juvenile idiopathic arthritis	Children, Parents	Self-reporting
(CVAQC)	[21]	UK	5–18	English, Chinese, Turkish	White	Visual ability	Visual impairment	Children	Interviews
(PedEyeQ)	[22]	USA	0–18	English	Various	Eye-related QoL and functional vision	Any eye condition	Children, Proxies, Parents	Self-reporting
(CVFQ)	[24]	USA	0–7	English, German	Various	Vision-related QoL	Any eye condition	Parents, Proxies	Self-reporting
(LVP-FVQ I)	[25]	India	8–18	English, Hindi, Telugu	Indian	Functional vision	Visual impairment	Children	Interviews
(LVP-FVQ II)	[26]	India	8–16	English, Hindi, Telugu	Indian	Functional vision	Visual impairment	Children	Interviews
(VRQOL-YC)	[27]	USA	0–7	English	Various	Vision-related QoL	Visual impairment	Proxies	Self-reporting
(QUICK)	[28]	Italy	4–12	Italian	NR	Disease-specific QoL	Allergic conjunctivitis	Children	Self-reporting
(FVQ-CYP)	[29]	UK	10–15	English	White	Functional vision	Visual impairment	Children	Self-reporting
(VRQOL-CID)	[30]	China	8–18	Chinese	Chinese	Vision-related QoL	Visual impairment	Children, Parents, Proxies	Self-reporting
(CVLS)	[31]	Saudi Arabia	5–12	English	Arabian	Vision-related QoL	Amblyopia	Children	Self-reporting
(IVI_C)	[32]	Australia	8–18	English	Australian	Vision-related QoL	Visual impairment	Children	Self-reporting, Interviews
(PROFV-CY)	[33]	UK	8–18	English	White	Functional vision	Visual impairment	Children	Interviews, Self-reporting
(CHVI-VFQ)	[34]	India	5–15	English, Hindi, Telugu	Indian	Visual function	Visual impairment	Children, Proxies	Self-reporting
(ATI)	[35]	USA	3–13	English	Various	Impact of amblyopia treatment	Amblyopia	Children, Proxies	Self-reporting
(CAT-QoL)	[36]	UK	5–7	English	Various	QoL	Amblyopia	Children	Interviews, Self-reporting
(CISS)	[37]	USA	9–18	English	NR	Symptoms	Convergence insufficiency	Children	Self-reporting, Interviews
(IXTQ)	[38]	USA	5–17	English	NR	Health-related QoL	Intermittent exotropia	Children, Proxies, Parents	Self-reporting

Table 2. *Cont.*

Instrument	Source	Country	Age of Respondents, in Years	Language	Ethnicity of Respondents	Concepts Measured	Ocular Condition Studied	Respondents	Mode of Administration
(PREP2)	[39]	USA	8–18	English	Various	Vision-related function	Refractive error	Children	Self-reporting
(SREEQ)	[40]	USA	10–20	English	Various	Vision-related QoL	Refractive error	Children	Self-reporting

(VRQOL-JIA) = Vision-Related Quality-of-Life Instrument for use in Juvenile Idiopathic Arthritis-associated Uveitis, (CVAQC) = Cardiff Visual Ability Questionnaire for Children, (PedEyeQ) = Pediatric Eye Questionnaires, (CVFQ) = Children's Visual Function Questionnaire, (LVP-FVQ I) = LV Prasad Functional Vision Questionnaire, (LVP-FVQ II) = LV Prasad Functional Vision Questionnaire, Second Version, (VRQOL-YC) = Vision-Related Quality of Life in Young Children, (QUICK) = Health-Related Quality of Life in Children with Vernal Keratoconjunctivitis Questionnaire, (FVQ-CYP) = Functional Vision Questionnaire for Children and Young People with Visual Impairment, (VRQOL-CID) = Vision-Related and Subjective Quality of Life in Children with Intellectual Disability, (CVLS) = Children's Vision for Living Scale, (IVI_C) = Impact of Vision Impairment on Children, (PROFV-CY) = Patient-Reported Outcome Measure of Functional Vision for Children and Young People aged 8 to 18 years with Visual Impairment, (CHVI-VFQ) = Vision Function Questionnaire for Children with Visual Impairment, (ATI) = Amblyopia Treatment Index, (CAT-QoL) = Children's Amblyopia Treatment Quality of Life Questionnaire, (CISS) = Convergence Insufficiency Symptom Survey, (IXTQ) = Intermittent Exotropia Questionnaire, (PREP2) = Pediatric Refractive Error Profile, (SREEQ) = Student Refractive Error and Eyeglasses Questionnaire, NR = not reported, USA = United States of America, UK = United Kingdom.

Table 3. Methods used for the development, domains, rating, reliability, and validation of the tools.

Tool	Sources Used to Generate Items	Rating Scales	List of Domains (N=)	No. of Items	Reliability Testing	Validity Testing
(VRQOL-JIA)	Focus group discussions with experts and children; Knowledge extracted from the literature	6-point scale assessing the severity of visual impairment; 5-point Likert scale assessing the level of task difficulty.	Distance vision, near vision, color, night vision, functionality, photosensitivity, optional driving, global vision, physical functioning, emotional functioning, social functioning, and school functioning (12).	49	Test–retest reliability; Internal consistency	Content validity; Constructive validity; Criterion validity
(CVAQC)	Focus group discussions with children	6-point scale assessing the level of task difficulty.	Educational, near vision, distance vision, getting around, social interaction, entertainment, and sport (7).	25	Test–retest reliability	Content validity
(PedEyeQ)	Knowledge extracted from the literature	4-point frequency scale.	Distance vision, near vision, mental distress, social life, and psychological health (5).	40	Internal consistency	Constructive validity

Table 3. *Cont.*

Tool	Sources Used to Generate Items	Rating Scales	List of Domains (N=)	No. of Items	Reliability Testing	Validity Testing
(CVFQ)	Consultation with experts	5-point scale assessing visual status; 5-point agreement scale; 5-point task difficulty scale; 5-point frequency scale.	General health, general vision, competence, personality, familial impact, and treatment (6).	75	Test–retest reliability; Internal consistency	Constructive validity
(LVP-FVQ I)	Knowledge extracted from the literature; Focus group discussions with experts and children	5-point Likert scale assessing the level of task difficulty; Yes/No options were available, where "No" meant there were no difficulties in performing a task.	Distance vision, near vision, color vision, and visual field (4).	20	Test–retest reliability	Content validity; Constructive validity; Criterion validity
(LVP-FVQ II)	Knowledge extracted from the literature; Focus group discussions with experts.	3-point Likert scale assessing difficulty; 3-point scale assessing global rating as compared to peers.	Activities of daily living, academic life, and leisure activities (4).	23	Test-retest reliability	Criterion validity
(VRQOL-YC)	Clinical expertise in the literature	5-point scale assessing quality of life.	General health, general vision, competence, personality, familial impact, and treatment (6).	61	Internal consistency	Content validity; Constructive validity
(QUICK)	Knowledge extracted from the literature; Consultations with researchers; Interviews with children and parents	3-point frequency scale.	Physical well-being, emotional well-being, self-esteem, family, friends, school life, and disease (7).	16	Internal consistency	Criterion validity; Constructive validity
(FVQ-CYP)	Interviews with children and experts	5-point Likert scale assessing task performance.	Functioning, home life, school life, and leisure (4).	36	NR	Constructive validity; Content validity

Table 3. *Cont.*

Tool	Sources Used to Generate Items	Rating Scales	List of Domains (N=)	No. of Items	Reliability Testing	Validity Testing
(VRQOL-CID)	Knowledge extracted from the literature; Focus group discussions with parents and caregivers	4-point Likert scale rating the level of happiness; Yes/No options were also used.	School activities, health, social life, leisure activities, family life, academic performance, gross motor activities, fine motor activities, object discrimination, distance vision, treatment, general health, general vision, competence, personality, and familial impact (16).	90	Test–retest reliability; Internal consistency	Construct validity; Internal validity
(CVLS)	Knowledge extracted from the literature; Consultations with pediatrics experts, parents, and children	5-point Likert scale rating frequency and severity.	Mood, self-esteem, social relations, functional vision, visio-motor skills, and academic performance (6).	21	Internal consistency	Content validity; Constructive validity
(IVI_C)	Focus group discussions with children, parents, and teachers	5-point frequency scale.	NR	24	Test–retest reliability; Internal reliability	Content validity; Construct validity
(PROFV-CY)	An already-available tool, namely the FVQ-CYP tool	4-point scale assessing task difficulty.	Restrictions at home, school and leisure activities, and limitations on levels of functioning, mobility, and communication (2).	41	Test–retest reliability; Internal consistency	Constructive validity
(CHVI-VFQ)	Already-available tools, namely the LVP FVQ I and LVP FVQ II tools; Consultations and workshops with experts	4-point scale assessing the severity of the condition; 3-point scale assessing the level of difficulty in performing tasks.	Mobility, education, daily routine, and psychosocial well-being (4).	43	Internal consistency	Internal validity
(ATI)	Knowledge extracted from the literature; Clinical experience	5-point agreement scale.	Adverse effects, treatment compliance, social stigma, and functioning at near distance (6).	39	Test–retest reliability; Internal consistency	Internal validity

Table 3. *Cont.*

Tool	Sources Used to Generate Items	Rating Scales	List of Domains (N=)	No. of Items	Reliability Testing	Validity Testing
(CAT-QoL)	Interviews with children	5-point scale assessing severity.	NR	11	Internal consistency	Internal validity
(CISS)	Perspectives of/consultations with researchers and children	5-point scale assessing symptom severity.	Symptom severity (1).	15	Test–retest reliability	Constructive validity; Internal validity
(IXTQ)	Interviews with children and parents	5-point agreement scale; 3-point agreement scale	Functional vision, psychosocial well-being, and surgery (3).	41	Internal consistency	Constructive validity
(PREP2)	Consultations with children and parents	5-point agreement scale.	Overall vision, near vision, distance vision, symptoms, appearance, satisfaction, activities, academics, handling, and peer perception (10).	56	Test–retest reliability; Internal consistency	Constructive validity
(SREEQ)	Researcher's teams and their expertise	3-point frequency scale.	Impact of uncorrected and corrected refractive error and vision-related quality of life (2).	23	Internal consistence	Content validity; Constructive validity

(VRQOL-JIA) = Vision-Related Quality-of-Life Instrument for use in Juvenile Idiopathic Arthritis-associated Uveitis, (CVAQC) = Cardiff Visual Ability Questionnaire for Children, (PedEyeQ) = Pediatric Eye Questionnaires, (CVFQ) = Children's Visual Function Questionnaire, (LVP-FVQ I) = LV Prasad Functional Vision Questionnaire, (LVP-FVQ II) = LV Prasad Functional Vision Questionnaire Second Version, (VRQOL-YC) = Vision-Related Quality of Life in Young Children, (QUICK) = Health-Related Quality of Life in Children with Vernal Keratoconjunctivitis Questionnaire, (FVQ-CYP) = Functional Vision Questionnaire for Children and Young People with Visual Impairment, (VRQOL-CID) = Vision-Related and Subjective Quality of Life in Children with Intellectual Disability, (CVLS) = Children's Vision for Living Scale, (IVI_C) = Impact of Vision Impairment on Children, (PROFV-CY) = Patient-Reported Outcome Measure of Functional Vision for Children and Young People aged 8 to 18 years with Visual Impairment, (CHVI-VFQ) = Vision Function Questionnaire for Children with Visual Impairment, (ATI) = Amblyopia Treatment Index, (CAT-QoL) = Children's Amblyopia Treatment Quality of Life Questionnaire, (CISS) = Convergence Insufficiency Symptom Survey, (IXTQ) = Intermittent Exotropia Questionnaire, (PREP2) = Pediatric Refractive Error Profile, (SREEQ) = Student Refractive Error and Eyeglasses Questionnaire, NR = not reported.

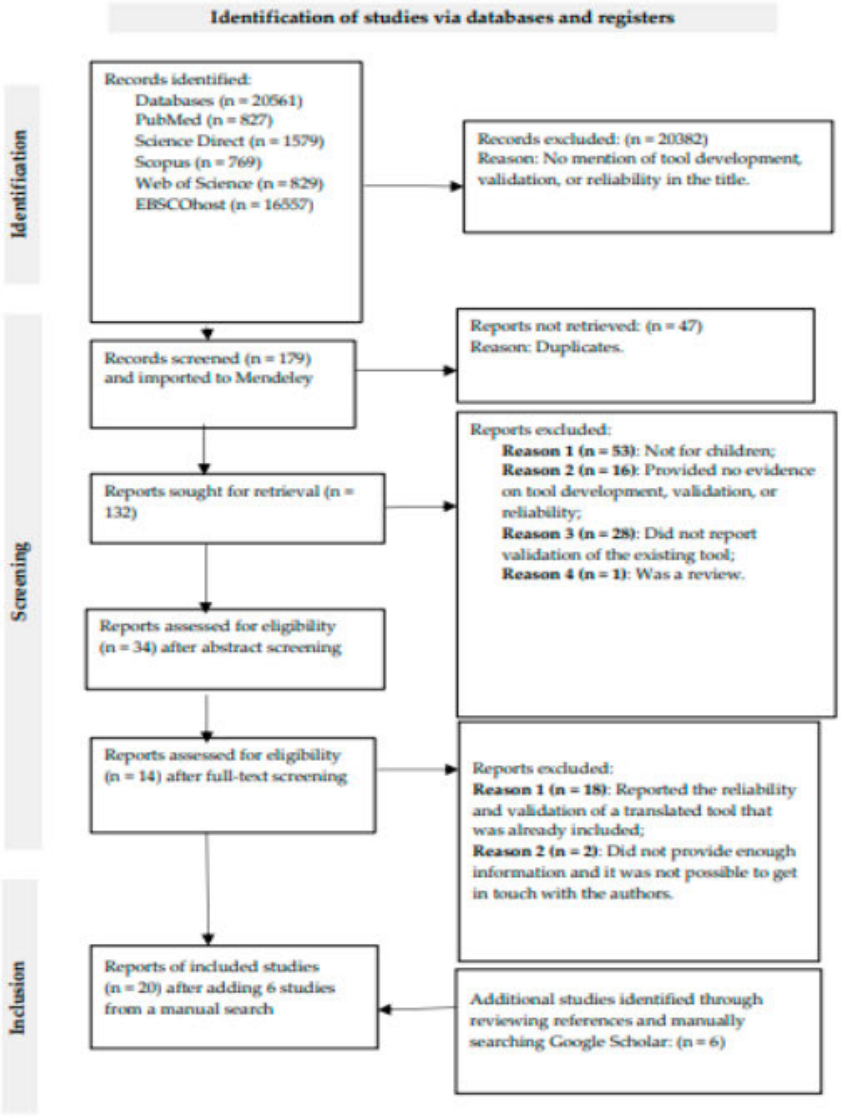


Figure 1. PRISMA 2020 flow diagram for systematic reviews, including searches of databases and registries.

4.2. Results of Individual Sources of Evidence

VRQOL-JIA

The Vision-Related Quality-of-Life Instrument for use in Juvenile Idiopathic Arthritis-associated Uveitis (VRQOL-JIA) is a QoL assessment tool designed specifically to assess the impact of vision-related issues on children aged 8–18 years living in the USA who suffer from juvenile idiopathic arthritis-associated uveitis [17]. This tool was developed through focus group discussions with experts and children and a thorough literature review. It measures both visual function and QoL related to vision. The questionnaire is completed by either the child with uveitis themselves or their parents, using a six-point vision severity scale and a five-point task difficulty scale. The tool consists of 12 domains, with 23 items for children aged 8–15 years and 26 items for individuals aged 16–18 years. The reliability

of this tool was tested using test–retest reliability and the Cronbach alpha coefficient, while its validity was examined through both constructive and criterion validity methods.

CVAQC

The Cardiff Visual Ability Questionnaire for Children (CVAQC) [21] is a purpose-built tool for evaluating the visual acuity of children between the ages of 5 and 18 years residing in the UK. This instrument was carefully developed through focus group discussions with children, ensuring its relevance and comprehensibility. It is presented to children in an interview format, utilizing a six-point scale to ascertain the level of task difficulty. With seven domains and 25 items, this tool comprehensively covers all aspects of visual ability. To test its reliability, the tool underwent a test–retest analysis using intraclass correlation (ICC), and the constructive validity method was implemented for validation purposes.

PedEyeQ

The Pediatric Eye Questionnaires (PedEyeQ) [22] present a valuable resource for assessing the QoL and functional vision of children up to 18 years of age in the USA. Developed through a thorough literature review, this tool is completed by either children, parents, or proxies using a four-point frequency scale. Divided into five domains and consisting of 40 items, the reliability of this tool was established through internal consistency using the Cronbach alpha test, and its validity was confirmed through constructive validity analysis.

CVFQ

The Children's Visual Function Questionnaire (CVFQ) [24] was created to evaluate the impact of visual impairments on the QoL of children up to 7 years of age residing in the USA. Experts were consulted in developing this questionnaire, which is completed by parents or proxies using a variety of five-point scales to rate visual status, agreement, task difficulty, and frequency. This tool consists of six domains, with 35 items for children under 3 years and 40 items for those aged 3–7. Its reliability was assessed through test–retest reliability and Cronbach alpha coefficient analyses for internal consistency, while constructive validity was used to validate this tool.

LVP-FVQ I

The LV Prasad Functional Vision Questionnaire (LVP-FVQ I) [25] is a tool that was designed to evaluate functional vision among Indian children between the ages of 8 and 18 years. The development process involved a thorough review of the existing literature, as well as focus group discussions with both children and experts. This questionnaire is presented to children in an interview format, utilizing a five-point task difficulty scale and consisting of four domains with a total of 20 items. To ensure its reliability, test–retest methods were utilized, while content, constructive, and criterion validity analyses were employed for validation purposes.

LVP-FVQ II

The LV Prasad Functional Vision Questionnaire Second Version (LVP-FVQ II) [26] is a second-version tool designed to evaluate functional vision among children aged 8–16 years living in India. The development process involved an extraction of knowledge from the literature via a literature review and focus group discussion with experts. This questionnaire is presented to children in an interview format, like the first version, and it utilizes a three-point task difficulty scale as well as a three-point global rating scale to compare respondents to their peers. The LVP-FVQ II tool consists of four domains and 23 items. To test its reliability, test–retest reliability using interclass correlation and internal consistency via the Cronbach alpha coefficient were measured. Moreover, it was validated through assessments of its content and construct. The LVP-FVQ II tool covers more domains and includes items related to mobility, which the first version did not have.

VRQOL-YC

The Vision-Related QoL in Young Children (VRQOL-YC) tool [27] is a tool that has been specifically designed to measure the visual-related QoL of children up to 7 years of age, who are residents of the USA. It was developed through a careful analysis of clinical expertise and the literature. The questionnaire, comprising 61 items, is completed by a proxy using a five-point QoL rating scale and covers six core domains. This tool's reliability

was assessed through the Cronbach alpha coefficient, while its validity was tested using both content and constructive validity methods.

QUICK

The Health-Related Quality of Life in Children with Vernal Keratoconjunctivitis Questionnaire (QUICK) [28] is a tool that evaluates the QoL of children aged 4–12 years who are living in Italy and who have been diagnosed with vernal keratoconjunctivitis. This questionnaire was developed through an extensive literature review, consultations with researchers, and interviews with children and their parents. It consists of 16 items grouped into seven domains, and children complete the questionnaire using a three-point frequency scale. The reliability of the QUICK was evaluated using the Cronbach alpha coefficient, and its validity was confirmed through criterion and constructive validity testing.

FVQ-CYP

The Functional Vision Questionnaire for Children and Young People with Visual Impairment (FVQ-CYP) [29] is a tool that was designed to evaluate the functional vision of children aged 10–15 years residing in the United Kingdom. This questionnaire was developed through interviews with children and experts. It is completed by the children themselves using a five-point scale that rates task performance. This tool consists of four domains and 36 items. There are no reports available on how its reliability has been assessed. However, its constructive validity was assessed using the personal correlation coefficient (PCC).

VRQOL-CID

The Vision-Related Quality of Life (VRQOL-CID) [30] tool is designed for Chinese children aged 8–18 years who have intellectual disability (ID). This tool helps in assessing vision-related quality of life and has 16 domains and 90 items. The questionnaire uses a four-point scale that rates the level of happiness scale and is completed by children, parents, and proxies. This tool was developed after an extensive literature review and focus group discussions with parents and caregivers. Its reliability was evaluated using test–retest reliability and the Cronbach alpha coefficient, while its validity was assessed via constructive and internal validity analyses.

CVLS

The Children's Vision for Living Scale (CVLS) [31] is a tool designed to measure QoL related to vision in children aged 5–12 years who live in Saudi Arabia. The development of this tool involved an extensive literature review and consultation with experts in children's health, parents, and children. Children with amblyopia complete this questionnaire, which comprises six domains and 21 items. The scale uses a five-point frequency rating and a five-point severity rating. The reliability of this tool was assessed using the Cronbach alpha coefficient, personal separation, and item separation, while its validity was assessed via construct and internal validity analyses.

IVI_C

The Impact of Vision Impairment on Children (IVI_C) questionnaire [32] is a tool designed to evaluate the vision-related QoL of children aged 8–18 years who are living with VI in Australia. This instrument was created through focus group discussions with children, parents, and teachers. It is available in both questionnaire and interview formats, with both being completed by the children themselves. This tool consists of 24 items rated on a five-point frequency scale, but the specific domains that it assesses have not been reported. The reliability of this tool was established through test–retest reliability, equivalence (inter-observer reliability), and internal reliability measures, while its validity was determined through content and construct validity analyses.

PRO-FV

The Patient-Reported Outcome Measure of Functional Vision (PRO-FV) tool [33] was developed to assess functional vision among children and young people aged 8 to 18 years with VI living in the United Kingdom. This tool was developed from modified items of the FVQ-CYP tool and consists of both a questionnaire and an interview format. Its respondents are children, and the tool consists of two domains assessed through 41 items,

using a four-point task difficulty scale. The Pearson correlation coefficient was used to assess its test–retest reliability, and constructive validity was used to measure its validity.

CHVI-VFQ

The Visual Function Questionnaire for Children with Visual Impairment (CHVI-VFQ) [34] is a tool that is used to measure the visual function of children in India aged 5–15 years. This tool was created by combining already-validated tools, namely LVP-FVQ I and II, and by conducting consultation workshops with experts. This questionnaire consists of 43 items and four domains. The questionnaire is completed by children and proxies, using a four-point scale rating the condition's severity and a three-point scale rating task difficulty. To test for its reliability, the Cronbach alpha coefficient was employed, and the tool was internally validated as a method of validation.

ATI

The Amblyopia Treatment Index (ATI) [35] is a tool designed to evaluate the effectiveness of amblyopia treatment among children between the ages of 3 and 13 years who live with the condition in the USA. The ATI was developed based on an extensive review of the literature and clinical experience. It comprises six domains, with 20 items for children aged 3–6 years and 19 items for children aged 7–13 years. This questionnaire is completed by both children and proxies, using a five-point agreement scale. The test–retest reliability of this tool was evaluated using the Pearson correlation coefficient; its internal consistency was assessed to measure its reliability; and it was validated using internal validity analysis.

CAT-QoL

The Children's Amblyopia Treatment Quality of Life Questionnaire (CAT-QoL) [36] is a questionnaire designed to gauge the QoL of children aged 5–7 years with amblyopia who live in the United Kingdom. This tool was developed through interviews with children and consists of 11 items. It uses a five-point scale that rates symptom severity and can be completed by the children themselves. However, there is no report on the number of domains it assesses. To assess its reliability, this tool underwent an evaluation of its Cronbach alpha coefficient and equivalence, while internal validity was used to assess its validity.

CISS

The Convergence Insufficiency Symptom Survey (CISS) [37] is a tool used to assess the symptom severity of children aged 9–18 years diagnosed with convergence insufficiency residing in the USA. This tool was developed through consultations for investigating the perspectives of researchers and children and has one domain assessed through 15 items. This tool is presented to children in an interview format and/or a questionnaire format using a five-point scale rating symptom severity. To assess its reliability, this tool underwent a test–retest reliability analysis, and for validation, constructive and internal validity analyses were employed.

IXTQ

The Intermittent Exotropia Questionnaire (IXTQ) [38] is a tool designed to measure the QoL of children aged 5–17 years who have been diagnosed with intermittent exotropia and live in the USA. The development of this tool involved interviews with children and their parents. It comprises three domains and a total of 12 items for children, 12 items for proxies, and 17 items for parents. This questionnaire uses five-point and three-point agreement scales and is completed by children, proxies, and parents. The reliability of this questionnaire was evaluated through a measurement of its Cronbach alpha coefficient, and its validation included a discriminant validity analysis.

PREP2

The Pediatric Refractive Error Profile (PREP2) [39] is a tool designed to evaluate the vision-related function of children aged 8–18 years who have been diagnosed with refractive error and who reside in the USA. The development of this tool involved consultations with children and their parents, and it includes ten domains assessed through 56 items. The questionnaire is filled out by children using a five-point agreement scale. To assess the

reliability of this tool, its test–retest reliability and internal consistency were measured, while constructive validity was used to validate this tool.

SREEQ

The Student Refractive Error and Eyeglasses Questionnaire (SREEQ) [40] is a tool designed to measure the vision-related QoL of children aged 10–20 years who wear spectacles due to having refractive errors and who reside in the USA. This tool was developed by a team of researchers who utilized their expertise in the field, and it comprises two domains evaluated through a total of 23 items. The questionnaire is filled out by the children themselves using a three-point frequency scale. The reliability of this tool was assessed using the Cronbach alpha coefficient and Pearson reliability methods, while its validity was examined through content and discriminant validity methods.

4.3. Psychometric Properties of the Tools

The reliability of a study is determined by its ability to consistently produce the same results when repeated [41]. This can be assessed by measuring the stability of a tool, test–retest reliability (reproducibility), and internal consistency. Test–retest, or reproducibility, refers to the extent to which scores remain consistent over time when no changes are expected [42]. It evaluates if stable patients score similarly on a certain measure between two assessments in a relatively short period of time. It is recommended that the intraclass correlation coefficients be higher than 0.60 in stable patients over a two-week period [43]. Test–retest reliability was evaluated for the following instruments: VRQOL-JIA, CVAQC, CVFQ, LVP-FVQ I, LVP-FVQ II, VRQOL-CID, IVI_I, PROFV-CY, ATI, CISS, and PREP2. Internal consistency refers to the degree to which all items measure the same underlying construct and is typically evaluated using the Cronbach's coefficient alpha formula [44]. A Cronbach alpha value of 0.70 or higher is generally considered indicative of satisfactory reliability [45]. Among the questionnaires used to assess internal consistency, the following were included: VRQOL-JIA, PedEyeQ, CVFQ, VRQOL-YC, QUICK, VRQOL-CID, CVLS, PROFV-CY, CHVI-VFQ, ATI, CAT-QoL, IXTQ, PREP2, and SREEQ. Notably, the FVQ-CYP tool did not provide any information regarding reliability, and seven tools were utilized through multiple methods for testing their reliability. It is important to note that while an instrument may demonstrate reliability, this does not guarantee accurate measurement of the intended construct; therefore, validating the tool is required.

Validity pertains to the extent to which an instrument accurately measures what it intendeds to measure [44]. This can be evaluated through content, construct, criterion, internal, and discriminant validity analyses. Content validity assesses how well an instrument captures crucial elements related to patients and the specific disease being studied [46]. In essence, this determines whether the instrument effectively reflects the concerns and perspectives of the patients. Tools that underwent this form of validation were CVAQC, LVP-FVQ I, VRQOL-YC, CVLS, and IVI_C. Construct validity evaluates how well a test assesses the concept for which it was designed [47]. Instruments validated through this validation method include VRQOL-JIA, PedEyeQ, CVFQ, LVP-FVQ I, VRQOL-YC, QUICK, FVQ-CYP, VRQOL-CID, CVLS, IVI_C, PROFV-CY, CISS, IXTQ, PREP2, and SREEQ. Criterion validity measures the extent to which there is a relationship between a given test score and performance on another relevant measure [48,49]. There are two forms of criterion validation: predictive validity and concurrent criterion validity. This form of validation was utilized in the development of VRQOL-JIA, LVP-FVQ II, and QUICK. The concept of internal validity refers to the degree of confidence that the observed causal relationship in a study is not influenced by other extraneous factors or variables [42,45]. This form of validation was employed during the development of the following tools: VRQOL-CID, CHVI-VFQ, ATI, CAT-QoL, and CISS.

5. Discussion

Health services are increasingly emphasizing the importance of understanding how patients perceive the status of their vision [50]. In the field of ophthalmic research, there is

growing recognition of the significance of measuring QoL as a supplementary indicator [48]. Historically, eye care professionals have predominantly relied on clinical examinations and input from parents, proxies, or teachers to assess the impact of vision issues on children, acknowledging the challenge in relying on children to express their vision problems [21,24,51]. However, there are concerns about whether assessments like visual acuity, contrast sensitivity, and visual field assessments accurately capture the child's perspective [24]. Quality-of-life assessment tools have been identified as reliable, relevant, and cost-effective means of evaluating the impact of vision problems on school children to some extent [52]. These self-reported tools are preferable to proxy assessments. Additionally, research indicates that children can reliably respond to health-related quality-of-life (HR-QOL) questionnaires if their reading skills, cognitive capacity, and emotional development have been considered in the questionnaire's design [53,54]. While the National Eye Institute Visual Function Questionnaire (NEI-VFQ) has been successfully used to measure QoL in individuals with visual impairment [55], its usefulness in assessing children is limited due to the inclusion of items not applicable to young children, such as those related to driving, and the exclusion of items like seeing the blackboard, writing in a straight line, and color perception, which are vital for growth and development during childhood.

While a few validated instruments have been developed specifically for use in children, over 80% of these were developed based on children in developed countries [19–21,24,25,29–33,35–40]. This makes some aspects, such as driving and reading traffic signs, irrelevant for children in developing countries. It also means that they overlook items familiar to children in developing countries, such as walking home through unpaved roads, playing soccer on uneven gravel playgrounds, and learning under poor lighting. Additionally, expected differences in socioeconomic status and cultural disparities between developed and developing countries, like those in Africa, make the effectiveness of these instruments somewhat unreliable when used with African children. Furthermore, most of these instruments were developed with a focus on developing countries, where children's hobbies may often include reading and video games, in contrast to the "outside-of-school" activities of their counterparts in most rural parts of Africa, which may include tending to domestic animals and crops, playing games outside, and fetching water from the river. Even though the highest prevalence of children living with VI is found within developing countries [56], only three instruments have been designed based on children in developing countries, namely the LV Prasad Functional Vision Questionnaire (LVP-FVQ I), LVP-FVQ II, and CHVI-VFQ [25,26,34]. However, these instruments were designed specifically for children living in India, and thus they might be culturally irrelevant to children in most parts of Africa.

This review highlights the lack of tools specifically designed to measure the quality of life related to vision of children from developing countries. The information from this review, particularly the methodologies used in developing the tools, will be valuable in creating a similar tool for children in Africa.

6. Limitations

This review focused only on studies that were published in English, which means that it might have overlooked valuable information from studies published in other languages.

7. Conclusions

This study has identified 20 available tools for measuring vision-related quality of life that have been designed and validated with a focus on developed countries. There appears to be a need for more tools developed in English for children in middle–low-income countries, especially for African children.

Supplementary Materials: The supporting information can be downloaded at https://www.mdpi.com/article/10.3390/ijerph21081009/s1. The list of appendices has been deposited by the Zenodo repository as a supplementary document entitled "Supplementary Documents for Vision-specific Tools for the Assessment of health-related Quality of Life (HR-QoL) in Children and Adolescents

with Visual Impairment: A Scoping Review", and can be accessed via this link: DOI: 10.5281/zenodo.11537918 [23].

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Institutional Review Board Statement: Even though this review did not require ethical clearance, a main part of the study was aimed at developing a tool for children. The study protocol was therefore reviewed and approved by the Biomedical Research Ethical Committee of the University of KwaZulu Natal (Ref: BREC/00003939/2022).

Informed Consent Statement: Not applicable.

Data Availability Statement: Protocol data for this review have been published by the Open Science Framework: https://doi.org/10.17605/OSF.IO/9HW8C [16]. The PRISMA ScR checklist has been completed and deposited online at the Zenodo repository: DOI: 10.5281/zenodo.11537654 [15]. The Supplementary Materials and extra data associated with this review have been deposited online at the Zenodo repository: DOI: 10.5281/zenodo.11537918 [23].

Conflicts of Interest: The authors declare no conflicts of interest.

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CHAPTER 3: FOCUS GROUP DISCUSSIONS

Chapter Three details and aims to answer the study's second objective, which focuses on organising and conducting the focus group discussions. These discussions were held with several groups of participants, including experts in the field and children living with or without vision problems. The aim was to collect valuable information and a list of items that would contribute to developing the CVF-QoL instrument to assess the quality of life of children affected by visual impairment.

The results from those discussions were synthesised and detailed in the below manuscript titled "**Impact of Vision Problems on Children's Daily Activities: Insights from a Focus Group Discussion**." This paper provides an in-depth analysis of the different ways that vision problems might affect children's daily activities and overall well-being in children.

The manuscript was successfully published in F1000Research, an open-access peer-review journal. To explore this manuscript further, it can be accessed through the following link:

http://dx.doi.org/10.12688/f1000research.159464.1

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RESEARCH ARTICLE

Impact of vision problems on children's daily activities: Insights from a focus group discussion

[version 1; peer review: awaiting peer review]

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Abstract

Background/Purpose

There are approximately 18.94 million visually impaired children worldwide, with 90% of them living in low-middle income countries. Research shows that visual impairment (VI) has a significant impact on the quality of life (QoL) of those affected. Therefore, it is essential to investigate how VI affects the daily activities of these children to develop management strategies that can help minimize its impact on their QoL. Therefore, qualitative research design was utilized to explore the perceived impact of VI on the daily activities of children living with VI.

Methods

Using a qualitative approach, purposive sampling was used to identify information-rich participants to partake in focus group discussions (FGDs) and address the aim of the study adequately. Identified data sources were divided into two groups: one with 'experts' who worked with children regularly, and another with school-going children aged 6-17 years, from three rural schools in Sekhukhune district, South Africa. The FGDs were guided by semi-structured interview questions. All sessions were recorded, transcribed verbatim, cleaned, coded, and analysed under ten domains, identified from the literature.

Results

A total of 477 statements and comments related to children's vision were generated through the nine FGDs. Participants were nine

experts working with children, and 49 children living with or without VI. Of the total number of statements, 60% (n = 287) were generated from FGDs with children, 63% (n = 299) were negative statements, and the remaining 19% (n = 92), and 18% (n = 86) were neutral and positive statements respectively. The most generated statements fell under the domains 'Hobbies, Leisure and Sport' 21% (n = 101), 'Education' 21% (n = 100), and 'Psychological and Emotional' 12.8% (n = 61).

Conclusion

This study offered comprehensive insights into the impact of VI on the daily activities of rural school-aged children and young people.

Keywords
Focus group discussion, children's vision, visual impairment, quality of life, poor vision, rural school-going children, South Africa.

This article is included in the Eye Health gateway.

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Introduction

Visual impairment (VI) is the most common cause of childhood handicaps and the second leading cause of childhood blindness.[1,2] It limits the ability of children to perform well in school, as a major part of learning depends on vision.[3] Additionally, children with VI often struggle with social and recreational activities, with subsequent negative effects on their socioeconomic security, all impacting their quality of life.[3–5] The onset of VI before or during school-going age has a significant impact compared to that in adulthood, considering the greater number of years that they will likely carry this condition.[6] In the United States, it was reported that a person living with VI needs an estimated $4000 per annum for medical expenditure, an amount that increases with age, as it later includes the cost imposed by loss of productivity, anxiety, and frustrations linked to their impairment.[7,8]

Globally, there are around 18.94 million visually impaired children, with 1.42 million of these children being blind.[9] The leading cause of VI in children is uncorrected or inappropriately corrected refractive error, attributing to about 12.8 million cases.[5] Ninety percent of children with VI reside in low-to-middle income countries (LMICs).[10,11] It is essential to understand the impact of VI on children's daily lives and their perceptions about their abilities and difficulties with daily activities to facilitate the development of appropriate management strategies.

To explore this, FGDs were decided upon for this study as a standard method for exploring people's feelings, motivations, insights, and experiences on any topic.[12,13] Focus group discussions are regarded as a quick and cost-effective qualitative research method in which participants openly share their perceptions and jointly develop new insights and a deeper understanding of the issues in question.[12,13] The purpose of this particular focus group study was to identify activities that school-aged children from rural areas in South Africa engage in, the difficulties that children with VI can encounter with these activities, and how their lives are impacted as a result of this limitation. The ultimate goal is to develop a self-reported measure of visual function QoL for rural school-going children aged 6-17 years.

Numerous instruments are available to measure the vision-related quality of life (QoL) in adults, which have been globally developed and validated with good reliability. However, there has been insufficient effort in creating similar instruments for school-aged children.[14] In most cases, the tools designed for adults need to be adapted before being used on children. This adaptation process may compromise the established reliability and validity. The WHOQOL group has suggested that each country should create its own instrument to measure the impact of any disease and treatment, which should be sensitive to the culture and suitable for different age groups.[15] A recent review of instruments for assessing vision-related quality of life in children and adolescents revealed a lack of such instruments for children in LMICs. Therefore, it is essential to explore these children's perceptions and statements to guide the development of an appropriate tool that will allow learners to honestly evaluate themselves, rather than being evaluated solely based on test results from eye care practitioners.

Methods

This qualitative study's aim was to gather comments and statements about the impact of VI on children's daily lives. FGDs were used to collect data for the study. The VI was classified based on the visual acuity (VA) measurement as guided by the World Health Organization (WHO).[16] Mild VI was defined as having a presenting VA in the better eye of less than 0.30 logarithm of the minimum angle of resolution (LogMAR) but greater than or equal to 0.50 LogMAR. Moderate VI is defined as having a presenting VA in the better eye of less than 0.50 LogMAR but greater than or equal to 1.0 LogMAR. Severe VI was defined as having a presenting VA in the better eye of less than 1.0 LogMAR but greater than or equal to 1.30 LogMAR. Blindness was defined as having a presenting VA in the better eye of less than 1.30 LogMAR.[16]

The research followed the principles of the Declaration of Helsinki regarding research involving humans, and ethical clearance was obtained from the Biomedical Research Ethical Committee of the University of KwaZulu-Natal (BREC/00003939/2022). Consent and assent forms were provided and signed by experts, children, and their parents prior to data collection. A total of nine FGDs were conducted.

Focus group discussions with experts

In the course of two FGDs, a total of nine professionals with an interest in children or working with children, participated. A purposive sampling method was used to recruit the participants, which included one nurse, two occupational therapists, two optometrists, and four teachers from both mainstream and special schools.

The FGDs were conducted online and recorded on Microsoft Teams to accommodate the participants' preferences and scheduling constraints. Prior to the discussions, participants each received an information sheet about the study, and an invitation to participate. After confirming voluntary consent, they received a Microsoft Teams meeting invitation via their

personal or work emails, detailing the date and time of the meeting. The principal investigator (PI) facilitated the discussion with an assistant by a trained moderator who took notes. Participants were welcomed, introduced to the PI and moderator, and given an overview of the purpose and topic of the discussion. They were also informed that there were no right or wrong answers, only differing points of view, and that the meeting would be recorded, so one person would speak at a time. The discussions were guided by prompt questions related to vision and children's activities as detailed below:

1. What role does vision play in children's lives in general?

2. What activities, at school, require children to have good vision?

3. What types of recreational activities that children engage in require good eyesight?

4. Does a child's vision impact the manner in which they socialise?

5. If a child has vision problems, how would this impact his/her life and development?

Each meeting lasted between 75 and 90 minutes and was audio recorded. At the end of each discussion, the PI and moderator thanked the participants for their time and contributions. They then stayed for a few minutes to summarize important points and emotions captured during the discussion.

Focus group discussion with children

Forty-nine children aged 6 to 17 years from three rural schools in Sekhukhune District, Makhuduthamaga Municipality, Limpopo province, were involved in one of seven FGDs. They were all of African ethnicity and were selected from Bosele Special School, Jane Furse Comprehensive, and Moreko Secondary School. The FGDs were divided into two sessions per school, one for the age group 6–11-year-olds and another for the 12–17-year-olds. Each group comprised solely of the children from one school but divided according to the two age groups, hence six groups in total. A seventh FGD was conducted for children from Bosele Special School in the age group 6-11 years after the initial round of FGDs, due to the need for more data. The groups were also stratified based on gender and visual status.

The FGDs took place at the respective school premises in an allocated classroom. Vision screening tests, to obtain clinical data for another part of the broader study, were conducted a few days prior to the discussions, and these included visual acuity testing, fundus examination, and auto refraction. All participating children were proficient in English and did not have any impairments apart from vision. The discussions took place in the afternoon to avoid disruption of academic activities. On the day of the FGD, the children were introduced informally over a light lunch before the commencement of the discussion. The discussions, led by the PI with a moderator was taking notes, each lasted between 60-80 minutes and was audio-recorded. Children were seated during the group discussions. After a set of ground rules were established, discussions commenced, structured as open-ended questions, and further expanded using probing questions whenever necessary. At the end, participants were acknowledged for their valued contribution and time. Both the PI and the moderator remained for a summary and to conclude the discussion.

Data capturing and analysis

The recordings and the transcription were done via Microsoft Teams meeting, and then PI and SS listened to the recording several times to verify transcriptions, clean data and extract important information from the interviews. This study employed Template Analysis as a method for thematic analysis to gather, categorize, and analyse data.[17] Template Analysis is a flexible approach that provides a structured way to organise and analyse large amounts of rich qualitative data, addressing common challenges in qualitative research.[18,19] This technique allows for the use of a priori themes and iterative refinement of the coding template, making it suitable for diverse research contexts as in the current study, and was conducted via six steps as outlined below.[17,18]

Step 1: To familiarize ourselves with the data to be analysed, two individuals read the material several times.

Step 2: The preliminary coding step was omitted because the domains were taken from a systematic literature review conducted prior to this study, which was an earlier objective of the broader research project.

Step 3: Emerging themes, statements, or comments related to a vision were organized based on the initial template outlined in Table 1.

Step 4: The domains were defined as outlined in Table 1.

Table 1. Initial template for catergorising data.

Subscale or domain	Prompt questions	Characteristics of comments or statements to include within the specified domain.
1. Education	What activities at school require children to have good vision?	1.1 Learning and Vision
		1.2 The Importance of Vision in Learning
		1.3 Learning difficulties resulting from impaired vision.
2. Distance vision	What role does vision play in children's lives in general?	2.1 Distance vision activities and vision
		2.2 The importance of vision in distance vision activities
		2.3 Challenges with seeing far as a result of poor vision
3. Near vision	What role does vision play in children's lives in general?	3.1 Near vision activities and vision
		3.2 The importance of vision on near vision activities
		3.3 Challenges with seeing near as a result of poor vision
	What role does vision play in children's lives in general?	4.1 Movement and Vision
		4.2 The role vision plays in mobility and orientation
		4.3 Challenges with mobility and orientation if vision is impacted
4. Hobbies and Leisure	What types of fun things require children to have good eyesight?	5.1 Children's hobbies and vision
		5.2 The Importance of Vision in fun activities children engage into
		5.3 Challenges with children's hobbies or leisure if vision is impaired
5. Sports	What types of fun things require children to have good eyesight?	6.1 Sport and vision
		6.2 The role of vision in sporting activities
		6.3 How would performance in sports be impacted if vision is impacted?
6. Social interaction	Does a child's vision impact the way they form relationships?	7.1 Social engagement and vision
		7.2 The importance of vision in communication and relationships
		7.3 The impact of socializing as a result of poor vision
7. Visual Comfort	If a child's vision problem is identified, how would it impact their life and development?	8.1 Discomfort that children experience due to vision problems
		8.2 Impact of visual strains due to vision problems in children's lives
8. Emotional	If a child's vision problem is identified, how would it impact their life and development?	9.1 Vision and Emotions
		9.2 Any relationship between vision and emotions, either positive or negative
9. Psychological	If a child's vision problem is identified, how would it impact their life and development?	10.1 Stress, anxiety, and depression concerning vision
10. Daily living activities/ skills	What role does vision play in children's lives in general?	11.1 Vision and the ability to perform daily tasks
		11.2 The impact of poor vision on the ability to perform daily tasks

Table 1. *Continued*

Subscale or domain	Prompt questions	Characteristics of comments or statements to include within the specified domain.
11. Treatment	If a child's vision problem is identified, how would it impact their life and development?	12.1 Eyes and treatment
		12.2 The importance of managing eye problems
		12.3 Problems arising from the management of eye problems
12. Financial and family impact	If a child's vision problem is identified, how would it impact their life and development?	13.1 Management of eye problems and the cost
		13.2 The challenges faced by the family of a child with vision problems.

Step 5: Data was categorized according to the template in Table 1, and the template was updated based on the data during the data capture process.

Step 6: After completing the data analysis, the final template with data was created.

The statements were also classified as positive, negative, or neutral based on the emotional tone expressed. All statements were thoroughly reviewed and corrected before analysis. Access to the transcripts can be requested from the first author via email.

Results

The experts consisted of four teachers focusing on learner support, two optometrists, two occupational therapists, and a nurse working at a paediatric hospital ward. All of these experts are currently working with children, and their years of experience range from 3 to 19 years. The majority of the participants in this group were female (n = 7), and all of them were African. A demographic profile of this group is detailed in Table 2.

Seven FGDs were conducted with 49 children aged between 6-17 years, all of whom were African. The gender distribution was almost even, with 51% female and 49% male, with participants falling into the following age categories, 6-9 years (n = 22), 10-13 years (n = 15), and 14-17 years (n = 12). Of these, 34.7% had normal vision, 24.5% had refractive errors, and 40.8% had VI which could be categorized as ranging from moderate to blindness according to the WHO classification.[16] The children came from three schools located in the rural area of Limpopo province, Sekhukhune district. The demographics and visual profile of the children are outlined in Table 3.

A total of 477 comments related to children's vision were noted and categorized into the initially created template. Some domains were merged in the template and only left with 11 domains which are: 'Education', 'mobility and orientation', 'Hobbies, leisure activities, and sports', 'social function', 'visual comfort', 'psychological and emotional', 'daily living activities/skills', 'self-esteem', 'family and financial impact', and 'treatment' and, lastly sociocultural, which was generated specifically for this population of a rural school going children. The list generated is deposited in an online repository, accessible through this link: https://zenodo.org/records/13999156. Out of these, 299 (62.7%) statements were classified as negative, 92 (19.3%) were neutral, and 86 (18%) were positive. Furthermore, 286 (60%) of the comments emanated from the FGDs with children. These comments were further classified according to the template subscales or domains, and are outlined below. The domain "sociocultural" encompasses the factors that impact attitudes, values, and beliefs regarding VI and generated 13 statements.

Summary of the generated domains, along with examples of statements assigned to each domain

School and learning domain

One hundred items were generated under the education domain, these generated items illustrated the major role that vision plays in children's learning and further highlighted the impact of vision problems on learning. Both children and experts agreed that VI affects aspects of learning, and the bearer of this condition goes through a lot. For instance, some statements noted under this domain included:

Table 2. **Demographic profile of the experts.**

Participants code	PA1	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9
Gender	Female	Female	Female	Female	Female	Female	Male	Male	Female
Occupation	Optometrist	Teacher	Occupational therapist	Teacher	Nurse	Optometrist	Teacher	Teacher	Occupational therapist
Years of experience	18	13	11	3	7	19	3	5	16

Table 3. **Demographic profile of children.**

Participant code	Age	Gender	Dist-UVA R-eye in LogMAR	Dist-UVA L-eye in LogMAR	Near-UVA OU-in LogMAR	Cyclo-Auto-Ref R-eye	Cyclo-Auto-Ref L-eye	Dist-AVA R-eye	Dist-AVA L-eye	Near-AVA OU	Diagnosis	VA Classification
PB1	10	F	0.3	0.2	0	PL/-0.75X163	PL/-0.75X180	0	0	0	Astigmatism	RE
PB2	13	M	0.24	0	0	0.25/-0.50X175	0.25	0	0	0	Hyperopia Astigmatism	RE
PB3	15	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB4	15	F	0.42	0.3	0	1.00/-1.25X15	1.00/-1.00X165	0	0	0	Hyperopia Astigmatism	RE
PB5	13	M	0	0.06	0	0.50/-0.50X90	0.25/-0.50X90	0	0	0	NAD	Emmetropia
PB6	13	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB7	09	M	0.06	0.5	0	0.25/-0.25x180	-0.50/-0.50X180	0	0	0	Hyperopia, Astigmatism, Myopia	RE
PB8	07	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB9	14	M	0.12	0.1	0	0.50/-0.50X73	0.50/-0.50X65	0	0	0	Hyperopia Astigmatism	RE
PB10	08	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB11	07	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB12	16	M	0.32	0.22	0	-0.75/-0.50X134	-0.75/-0.25X103	0	0	0	Myopia Astigmatism	RE
PB13	09	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB14	11	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB15	14	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia

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Table 3. *Continued*

Participant code	Age	Gender	Dist-UVA R-eye in LogMAR	Dist-UVA L-eye in LogMAR	Near-UVA OU-in LogMAR	Cyclo-Auto-Ref R-eye	Cyclo-Auto-Ref L-eye	Dist-AVA R-eye	Dist-AVA L-eye	Near-AVA OU	Diagnosis	VA Classification
PB16	14	F	0.62	0.52	0	-2.00/-0.25X138	-1.50/-0.50X118	0	0	0	Myopia Astigmatism	RE
PB17	15	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB18	17	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB19	12	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB20	16	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB21	12	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB22	08	F	0.42	0.44	0	1.25/-1.75X03	1.00/-1.25X180	0	0	0	Hyperopia Astigmatism	RE
PB23	09	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB24	11	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB25	07	M	0.3	0.98	0	-1.00/-0.25x64	-0.5	0	0	0	Myopia Astigmatism	RE
PB26	06	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB27	06	F	0.22	0.6	0	PL/-0.75X93	-0.25/-0.50X103	0	0	0	Myopia Astigmatism	RE
PB28	08	M	1.08	1.38	1	5.00/-7.25X102	7.00/-6.75X34	0.84	0.94	0.7	OCA	Moderate VI
PB29	08	M	1.3	1.18	0.1	3.75/-4.75x07	3.75/-3.75X12	0.56	0.52	0	OCA	Mild VI
PB30	07	F	0.7	0.7	0.7	3.00/-2.75X135	3.00/-2.25X45	0.3	0.26	0	OCA	Mild VI
PB31	06	F	2.04	2	1	Not Possible	Not Possible	2	2	1	ROP	Blind
PB32	06	F	NLP	NLP	NLP	NR	NR	NLP	NLP	NLP	Anophthalmia	Blind
PB33	06	M	1.4	1.4	0.9	-3.25/-4.25X78	-2.75/-5.00X65	0.72	0.72	0.3	Congenital Glaucoma)	Moderate VI
PB34	13	M	1.1	1.2	0.8	0.75/-3.50X115	1.00/-3.75X118	0.46	0.4	0.2	OCA	Mild VI
PB35	15	F	1.12	1.06	0.5	1.75/-5.25X17	2.50/-5.75X23	0.6	0.5	0	Nystagmus	Moderate VI
PB36	10	M	1.3	NLP	1	-6.25/-3.75X171	NR	1.3	NLP	1	Hypoplasia	Blind
PB37	11	M	1.32	2.02	1	-0.75/-1.00X93	-2.50/-1.75X06	1.32	2.02	1	Retinoschisis Secondary Optic atrophy	Severe VI

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Table 3. *Continued*

Participant code	Age	Gender	Dist-UVA R-eye in LogMAR	Dist-UVA L-eye in LogMAR	Near-UVA OU-in LogMAR	Cyclo-Auto-Ref R-eye	Cyclo-Auto-Ref L-eye	Dist-AVA R-eye	Dist-AVA L-eye	Near-AVA OU	Diagnosis	VA Classification
PB38	09	F	1.32	NLP	1.06	1.75/-5.50X169	0.50/-2.00X180	1.32	NLP	1.06	Congenital Glaucoma)	Blind
PB39	10	F	1.1	NLP	NR	9.25/-1.00X137	NR	0.6	NLP	NR	Aphakia Cataract	Severe VI
PB40	12	M	0.84	1.52	0.6	3.50/-4.75X1	6.75/-3.50X180	0.48	0.56	0.08	OCA	Mild VI
PB41	08	F	1.3	1.3	0.72	-2.75/-4.25X43	-3.25/-3.75X123	0.46	0.4	0	OCA	Mild VI
PB42	14	M	1.2	1	0.32	0.75/-8.25X03	0.50/-9.50X105	0.7	0.56	0.12	Keratoconus	Moderate VI
PB43	17	M	0.86	0.88	0.4	3.00/-4.75X18	3.00/-3.75X11	0.42	0.46	0	OCA	Mild VI
PB44	09	M	1.32	1.34	0.5	2.50/-4.25X100	2.50/-5.25X113	1.02	1.04	0.3	Keratoconus	Severe VI
PB45	08	F	1.1	1.1	0.3	4.75/-3.25X90	5.25/-3.75	0.28	0.36	0	OCA	RE
PB46	06	F	2	LP	NR	NR	NR	NR	NR	NR	Aniridia	Blind
PB47	10	F	0.46	0.46	0.7	1.25/-2.50X179	1.50/-2.25X111	0.14	0.14	0	OCA	RE
PB48	09	F	2	2	1	13.00/-0.75X90	12.25/-0.75X93	0.84	0.84	0.4	Aphakia	Moderate VI
PB49	11	M	1.1	1.2	0.6	PL/-6.25X15	1.00/-5.75X173	0.48	0.5	0.08	OCA	Mild VI

F = Female, M= Male, **Dist-UVA** = Distance Unaided Visual Acuity, **R**-eye= Right eye, **L**-eye= Left eye, **Near-UVA** = Near Unaided Visual Acuity, **OU** = Both eyes, **Cyclo-Auto-Ref** = Cycloplegic Auto Refraction, **Dist-AVA** = Distance Aided Visual Acuity, **Near-AVA** = Near Aided Visual Acuity, **NAD** = No Abnormality Detected, **NR** = No Record, **OCA** = Oculocutaneous Albinism, **ROP** = Retinopathy of prematurity, **RE** = refractive error, **VI** = Visual Impairment.

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"*I struggle to complete my school tasks on time due to poor vision*". - PB22, an 8-year-old girl living with an uncorrected refractive error (URE).

"*Most children with poor vision still struggle, even when seated at the front of the classroom*". - PA8, teacher.

"Most students with visual impairments resort to copying from their peers' books in class due to difficulties in seeing the chalkboard". - PA2, teacher.

"*I place my book very close when I read*". - PB31, a six-year-old girl who is partially blind

Daily living activities/skills domain

Under this domain a total of 47 items were generated. These items cover self-care tasks that children should be able to perform to care for themselves. These activities include personal hygiene, preparing meals and feeding, dressing oneself (such as tying shoes), and doing household chores. Vision problems can interfere with these daily activities. In this domain participants have highlighted the difficulties they experience with tasks like bathing, preparing meals, taking care of livestock, going to a store, and accurately using the right amount of something. Below are some related statements from the participants:

"I cannot go to the tuck shop alone because I cannot see". - PB39, a 10-year-old girl who is severe VI.

"My eyes help me to take livestock to the field for grazing". - PB23, a nine-year-old boy who is emmetropic.

"I cannot bathe myself properly because I cannot see". - PB38, a nine-year-old girl who is blind.

"Children with visual impairment struggle with preparing their meals". - PA7, teacher.

Visual comfort domain

It is typical for children with visual impairments to suffer from headaches, eye strain, and fatigue.[20] The individual in this domain has described experiencing increased discomfort, itching, burning, strain, and headaches. Additionally, their symptoms are exacerbated in sunlight. A total of 25 items was generated under this domain, and below are some of the comments coming directly from some of the participants:

"I often scratch my eyes because they are itching and burning". - PB17, a 15-year-old male who is emmetropic.

"My eyes cause me lots of discomforts". - PB37, an 11-year-old boy living with severe VI) due to Retinoschisis.

"Visually impaired children experience eye strains and headaches". - PA7, teacher.

"I am very uncomfortable when there is too much sunlight". - PB35, a 15-year-old girl living with moderate VI.

Mobility and orientation domain

Forty-seven items on this domain cover various aspects such as how vision helps children interpret and explore their surroundings, the challenges faced by visually impaired children in navigating new environments, and the potential risks and difficulties they encounter in this domain due to poor vision. Below are some of the statements directly from the participants:

"*I need assistance when going to the pit toilet*". - PB41, an eight-year-old girl, Mild VI.

"*Children with visual impairment are prone to frequent falls and potential fractures due to walking challenges*". - PA5, Nurse.

"*I often trip on objects when moving within the classroom*". - PB42, a 14-year-old boy, Moderate VI.

"*Good vision is important for children to understand their environment*". - PA6, Optometrist.

Hobbies, leisure activities, and sports domain

Visual impairment has a noticeable effect on children's hobbies, leisure activities, and participation in sports. Additionally, children with vision problems may find it challenging to watch TV, which can lead to feelings of loneliness and

increased reserve behavior.[4] A hundred and one items were generated under this domain, and below are some of the statements stated by participants stated under this domain:

"Poor vision affects children's ability to play, which affects their learning". -PA9, Occupational Therapist.

"I cannot play all the games I want to due to my poor eyesight". - PB38, a nine-year-old girl classified as blind.

"I get closer to the television (TV) so that I can see well". - PB43, a 17-year-old boy, Mild VI.

"Visually impaired children often become introverted and spend most of their time at home". – PA1, Optometrist.

Treatment domain

Most of the school-going children with visual impairment do not comply with wearing their optical corrections.[21] The reason might be issues like the stigma attached to the devices, broken spectacles, headaches, and or strains when they wear them.[21] In this domain participants also outlined that spectacles strain them, they do not like putting eye drops in their eyes. Children and expert participants indicated the stigma attached to wearing optical devices and the bullying that comes with wearing them. Twenty-two items were generated and below are how some participants commented under this domain:

"It is challenging for visually impaired children to wear optical devices because of the stigma attached to them". - PA7, teacher.

"Children with visual impairment get bullied at school when they wear spectacles". - PA5, nurse.

"My glasses are straining my eyes, that's why I do not like wearing them". - PB44, a seven-year-old boy who is severe VI.

"My eye drops are not comfortable". - PB33, a six-year-old boy living with moderate VI.

Families and financial impact domain

Visual impairment significantly affects the lives of individuals and their families, friends, and society as a whole.[22] This domain houses 20 items, which include statements that highlight the financial burden of caring for a visually impaired child, family misunderstanding of the condition, and the dependency that arises from always needing someone at home to care for a child with VI as indicated by statements of some of the participants below:

"Caring for a visually impaired child comes with financial costs". - PA4, teacher.

"The lives of parents of children living with visual impairment are always impacted, as they have to make arrangements for special care". - PA2, teacher.

"Parents and caregivers of visually impaired children bear a heavier burden than the children themselves". - PA6, Optometrist.

"My parents believe that I am seeking attention when I express my visual difficulties". - PB4, a 15-year-old girl living with URE.

Social functioning domain

Visual cues play a crucial role in social interaction as they are the primary means of identifying other people and provide important non-verbal social information through facial expressions and body language.[23] This domain has 41 items that highlight the challenges visually impaired children face in developing bonds with family and friends, being excluded from many activities due to poor vision, and spending a significant amount of time alone due to their condition. Some statements related to this domain included:

"Good vision aids in the development of bonds with family members, peers, and caregivers". - PA5, Nurse.

"Visually impaired children struggle to interpret the facial expressions of those they are communicating with". - PA9, Occupational Therapist.

"I spend most of my time at home due to poor eyesight". - PB36, a 10-year-old boy who is blind.

"No one wants to play with me because I cannot see well". - PB29, an eight-year-old boy living with mild VI.

Emotional and psychological

The mental health of children with vision impairment may be adversely affected because they tend to participate in fewer physical activities, have lower academic achievement, and are more socially isolated.[24] This domain has produced 61 statements highlighting the impact of VI on children's mental health, including social exclusion, increased dependency on others for assistance, reduced participation in physical activities, and the impact on the parents of visually impaired children as well. Below are some examples of generated statements from participants:

"Children with poor vision feel lonely most of the time and they sometimes develop depression". - PA5, nurse.

"Visually impaired children feel frustrated when choosing careers because they are restricted by their poor vision". - PA4, teacher.

"I feel like I am bothering people when I ask them for scores during sporting events". - PB48, a nine-year-old girl living with moderate VI.

"I often feel left out and isolated in social situations because of the glasses I wear". - PB16, a 14-year-old female living with URE.

Sociocultural

Thirteen items were generated in this domain which includes an examination of how cultural beliefs, such as attributing visual impairment to witchcraft or relying on traditional herbal medicine, can lead to delays in the diagnosis and proper management of visual impairment. Furthermore, the statements indicate that a child's visual impairment may be influenced by their family's poverty, leading to the child being treated differently. The statements also mention that parents may feel ashamed to admit that their visually impaired child needs to attend a special school. This is how some of these participants stated it:

"Associating visual impairment with witchcraft delays the diagnosis and prognosis of visual impairment and worsens the condition". - PA5, nurse.

"Some parents feel ashamed to admit that their visually impaired children need to attend special schools". - PA8, teacher.

"Poverty also influences how visually impaired children are treated in their families and communities". - PA2, teacher.

"The use of herbal medication delays the diagnosis and management of visual impairment". - PA4, teacher.

Discussion

This study analysed data from FGDs with children and experts to explore the impact of VI on the lives of children. The experts who participated in this study had at least three years of experience working with children and encountered those with VI in their field of work. Age and gender were considered when selecting the child participants, as the impact of VI varies with these factors.[25] To ensure the representation of all types of children, 34.7% of the participants had no VI, 24.5% had a refractive error, and 40.8% had moderate to severe VI. The data was classified into ten domains adopted from a systematic review of literature on instruments to measure vision-related quality among children and adolescents.[26] The tenth domain (Sociocultural) was created based on the extra data generated for the participants in this study.

Poor vision has a significant impact on reading and learning, as 70-85% of school content and activities rely on vision.[3,27] Individuals with VI encounter unique obstacles within the educational system, regardless of the severity of their impairment.[28] This study presents a compilation of statements concerning the impact of poor vision on children, especially those with VI. These visually impaired children, when attempting to read, tend to put books too close, frequently stop, lose track, and skip lines.[29–31] Additionally, it was reported that children with early-onset VI may experience delayed motor, language, emotional, social, and cognitive development, leading to lower levels of educational achievement.[32] Moreover, children with impaired vision may experience decreased hand-eye coordination, which impacts their ability to perform tasks such as personal hygiene, preparing meals, dressing themselves, and doing

household chores.[33] Participants further highlighted that vision problems can also interfere with daily activities, estimating the distance of oncoming cars, and seeing what is happening in the field during sporting events.

Children experiencing vision problems often exhibit behaviors such as rubbing their eyes or blinking frequently, avoiding reading, having short attention spans, experiencing frequent headaches, and covering one eye when focusing.[34] Even in this study, these individuals have described experiencing increased discomfort, itching, burning, strain, and headaches, which are exacerbated in sunlight.

Vision has been reported to play a crucial role in understanding the environment, developing awareness, gathering information about the relationships between objects, and carrying out various cognitive and motor activities.[28] In the study, it was found that children use vision to engage with others, explore the world around them, and rely on vision for activities like walking, avoiding obstacles, and being cautious in different settings. The study also highlights the need for assistance and the risk of falls and fractures faced by visually impaired children. In support of these issues of frequent falls and fractures associated with VI, several studies reported on that too.[27,35,36] For children to perform well, effective eye-hand coordination, clear vision, and good depth perception are crucial visual abilities.[33] When children experience vision problems, it not only impacts their ability to play sports but also hinders their overall learning experience.[24] Participants in this study also highlighted that poor vision impacts on children's ability to play, consequently affecting their overall learning and development. Furthermore, individuals in this study have reported that VI limit's children from reaching their full potential and securing good jobs, which ultimately affects the socioeconomic status of their families and the children themselves in the future. Such statements were also reported by studies on the impact of VI on the socioeconomic status of bearer.[37–39]

Visual impairment forces individuals to rely on non-visual cues during social interactions, leading to reduced social engagement and participation in enjoyable activities.[40] While verbal cues can convey a significant amount of information, this information is often not accessible to untrained listeners.[23] This study also highlighted that VI children struggle with social engagement and sometimes show inappropriate emotions to situations. Not surprisingly numerous studies suggest that VI and blindness are risk factors for anxiety and depression.[21,23,40,41] This study highlights that children with vision problems experience a noticeable effect on their hobbies and leisure activities, and may find it challenging to watch TV, which can lead to feelings of loneliness and increasingly reserved behavior.[4]

Children with VI often experience lower self-esteem due to the unique challenges they face compared to sighted children.[42] Self-esteem, which refers to one's evaluation of oneself, is significantly affected in children with VI.[43] This study has shown that many of these children struggle with low confidence levels and feelings of worthlessness. In fact, the children themselves have expressed how profoundly low their confidence levels are.

Children with VI are more likely to live in deprivation, negatively impacting their emotional and mental well-being.[21] Even in this study, participants produced statements that highlighted the impact of VI on mental health. Several statements about the influence of culture, beliefs, and traditions when dealing with VI were grouped under the sociocultural domain. The sociocultural factors within a community have a profound influence on the emotions, attitudes, values, beliefs, and interactions of its members concerning VI.[44] This includes an examination of how cultural beliefs, such as attributing VI to witchcraft or relying on traditional herbal medicine, can lead to delays in the diagnosis and proper management of VI. It is important to note that the significant suffering caused by blinding eye diseases often goes unnoticed, especially because avoidable visual loss disproportionately impacts those living in rural and urban poverty.[32]

Among the various domains discussed, the majority of the statements, comprising 21% (n=100), centered around hobbies, leisure, and sports. This finding is supported by a study conducted by Sacchetti *et al.* in 2007, which highlighted that children were primarily concerned about engaging in sports, visiting the pool, and socializing with friends.[45] The study further revealed that children's proficiency in sports can be notably hampered if they lack adequate visual skills. The education domain emerged with the second-highest number of statements, which is not surprising given that this group is primarily involved in school-related activities. Additionally, the psychological and emotional domain also garnered significant attention, shedding light on the profound psychological impact of VI on the participants in the study. These findings are consistent with previous studies, indicating that children with VI often experience psychological effects that can significantly influence their overall quality of life.[23,45,46]

Conclusion

This study offers a comprehensive insight into the impact of VI on school-aged children and young people particularly those living in rural areas. The domain, sociocultural, shows the uniqueness of that population being studied and it is recommended that there be a tool to measure the impact of VI on rural school-going children.

Ethics and consent

The research followed the principles of the Declaration of Helsinki regarding research involving humans, and ethical clearance was obtained from the Biomedical Research Ethical Committee of the University of KwaZulu-Natal (BREC/00003939/2022). The first approval was on the 15th of November 2022, and we applied for the extension which was approved on the 15th of November 2023. Written Consent and assent forms were provided and signed by experts, children, and their parents prior to data collection.

Author's contributions

T.S.S., R.H., and Z.N.X. conceived and planned the experiments. T.S.S. conducted the experiments. T.S.S., R.H., and Z.N.X. reviewed and analyzed the results. T.S.S. drafted the manuscript, while R.H. and Z.N.X. edited and made modifications to it. All authors have accepted the final version and approved it for submission to the journal.

Disclaimer

All opinions expressed in this manuscript are solely those of the authors and stem from their professional research. The information presented does not necessarily align with the official policies or positions of the affiliated institute or the publisher. The authors are accountable for the results, findings, and content of this article.

Data availability

Zenodo: Statements from the Focus Group Discussions with Children and Experts, DOI: 10.5281/zenodo.13999155.[47]

The project contains the following underlying data:

- Comments or Statements from FGDs All 27October2024.pdf

Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

The recording data for this study cannot be deposited in the public domain because it contains personal information that could easily be traced back to the participants. However, the data is available upon request. To obtain it, please send an email to the corresponding author, M.T.S.S.

Reporting guidelines

This study adhered to the Consolidated Criteria for Reporting Qualitative Studies (COREQ), which consists of 32 items for reporting guidelines.

Zenodo: COREQ Checklist for the paper: Impact of vision problems on children's daily activities: Insights from a focus group discussion, DOI: 10.5281/zenodo.14343032.[48]

The project contains the following Reporting guidelines:

- COREQ for FGD Paper by Magakwe tss et al.docx

Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

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CHAPTER 4: DEVELOPMENT AND VALIDATION OF THE CVF-QoL INSTRUMENT

This chapter presents a published manuscript titled: "Development of a Children's Visual Function Quality of Life (CVF-QoL) Instrument for Rural School-Going Children with Visual Impairment within a South African Context: Item Generation and Validation."

The items selected from the scoping review in Chapter Two and those gathered from the focus group discussions in Chapter Three were combined to eliminate duplicates. These items formed the basis of the first draft of the CVF-QoL instrument. The domains from Chapter Two were also adopted to inform the themes of this instrument. The rating scales were also adapted from Chapter Two and modified to suit the population in question. The initial drafts of the CVF-QoL instrument were content validated by experts in the field and further face-validated by children to ensure comprehensibility and relevance. This manuscript addresses objectives 3 to 5, which are outlined below:

- To develop a preliminary version of the CVF-QoL instrument using items generated from existing literature and focus group discussions.
- To conduct content validation of the CVF-QoL with a panel of subject-matter experts.
- To assess the comprehensibility and relevance of the instrument within the targeted population.

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Development of a Children's Visual Function Quality of Life (CVF-QoL) Instrument for Rural School-Going Children with Visual Impairments Within a South African Context: Item Generation and Validation

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Abstract: Background: Assessing visual function and quality of life in children with visual impairments is crucial for understanding its impact and evaluating interventions. While tools exist for developed countries, there is a lack of instruments for rural school-going children in middle- to low-income countries. This study aimed to develop and validate an instrument to measure Children's Visual Function Quality of Life (CVF-QoL) for South African children aged 6 to 17 with uncorrected refractive errors, visual impairments, or blindness. **Methods**: The CVF-QoL instrument was created through a literature review and focus group discussions with experts and children. Readability was assessed, resulting in two versions of the CVF-QoL instrument. The contents of both versions were validated by experts, and pre-testing was performed with school children aged 6–17 years. **Results**: From the literature review, 769 items were identified, and 477 statements were generated from focus group discussions. After merging and eliminating duplicates, 91 items were classified into eight domains. The tool was divided into Version 1.1 for ages 10–17 (89 items) and Version 2.1 for ages 6–9 (63 items), both demonstrating strong clarity, coherence, and relevance. **Conclusions**: The CVF-QoL instruments are valid for evaluating the quality of life-related to visual function among rural school-going children with visual impairments in South Africa. This instrument thus provides an additional QoL tool to those already existing that may be more appropriate for measuring quality of life for rural school-going children in low- and middle-income countries.

Keywords: vision-related quality of life; visual impairment; children; questionnaire; instrument; child-centered approach; self-report; interviews; validity

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1. Introduction

Children with early-onset, irreversible, severe vision impairments (VIs) may experience delays in motor, language, emotional, social, and cognitive development, with implications that can last a lifetime [1]. Furthermore, school-age children with VIs may also face lower levels of educational achievement [2]. It thus comes as no surprise that VI significantly impacts the quality of life of these individuals [3]. Quality of life (QoL) is defined by the World Health Organization (WHO) as "the perception an individual has of their position in life in the context of the culture and values in which they live and concerning their goals, expectations, standards, and concerns" [4]. Therefore, the vision-

related QoL can be defined in the context of vision [5]. Essentially, vision-related QoL is the degree to which vision impacts how an individual can carry out daily living activities as they relate to their socioeconomic, emotional, and social well-being [6]. Increasingly, health services are focusing on capturing patient perceptions of their vision status [7]. Even in ophthalmic research, QoL measurement is being recognized as a key supplemental indicator [8].

The assessment of pediatric vision impairments has historically depended on clinical evaluations conducted by eye care practitioners, supplemented by observational reports from parental figures and educators [9]. This approach emerged as a practical necessity, given children's inherent difficulties in articulating their visual challenges [10]. Nonetheless, the extent to which conventional clinical metrics—including visual acuity assessments, contrast sensitivity measurements, and visual field examinations—can effectively capture the pediatric patient's lived experiences remains a debatable matter [9]. Recent studies suggest that quality-of-life instruments offer a promising alternative, providing a relatively economical yet reliable methodology for evaluating vision-related impacts on school-aged children [11]. These self-reporting mechanisms demonstrate advantages over proxy-based assessments in capturing the child's direct perspective. Moreover, these tools can help measure the effectiveness of interventions and rehabilitation programs [12]. These evaluations are important for understanding the long-term impact of VIs on children's development, education, and independence, and for guiding appropriate support and treatment strategies [13,14].

Evidence on various existing validated quality of life (QoL) assessment instruments designed for pediatric populations has been identified [2,10,11,14–29]. The National Eye Institute Visual Function Questionnaire (NEI-VFQ) has been effectively used to measure the quality of life (QoL) in individuals with vision impairments, but it is less suitable for children. This is because it includes irrelevant items like driving and omits critical aspects for child development, such as seeing from the blackboard or color perception [30]. The Cardiff Visual Ability Questionnaire for Children (CVAQC) targets children aged 5–18, developed in the UK based on focus groups of children with and without visual impairments. However, its applicability in developing countries is limited since all participants were white British, making it less relevant for South Africa's predominantly Black population [2]. The Vision-Related Quality of Life Instrument for Young Children, developed in Dallas for children under seven, relies on proxy responses and does not specify suitable populations. It may be less effective than self-report instruments, which better capture children's opinions [18].

The Impact of Visual Impairment on Children Questionnaire (IVI-C) is designed for children aged 8–18 in Australia and aims to measure vision-related QoL with positively framed items. Limitations include a small validation sample and difficulties in detecting changes in high-ability learners, necessitating further research with larger, randomized samples [23]. An instrument for children aged 8–18 with Juvenile Idiopathic Arthritis-Associated Uveitis measures vision-related QoL but may not apply to other conditions. Its validation is inconclusive due to issues like a small sample size, half the children having normal vision, and method limitations in measuring visual acuity [9]. Lastly, the LV Prasad Functional Vision Questionnaire, aimed at visually impaired children in India and developing countries, presents limitations such as potential bias from self-reporting, an unrepresentative sample, and contextual influences on content. Enhancements include adding mobility-related items and conducting further studies with a more diverse sample [10].

A significant limitation on existing tools emerges; approximately 85% of these instruments were developed within the context of developed economies. Consequently, they incorporate elements like driving and traffic sign comprehension, which hold minimal relevance for children in low- and middle-income countries. Activities central to these

children's daily experiences include navigating unpaved roads, engaging in sports on uneven terrain, and studying under suboptimal lighting conditions. The socioeconomic and cultural disparities between developed nations and African countries raise substantial concerns about these instruments' reliability when applied to African children. This methodological constraint is further compounded by the instruments' focus on developed-world leisure activities such as reading and digital entertainment, which stand in stark contrast to the typical rural African child's daily activities such as agricultural labor, animal husbandry, outdoor recreational pursuits, and water collection from natural sources.

While the highest prevalence of children living with VIs is found within middle- to low-income countries [31–34], only four instruments have been designed using children in developing countries, three from India [10,17,25], and one from Saudi Arabia [22]. The recent scoping review highlighted the lack of an instrument specifically designed to measure visual function quality of life in children from rural Africa, South Africa to be specific. This makes it questionable to use some of the existing instruments without first modifying them for relevancy. The aim of this study is therefore to identify the domains, generate items, and validate and pre-test the content of the CVF-QoL instrument with a specific focus on South African rural school-going children.

2. Materials and Methods

The research followed the guidelines of the Declaration of Helsinki for research involving human subjects and received ethical approval from the Biomedical Research Ethical Committee of the University of KwaZulu-Natal (BREC/00003939/2022) and the Limpopo Provincial Review Ethics Committee (Ref:2/2/2). The development of CVF-QoL involved the following steps:

2.1. Step 1: Identification of Domain and Item Generation

2.1.1. Domain Identification

The domains examined in this study were taken from the literature review. Before this part of the study, a scoping review was conducted on vision-specific quality of life (QoL) tools. A total of 20 tools were reviewed, and their items and domains were extracted for this part of the study [35]. This was performed to improve understanding of the phenomenon being studied, establish the boundaries of the domain, and facilitate the process of generating items and validating content [36]. Domains were selected based on the aims and objectives of the tools to be developed.

2.1.2. Items Generation

To identify appropriate questions or items for the CVF-QoL instrument to fit the identified domains, the study employed deductive and inductive methods.

2.1.3. Deductive Method

Initially, items were derived from a comprehensive literature review that systematically examined the availability and utilization of vision-specific QoL instruments for assessing VIs in children and adolescents [35]. A total of 20 instruments were included in this review and the scoping review paper on these instruments has been published elsewhere and can be accessed via this link, https://www.mdpi.com/2893610 accessed on 4 August 2024 [35].

2.1.4. Inductive Methods

This part of the study utilized exploratory research methodology involving focus group discussions (FGDs) with two distinct participant groups: experts and children.

2.1.5. Focus Group Discussions with Experts

Two FGDs were conducted with a panel of experts consisting of nine participants who worked with children regularly. A purposive sampling method was used to recruit the participants. Their experience ranged from 3 to 19 years at the time of the discussions and included teachers, occupational therapists, optometrists, and nurses. The FGDs were facilitated via Microsoft Teams, chosen as the most convenient method for all participants. Prior to the discussions, the participants were provided with an information sheet outlining the study and invited to participate. After signing the consent form, they received a Microsoft Teams meeting link through personal or work emails, detailing the date and time of the meeting. The discussions involved prompt questions about the role of vision in children's lives and were recorded and transcribed. Each meeting with the experts lasted between 75 and 90 min. The statements related to vision were then categorized based on the domains adopted from the scoping review and were converted into items. The detailed report of this focus group discussion has been published and can be accessed via the link, https://doi.org/10.12688/f1000research.159464.1 accessed on 4 August 2024 [37], and its data can be accessed directly from the corresponding author via the email address.

2.1.6. Focus Group Discussion with Children

A total of seven FGDs were conducted with children to gather their perspectives on the importance of vision in their daily lives. Forty-nine children aged 6–17 years from three schools in the Sekhukhune district of Limpopo province, South Africa, participated in this part of the study. Convenience sampling was used to sample the selected schools, and any learner aged 6–17 who volunteered to participate was allowed, as long as they did not have any other disabilities except for vision. Participants were categorized based on age, gender, and visual status, and all were of African ethnicity, residing in an area categorized as rural. The FGDs were held within the school premises, in classrooms provided by the schools. Parents were required to sign consent forms for their children to participate, and the children also signed assent forms if they wished to take part. One of the teachers was trained to assist the children to ensure their comfort during the discussions. Vision screening, which included visual acuity testing, visual field assessments, fundus examinations, and auto refraction, was conducted a few days before the FGDs to assess the participants' visual status. Each meeting with children lasted between 60 and 80 min.

The discussions, for both focus groups, were guided by the prompt questions listed below.

1. 1What role does vision play in children's lives overall?
2. What school activities require children to have good vision?
3. What types of recreational activities that children engage in require good eyesight?
4. How does a child's vision affect the way they socialize?
5. If a child has vision problems, how would this impact their life and development?

The discussions were recorded and transcribed, allowing for the generation of statements. Similarly to the focus group discussions (FGDs) with experts, the comments were categorized into domains based on the literature, from which various items were derived. For more details on the data analysis methods used in these focus group discussions, please refer to the already published paper available via the following link: https://doi.org/10.12688/f1000research.159464.1 accessed on 4 August 2024 [37]. The information obtained from the literature review, FGDs with experts, and FGDs with children was carefully reviewed to identify any repeated items that could lead to redundancy. Several items were merged to avoid repetition with qualifying items used to create the first draft of the CVF-QoL instrument. Finally, the rating scales identified in the literature were

reviewed, and suitable ones were adapted to be used as the rating scales for the CVF-QoL instrument.

2.2. Step 2: Content Validation of CVF-QoL Using a Panel of Experts

The initial drafts of the CVF-QoL Version 1.1 and Version 2.1 instruments were distributed to a group of experts considered so due to their knowledge in pediatric vision, visual disability, and/or tool development. Seven experts who were purposively sampled participated in this part of the study. Among them were three low-vision senior lecturers, two pediatrics lecturers, two optometrists with experience in QoL tools, and two educators. Firstly, the experts had to rate the level of clarity for each item on a scale of 1 to 4, with 4 being the item is clear and understandable, with good word order. Extra space was provided to comment on items or suggest revisions on items deemed unclear. Secondly, they had to rate the level of coherence of the item in measuring the aligned domain of the CVF-QoL instrument on a scale of 1 to 4, with 4 being the item is completely related to the domain it is measuring. Space was provided for them to comment on the item or suggest revisions. Thirdly, they had to rate the relevance of the item in measuring the domain of the CVF-QoL instrument on a scale of 1 to 4, with 4 being the item is very relevant and should be included. Space was provided for them to comment on the item or suggest revisions. Lastly, they had to comment on the overall instruments from the introduction to the last item.

The study used a statistical procedure called a content validity ratio to measure their consensus based on relevancy results. After collecting and considering the data and recommendations from the experts, the tool was modified and was ready for the pre-testing step.

2.3. Step 3: Pre-Testing

This step aimed to ensure that the questions aligned with the study's subject and met the necessary criteria utilizing the cognitive interview technique. The initial questionnaire was reviewed by a group of learners conveniently sampled from two schools in Limpopo's Sekhukhune district to assess the clarity, structure, and relevance of the questionnaires. The learners were of African ethnicity, aged 6 to 17 years, from rural areas. Additionally, they were categorized based on age, gender, and visual status.

This process aimed to confirm that the questions produced the intended data, identify and improve any questions that were confusing to children, resolve problematic or difficult-to-answer questions, ensure appropriate response options, shed light on how participants approached the topics, and identify any issues with question order. Additionally, questions were removed if fewer than 70% of the students agreed that they were relevant to them. The questionnaire and the rating were presented in English by the principal investigator and field workers who were fluent in both English and Sepedi to assist with interpretation if needed.

3. Results

A total of eight domains were adopted based on the literature review which are the "educational domain" which includes items that show how vision problems can affect learning. The "mobility and orientation domain" illustrates the challenges visually impaired children face when navigating new environments and the potential risks and difficulties they encounter due to poor vision. The "daily living skill domain" covers items related to difficulty with daily self-care tasks caused by poor vision. The "hobbies, leisure, and sport" section contains items that highlight how poor vision can impact recreational activities, which can hinder learning as children learn through play. The "social interaction domain" showcases the challenges visually impaired children face in developing bonds with family and friends, being excluded from many activities due to poor vision,

and spending most of their time alone. The "psychological and emotional function domain" includes items that emphasize the impact of poor vision on confidence, self-esteem, and overall mental health. The "treatment domain" includes items that highlight the stigmas, strains, and costs associated with using eye drops or optical corrections for the management of VIs. Additionally, it emphasizes the financial burden that families experience when seeking proper treatment for their visually impaired children. Lastly, the "sociocultural domain" includes an item that highlights how the community profoundly influences the emotions, attitudes, values, beliefs, and interactions of its members regarding VIs.

Twenty resources were systematically reviewed, resulting in 749 extracted items. These resources consisted of instruments related to vision, designed to measure visual abilities, visual function, symptoms, or vision-related QoL in children with VIs [35]. The demographics of experts who participated in the FGDs are listed in Appendix A, while the children who participated can be found in Appendix B, located below the reference list. Focus group discussions generated 477 statements and comments, and can be accessed via this link: https://zenodo.org/records/13999156 accessed on 13 October 2024. The statements were considered for relevancy in the eight domains that were determined upon and included as was found appropriate.

After conducting a comprehensive review, removing duplicates, and consolidating items, the initial version of the CVF-QoL was developed. This version included rating scales that were agreed upon by the principal investigator and two research supervisors. The questions were assessed using the WebFX readability checker https://www.webfx.com/tools/read-able/ accessed on 3 July 2024 to determine the reading and comprehension level suitable for children. This process divided the CVF-QoL instrument into two versions: one for 6–9-year-olds with 66 items and another for 10–17-year-olds with 89 items.

3.1. Content Validation with Expert's Results

Seven experts evaluated the two versions of the CVF-QoL instrument and found them to be coherent, comprehensive, and relevant. Table 1 below presents the relevancy scores for both versions of the CVF-QoL instrument, including the number of experts in agreement (Exp-A), the item content validity index (I-CVI), universal agreement (UA), the average score content validity index (S-CVI), the proportion relevance (PR), and the average score content validity universal average (S-CVI UA). The cut-off values for determining the content validity index (CVI) are as follows: CVI = 1 is considered valid for three to five experts, CVI ≥ 0.83 for six to eight experts, and CVI ≥ 0.78 for nine or more experts [38]. The S-CVI UA for the CVF-QoL version for ages 10–17 was 0.86, while the S-CVI UA for the CVF-QoL version for ages 6–9 was 0.85. Based on these calculations, we can conclude that the S-CVI average based on the item content validity index (I-CVI), the S-CVI average based on the PR, and the S-CVI UA all meet a satisfactory level. Therefore, both versions of the CVF-QoL instrument have achieved an acceptable level of content validity.

Table 1. Expert's scoring on the relevancy of both CVF-QoL instruments.

CVF-QoL Version 1.1								CVF-QoL Version 2.1							
Item (Domain)	Number of Experts in Agreement	I-CVI	UA	Item (Domain)	Number of Experts in Agreement	I-CVI	UA	Item (Domain)	Number of Experts in Agreement	I-CVI	UA	Item (Domain)	Number of Experts in Agreement	I-CVI	UA
1 [SL]	7	1	1	46 [HLS]	7	1	1	1 [SL]	7	1	1	46 [PEF]	7	1	1
2 [SL]	7	1	1	47 [HLS]	7	1	1	2 [SL]	7	1	1	47 [PEF]	7	1	1
3 [SL]	6	0.86	0	48 [HLS]	7	1	1	3 [SL]	7	1	1	48 [PEF]	7	1	1
4 [SL]	7	1	1	49 [SI]	7	0.86	0	4 [SL]	7	1	1	49 [PEF]	7	1	1
5 [SL]	7	1	1	50 [SI]	7	1	1	5 [SL]	7	1	1	50 [PEF]	6	0.86	0
6 [SL]	7	1	1	51 [SI]	7	1	1	6 [SL]	7	1	1	51 [PEF]	5	0.71	0
7 [SL]	4	0.57	0	52 [SI]	7	1	1	7 [SL]	4	0.57	0	52 [PEF]	6	0.86	0
8 [SL]	7	1	1	53 [SI]	7	1	1	8 [SL]	7	1	1	53 [T]	7	1	1
9 [SL]	7	1	1	54 [PEF]	7	1	1	9 [SL]	7	1	1	54 [T]	7	1	1
10 [SL]	7	1	1	55 [PEF]	7	1	1	10 [SL]	7	1	1	55 [T]	7	1	1
11 [SL]	7	1	1	56 [PEF]	7	1	1	11 [SL]	6	0.86	0	56 [T]	7	1	1
12 [SL]	7	1	1	57 [PEF]	7	1	1	12 [MO]	7	1	1	57 [T]	7	1	1
13 [SL]	7	1	1	58 [PEF]	7	1	1	13 [MO]	7	1	1	58 [T]	7	1	1
14 [SL]	7	1	1	59 [PEF]	7	1	1	14 [MO]	7	1	1	59 [T]	7	1	1
15 [SL]	7	1	1	60 [PEF]	7	1	1	15 [MO]	7	1	1	60 [T]	7	1	1
16 [SL]	7	1	1	61 [PEF]	7	1	1	16 [MO]	6	0.86	0	61 [SC]	7	1	1
17 [MO]	7	1	1	62 [PEF]	7	1	1	17 [MO]	7	1	1	62 [SC]	7	1	1
18 [MO]	7	1	1	63 [PEF]	7	1	1	18 [DLS]	7	1	1	63 [SC]	7	1	1
19 [MO]	7	1	1	64 [PEF]	7	1	1	19 [DLS]	7	1	1	64 [SC]	7	1	1
20 [MO]	7	1	1	65 [PEF]	7	1	1	20 [DLS]	6	0.86	0	65 [SC]	7	1	1
21 [MO]	7	1	1	66 [PEF]	7	1	1	21 [DLS]	7	1	1	66 [SC]	7	1	1
22 [MO]	6	0.86	0	67 [PEF]	7	1	1	22 [DLS]	7	1	1				
23 [MO]	7	1	1	68 [PEF]	7	1	1	23 [DLS]	7	1	1				

24 [MO]	7	1	1	69 [PEF]	7	1	1	24 [DLS]	7	1	1
25 [DLS]	7	1	1	70 [PEF]	7	1	1	25 [DLS]	7	1	1
26 [DLS]	7	1	1	71 [PEF]	7	1	1	26 [DLS]	7	1	1
27 [DLS]	7	1	1	72 [PEF]	6	0.86	0	27 [DLS]	6	0.86	0
28 [DLS]	7	1	1	73 [PEF]	7	1	1	28 [DLS]	6	0.86	0
29 [DLS]	7	1	1	74 [T]	6	0.86	0	29 [HLS]	7	1	1
30 [DLS]	7	1	1	75 [T]	6	0.86	0	30 [HLS]	7	1	1
31 [DLS]	7	1	1	76 [T]	7	1	1	31 [HLS]	7	1	1
32 [DLS]	7	1	1	77 [T]	6	0.86	0	32 [HLS]	7	1	1
33 [DLS]	6	0.86	0	78 [T]	7	1	1	33 [HLS]	7	1	1
34 [DLS]	7	1	1	79 [T]	7	1	1	34 [HLS]	7	1	1
35 [DLS]	7	1	1	80 [T]	6	0.86	0	35 [SI]	5	0.71	0
36 [DLS]	7	1	1	81 [T]	7	1	1	36 [SI]	7	1	1
37 [DLS]	7	1	1	82 [T]	7	1	1	37 [SI]	7	1	1
38 [DLS]	7	1	1	83 [SC]	7	1	1	38 [SI]	7	1	1
39 [DLS]	7	1	1	84 [SC]	7	1	1	39 [PEF]	7	1	1
40 [DLS]	7	1	1	85 [SC]	7	1	1	40 [PEF]	7	1	1
41 [DLS]	7	1	1	86 [SC]	7	1	1	41 [PEF]	7	1	1
42 [DLS]	7	1	1	87 [SC]	7	1	1	42 [PEF]	7	1	1
43 [HLS]	7	1	1	88 [SC]	5	0.71	0	43 [PEF]	7	1	1
44 [HLS]	7	1	1	89 [SC]	6	0.86	0	44 [PEF]	7	1	1
45 [HLS]	7	1	1	90 [SC]	6	0.86	0	45 [PEF]	7	1	1
		S-CVI Ave = 0.97 S-CVI Ave (based on PR) = 0.97 S-CVI UA = 0.85							S-CVI Ave = 0.97 S-CVI Ave (based on PR) = 0.95 S-CVI UA = 0.86		

[SL] = School and Learning; [MO]= Mobility and Orientation; [DLS]= Daily Living Skills; [HLS]= Hobbies Leisure and Sport; [SI] = Social Interaction; [PEF] = Psychological and Emotional Function; [T] = Treatment; [SC] = Sociocultural; I-CVI = Item-Content Validity Index; UA = Universal Agreement; PR = Proportion Relevance; S-CVI Ave = Score-Content Validity Index Average; S-CVI Ave (based on PR) = Score-Content Validity Index based on Proportional Relevancy; S-CVI UA = Score Content Validity Universal Average.

Table 2 below highlights some of the recommendations and modifications made on the items of both versions of the CVF-QoL instrument.

Table 2. Experts' comments and items modified.

CVF-QoL Version 1.1			CVF-QoL Version 2.1		
Original Item	**Experts Comments**	**Revised Item**	**Original Item**	**Experts Comments**	**Revised Item**
Identifying colors (e.g., while coloring)	Maybe consider seeing colors, instead of identifying.	Matching colors (e.g., while coloring or painting)	Completing my school work on time	Suggestion: Use "finishing" instead of "completing".	Finishing my schoolwork on time
Remembering what I have read	I think it should be rephrased or removed. Unless you want to test something on seeing and memory.	Deleted	Remembering what I have read	I think it should be rephrased or removed. Unless you want to test something on seeing and memory.	Deleted
I do not do as well in my tests and exams as others	Remember that there are over-achievers who may answer or agree to this despite no visual problems. Maybe consider 'I do not do as well in my tests and exams as others, because of my eyes'.	I do not do as well in my tests and exams as others, because of my eyesight	I cannot see well from the chalkboard	Duplicate, same as no.1. To be deleted.	Deleted
Telling the time on a wall clock	If this question is linked to ascertaining visual function for a distance task, consider seeing who is at the door.	Seeing the time on a wall clock	I experience double vision when I read	Simplify it for this age group, they might not understand the question.	Words are becoming double when I read

Introduction of new items	Add items related to children's hobbies under the domains Hobbie, Leisure, and Sport.	1. It is difficult to read the story books because of my eyesight. 2. It is difficult to create crafts with clay or boxes because of my eyesight. 3. I find it difficult to do knitting because of my eyesight.	My head is sore when I read	I suggest you rephrase it to replace sore head with headaches.	I sometimes experience headaches when I read
I feel different from other children because my eyes go in and out	Consider left and right or side to side. In and out seems inclined to scientific optometry jargon.	I feel different from other children because my eyes are crossed	I skip lines when I read or write	Please make this text easier to understand for this age group.	Reading or writing along a line in a book
I get bullied at school because of wearing glasses	This item fits well under the SocCultural domain.	The item was moved from the Psychology and emotional function to the SocioCulturak function.	Telling the time on a wall clock	If this question is linked to ascertaining visual function for a distance task, consider seeing the time on a wall clock.	Seeing the time on a wall clock
Introduction of new items	Recommended item under treatment domain.	1. I cannot see clearly even when I wear my glasses 2. The eyedrop is uncomfortable for my eyes	I don't like the way I am	Maybe say 'I don't like the way I am because of my eyes'	I don't like the way I am because of my eyesight
I am mistreated by other children and other village members because of my eye problems	This text must be removed. It is similar to item number 2.	Deleted	People think I am cleaver less because of my poor eyesight	Rather say people think I am not clever because I cannot see.	People think I am not clever because of my poor eyesight
My parents think I am cursed or bewitched	This can be combined with number 1.	Deleted	I do not feel good about myself because I cannot see well	This is the same as item number 6 and should be deleted.	Deleted
			I feel ashamed about attending a special school	Remove for this age group.	Deleted

3.2. *Pre-Testing Phase Results*

After the content validation stage was completed, both versions of the CVF-QoL were modified as required and pre-tested with 30 learners. Fifteen learners aged 10 to 17 years were asked to evaluate the clarity, structure, and relevance of the entire questionnaire, as well as each item in the CVF-QoL Version 1.1. Meanwhile, another group of 15 learners aged 6 to 9 years rated the CVF-QoL Version 2.1. This process resulted in the reduction in some items, the modification of others, and the addition of new items. Table 3 presents the items that were retained for both versions of the CVF-QoL instrument. The time required to administer the questionnaires ranged from 15 to 20 min.

Table 3. All versions of the CVF-QoL instrument.

Items for CVF-QoL Version 1.1 [Domain]			Items for CVF-QoL Version 2.1 [Domain]	
Indicate how much difficulty you have with the following activities because of vision problems:	33. Playing games requires me to see things in the near such as Morabaraba, Diketo, Mmela, etc. [HLS]	65. I spend a lot of time on vision treatment (eye doctor appointments, patching, eye drops, and therapy) [T]	How hard or easy is it for you to do the following things because of your eyesight problems:	32. I often fall when I walk because I cannot see well [MO]
1. Seeing clearly what is written on the chalkboard [SL]	34. Maintaining eye contact when talking with your friend [SI]	66. I find it hard to clean my glasses [T]	1. Seeing clearly what is written on the chalkboard [SL]	33. I am not sure of how far a car or taxi is to me when I am crossing the road [MO]
2. Drawing [SL]	35. Taking part in various activities (like sporting events) with friends [SI]	67. The eyedrop is uncomfortable for my eyes [T]	2. Drawing [SL]	34. I need someone to stay at home with me because I cannot see well [DLS]
3. Matching colors (e.g., while coloring or painting) [SL]	36. Making friends [SI]	68. I cannot see clearly even when I wear my glasses [T]	3. Matching colors (e.g., while coloring or painting) [SL]	35. I often lose in most games because I cannot see [HLS]
4. Using a pair of scissors to get the desired shapes [SL]	Please indicate if these things happen to you:	69. My family members are ashamed of me because of my eyesight [SC]	4. Using a pair of scissors to get the desired shapes [SL]	36. It is difficult to read the story books because of my eyesight [HLS]
5. Completing my school work on time [SL]	37. My eyesight affects how fast I can read and write [SL]	70. I feel like I am cursed for not seeing well [SC]	5. Finishing my school work on time [SL]	37. It is difficult to create crafts with clay or boxes because of my eyesight [HLS]
6. Reading from books including my textbooks [SL]	38. My eyes hurt and tear up when I read or do close work [SL]	Indicate how often this happens:	6. Reading from books including my textbooks [SL]	38. Other children don't want to play with because of my eyesight [SI]

7. Seeing pictures clearly in my book (e.g., Map book) [SL]	39. Words become double when I read [SL]	71. I am afraid of drowning when fetching water by the river [DLS]	7. Copying correctly from the board or books [SL]	39. It is hard to see if someone is happy, sad, or angry when they are talking to me [SI]
8. Reading or writing along a line in a book [SL]	40. I think I would benefit better from the special school for people who cannot see well [SL]	72. I get closer to the television (TV) screen so that I can see what's happening on TV [HLS]	8. Reading or writing along a line in a book [SL]	40. I don't like going for my eye check-up [PEF]
9. Using public transport (e.g., taxi or bus) [MO]	41. I do not do as well in my tests and exams as others, because of my eyesight [SL]	73. I am scared that I might go blind [PEF]	9. Moving around by yourself without tripping into objects or people [MO]	41. I feel different from other children because my eyes are crossed [PEF]
10. Moving around by yourself without bumping into objects or people [MO]	42. I struggle to read what other people have written because of my eyesight [SL]	74. I am worried about my poor vision [PEF]	10. Moving around safely by myself in places I don't know [MO]	42. Wearing glasses makes me feel different [PEF]
11. Walking safely in new places without help [MO]	43. I get headaches after reading for some time [SL]	75. I get bullied at school because I wear glasses [SC]	11. Walking home [MO]	43. I feel sad when friends laugh at me because I cannot see well [PEF]
12. Walking home [MO]	44. I copy from other classmate's notes because I struggle to see clearly on the board [SL]	76. People think I am less intelligent because of my poor eyesight [PEF]	12. Walking on bumpy ground [MO]	44. I find it hard to clean my glasses [T]
13. Walking on uneven ground [MO]	45. I am not sure of how far a car or taxi is to me when I am crossing the road [MO]	77. I am afraid to tell the teacher that I cannot see well in class [PEF]	13. Seeing someone across the street when they are calling out to you [MO]	45. I don't like it when someone puts drops in my eyes [T]
14. Seeing someone across the street when they are calling out to you [MO]	46. I often fall when I walk because I cannot see well [MO]	78. I am bothered because my parents tend to treat me differently as compared to my other siblings due to eyesight [PEF]	14. Going to the toilet [DLS]	46. I cannot see clearly even when I wear my glasses [T]

15. Fetching water [DLS]	47. I often need someone to stay at home with me because I cannot see well [DLS]	79. I feel worthless because I cannot see well [PEF]	15. Seeing the right money when at the shop [DLS]	47. I do not like the way I look when wearing glasses [T]
16. Going to the toilet [DLS]	48. I struggle to look after my siblings when we are left home alone [DLS]	80. It is hard for me to defend myself verbally, even if I am right [PEF]	16. Seeing the time on a wall clock [DLS]	48. My family is ashamed of me because of my poor eyesight [SC]
17. Locking or unlocking the door [DLS]	49. I often lose in most games due to my eyesight [HLS]	81. I feel ashamed about attending a special school [PEF]	17. Seeing the time on a wristwatch [DLS]	49. My parents think I am under a curse or bewitched because of my eyesight [SC]
18. Making out differences in coins or notes when I want to pay because of my eyesight [DSL]	50. It is difficult to read the story books because of my eyesight [HLS]	82. When I wear my glasses, I have to squint to see things [T]	18. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.) [DLS]	50. I feel like I am cursed for not seeing well [SC]
19. Taking goats and cows to the field for grazing [DLS]	51. It is difficult to create crafts with clay or boxes because of my eyesight [HLS]	83. Glasses hurt my nose/ ears [T]	19. Pouring water/drink into a cup or glass [DLS]	How many times does this happens to you:
20. Washing my school uniform so that it gets clean [DLS]	52. I find it difficult to do knitting because of my eyesight [HLS]	84. I feel dizzy/nausea when I wear my glasses [T]	20. Seeing the food on my plate when eating [DLS]	51. I go closer to the TV so that I can see better [HLS]
21. Doing household chores (like sweeping, washing dishes, cooking, preparing a meal [DLS]	53. People are getting frustrated with you because of your eyesight [SI]	85. My glasses sometimes break or fall off while I am wearing them [T]	21. Going to the tuckshop alone [DLS]	52. I am scared that I might go blind [PEF]
22. Seeing the time on a wall clock [DLS]	54. Other children don't want to play with me because I cannot see [SI]	86. I have been told that I am cursed or bewitched for not being able to, see clearly [SC]	22. Using the cell phone (for example to dial a number or read messages) [DLS]	53. I am worried that I cannot see well [PEF]
23. Seeing the time on a wristwatch [DLS]	55. It is hard to see if someone is happy, sad, or angry when they are talking to me [SI]	87. I am treated differently from other children in my village because of eye problems [SC]	23. Taking part in athletics (running, jumping, throwing, and race walking) [HLS]	54. I get bullied at school because I wear glasses [SC]
24. Taking something out from a cupboard [DLS]	56. I become stressed when I have to go for my eye check-up [PEF]	88. Some people believe I cannot think properly because of my eye problem [SC]	24. Playing ball games (soccer, tennis, Mokoloti, etc.) [HLS]	55. People think I am not clever because of my poor eyesight [PEF]
25. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.) [DLS]	57. I feel different from other children because my eyes are crossed [PEF]	89. Some people think that God is punishing my parents because of my eye problems [SC]	25. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu [HLS]	56. I am afraid to tell the teacher that I cannot see well in class [PEF]
26. Pouring water/drink into a cup or glass [DLS]	58. Wearing glasses makes me feel different from other children [PEF]		26. Playing games requires me to see things that are near such as Morabaraba, Diketo, Mmela, etc. [HLS]	57. I feel ashamed about attending a special school [PEF]

27. Seeing the food on my plate while eating [DLS]	59. I feel like people are impatient with me due to my eyesight [PEF]	Please indicate if these things happen to you:	58. When I wear my glasses, I have to cross my eyes to see things [T]
28. Going to the tuckshop alone [DLS]	60. I feel sad because I may not be able to choose the career I want because of my eyesight [PEF]	27. My eyes hurt when I read [SL]	59. Glasses hurt my nose/ ears [T]
29. Using the cell phone (for example to dial a number or read messages) [DLS]	61. I feel sad when I get corrected on things I did not see clearly [PEF]	28. I cannot see what other people write in their books [SL]	60. I feel dizzy when I wear my glasses [T]
30. Taking part in athletics (running, jumping, throwing, and race walking) [HLS]	62. I feel sad when friends laugh at me because I cannot see well [PEF]	29. Words are becoming double when I read [SL]	61. My glasses sometimes break or fall off while I am wearing them [T]
31. Playing ball games (soccer, tennis, Mokoloti, etc.) [HLS]	63. I feel like I am a burden to my family members and the people around me because of my eyesight [PEF]	30. I have a sore head when I read [SL]	62. I am being mistreated by other children in my village because of my eye problems [SC]
32. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu [HLS]	64. I have low confidence in myself because of my poor eyesight [PEF]	31. People are getting annoyed with me because of my eyesight [SL]	63. I cannot see so people say I cannot think well [sc]

[SL] = School and Learning; [MO] = Mobility and Orientation; [DLS] = Daily Living Skills; [HLS] = Hobbies Leisure and Sports; [SI] = Social Interaction; [PEF] = Psychological or Emotional Function; [T] = Treatment; [SC] = Sociocultural.

3.3. Rating Scales and Scoring of CVF-QoL

The rating scales and scoring for all items are detailed in Table 4. For example, the question "Indicate how much difficulty you have with the following activities due to vision problems" can be rated as follows:

- 3 (very difficult) with a score of 0;
- 2 (A little bit difficult) with a score of 50;
- 1 (not difficult) with a score of 100;
- 0 (does not apply to me) which is scored as "#" to indicate a missing response; this score should not be included when calculating the average scores.

Table 4. Rating scales and values for CVF-QoL instrument.

Responds	Change the Original Response Category	To Record the Value of:
Indicate how much difficulty you have with the following activities because of vision problems		
Very difficult	3	0
A little bit difficult	2	50
Not difficult	1	100
Does not apply to me	0	# (missing)
Please indicate if these things happen to you		
Yes	3	0
Sometimes	2	50
No	1	100
Does not apply to me	0	# (missing)
Indicate how often this happens		
All the time	3	0
Sometimes	2	50
Never	1	100
Do not apply to me	0	# (missing)
How hard or easy is it for you to do the following things because of your eyesight problems		
Very hard for me	3	0
Not so easy for me	2	50
Very easy for me	1	100
I do not do this thing	0	# (missing)
Please indicate if these things happen to you		
Yes	2	0
No	1	100
Does not apply to me	0	# (missing)
How many times does this happens to you		
All the time	3	0
Sometimes	2	50
Never	1	100
Do not apply to me	0	# (missing)

= missing data and should not be counted when averaging the domain. Scores represent the achieved percentage of the total possible score, e.g., a score of 50 represents 50% of the highest possible score.

3.4. Composite Score Calculation

To calculate an overall composite score for the CVF-QoL instrument, the scores from the vision-targeted sub-scales are averaged, i.e., we average the sub-scale scores rather than the individual items. By doing so, each sub-scale has an equal weight in the overall

score, while averaging the individual items would give greater influence to the sub-scales with more items.

Formula:

Mean = ((Score for each item with a non-missing answer))/((Total number of items with non-missing answers))

Example:

With responses converted, ((25 + 100 + 25))/3 = 50

A score closer to 0 indicates poor QoL while a score closer to 100 indicates good QoL as indicated in Table 5.

Table 5. CVF-QoL instrument score indication.

Score Ranges	Indication
70–100	Good quality of life (QoL)
50–74	Fair QoL
25–49	Poor QoL
0–24	Very poor QoL

4. Discussion

This study aimed to address the gap in vision-related quality of life instruments for rural school-going children in low–middle income countries. Scales are representations of latent constructs designed to measure behaviors, attitudes, and hypothetical scenarios that we anticipate may arise based on our theoretical understanding of the world [36]. However, it is important to note that these constructs cannot be directly assessed. While several scales have been developed to measure vision-related quality of life, there has been limited research specifically focused on rural school-going children from middle- to low-income communities. To address these gaps, two versions of a visual function quality of life (CVF-QoL) instrument for school-age children in rural South Africa were developed using a rigorous questionnaire development method. The CVF-QoL Version 1.2, intended for children aged 10 to 17 years, includes 89 items that assess eight different domains and is designed for older children. In contrast, the CVF-QoL Version 2.1, aimed at children aged 6 to 9 years, consists of 63 items that also evaluate eight domains, making it appropriate for younger children.

This study followed three key steps recommended by best practices for developing and validating scales in health, social, and behavioral research: domain and item generation, content validation, and pre-testing questions [36]. First, the domains and some items were adopted from the existing literature and modified as necessary. Several tools were developed in a similar manner [38–40]. Next, an inductive method of data collection was employed to identify items directly from the affected individuals. This approach was undertaken to capture the specific visual needs of the current population, as such an effort had not been made before. As a result, this study was able to identify an important and unique domain for these population studies, termed the sociocultural domain. This domain encompasses how cultural, historical, and social contexts shape perceptions of visual impairment (VI), how affected individuals are treated, and how VI is managed. It includes significant aspects, such as the association of VI with witchcraft or curses.

Both versions of the CVF-QoL instrument have demonstrated a satisfactory level of content validity. The Scores Content Validity Index Universal (S-CVI UA) for CVF-QoL Version 1.1 is 0.85, and for Version 2.1, it is 0.86. Both scores exceed the accepted cut-off score of 0.83 [21,41], which is applicable for a panel of six to eight experts, with seven experts having participated in this evaluation. After addressing the expert recommendations, the content of the instrument was deemed clear, comprehensive, and relevant for

effectively measuring visual function QoL. To ensure the questions and answers are meaningful to the targeted population, both versions of the CVF-QoL instrument were administered to 30 learners, with fifteen assigned to each version. Angeles-Han (2011) utilized a similar method involving 13 learners for this step of their study when developing the vision-related quality of life instrument for children aged 8–18 years with juvenile idiopathic arthritis-associated uveitis [9]. The CVF-QoL instrument consists of an average of 152 items distributed across eight domains that assess the QoL related to visual function. It utilizes a four-point Likert scale to measure the level of difficulty, the level of agreement, and the frequency of issues, along with a three-point Likert scale for agreement in Version 2.1 as indicated in Table 4. The scoring method, domain averaging, and score interpretation are outlined in Table 5, adopted from the National Eye Institute-Visual Function Questionnaire (NEI VFQ-25) manual which is one of the most widely used instruments to assess the visual function quality of life [30].

The CVF-QoL instrument does assess the quality of life in children with visual impairment, and even though some of the questions (those dealing with specific activities) are relevant in a South African context, the majority of the questions should apply in any context as it focuses primarily on the impact of visual impairment on activities that children carry out, in general. While it may be most appropriate for low–middle income contexts where this type of rural setting is most likely to be found, the process followed in the development of this tool can be utilized in different contexts outside of South Africa in developing similar tools for different populations of concern, tailoring them for culturally appropriate activities and modifying them as required.

This study has the following limitations: 1. All the experts involved in developing the tool were local, focusing on the concerns of children in the area. The inclusion of international experts might have provided additional insights. 2. The children included in the development process were sourced from a single area in Limpopo, which may not represent all children in South Africa, especially those in rural regions. Despite these limitations, the CVF-QoL instrument is a valuable tool, as it appears to be the only quality of life (QoL) instrument for visually impaired individuals developed in an African and rural context.

5. Conclusions

The CVF-QoL instruments are valuable tools for evaluating the quality of life related to visual function in rural school-aged children with visual impairments (VIs). Particularly pertinent in South Africa, these instruments tackle the specific challenges faced by this population. They offer insights into how VI influences daily living and overall well-being, and they can also monitor changes in the quality of life following interventions, thereby aiding the assessment of management strategies. This paper focuses on the generation and validation of items for a CVF-QoL tool designed to assess the impact of visual impairment in rural school children. Further validation of the final tool, including an examination of its reliability, will be presented in a subsequent paper.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The generated statements and comments from the focus group discussion were deposited online and can be accessed by this link: https://zenodo.org/records/13999156 accessed on 3 July 2024 [42]. However, the recording, transcription, codes, and all other data can be accessed by emailing the corresponding author.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Demographic Profile of the Experts

Participants Code	Gender	Occupation	Years of Experience
PA1	Female	Optometrist	18
PA2	Female	Teacher	13
PA3	Female	Occupational therapist	11
PA4	Female	Teacher	3
PA5	Female	Nurse	7
PA6	Female	Optometrist	19
PA7	Male	Teacher	3
PA8	Male	Teacher	5
PA9	Female	Occupational therapist	16

Appendix B. Demographic Profile of Children

Participant Code	Age	Gender	Dist-UVA R-Eye in LogMAR	Dist-UVA L-Eye in LogMAR	Near-UVA OU-in Log-MAR	Cyclo-Auto-Ref R-Eye	Cyclo-Auto-Ref L-Eye	Dist AVA R-Eye	Dist-AVA L-Eye	Near-AVA OU	Diagnosis	VA Classification
PB1	10	F	0.3	0.2	0	PL/−0.75 × 163	PL/−0.75 × 180	0	0	0	Astigmatism	RE
PB2	13	M	0.24	0	0	0.25/−0.50 × 175	0.25	0	0	0	Hyperopia Astigmatism	RE
PB3	15	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB4	15	F	0.42	0.3	0	1.00/−1.25 × 15	1.00/−1.00 × 165	0	0	0	Hyperopia Astigmatism	RE
PB5	13	M	0	0.06	0	0.50/−0.50 × 90	0.25/−0.50 × 90	0	0	0	NAD	Emmetropia
PB6	13	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB7	9	M	0.06	0.5	0	0.25/−0.25 × 180	−0.50/−0.50 × 180	0	0	0	Hyperopia, Astigma-tism, Myopia	RE
PB8	7	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB9	14	M	0.12	0.1	0	0.50/−0.50 × 73	0.50/−0.50 × 65	0	0	0	Hyperopia Astigmatism	RE
PB10	8	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB11	7	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB12	16	M	0.32	0.22	0	−0.75/−0.50 × 134	−0.75/−0.25 × 103	0	0	0	Myopia Astigmatism	RE
PB13	9	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB14	11	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB15	14	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB16	14	F	0.62	0.52	0	−2.00/−0.25 × 138	−1.50/−0.50 × 118	0	0	0	Myopia Astigmatism	RE
PB17	15	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB18	17	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB19	12	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB20	16	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB21	12	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB22	8	F	0.42	0.44	0	1.25/−1.75 × 03	1.00/−1.25 × 180	0	0	0	Hyperopia Astigmatism	RE
PB23	9	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB24	11	F	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB25	7	M	0.3	0.98	0	−1.00/−0.25 × 64	−0.5	0	0	0	Myopia Astigmatism	RE
PB26	6	M	0	0	0	PL	PL	0	0	0	NAD	Emmetropia
PB27	6	F	0.22	0.6	0	PL/−0.75 × 93	−0.25/−0.50 × 103	0	0	0	Myopia Astigmatism	RE
PB28	8	M	1.08	1.38	1	5.00/−7.25 × 102	7.00/−6.75 × 34	0.84	0.94	0.7	OCA	Moderate VI

PB29	8	M	1.3	1.18	0.1	3.75/−4.75 × 07	3.75/−3.75 × 12	0.56	0.52	0	OCA	Mild VI
PB30	7	F	0.7	0.7	0.7	3.00/−2.75 × 135	3.00/−2.25 × 45	0.3	0.26	0	OCA	Mild VI
PB31	6	F	2.04	2	1	Not Possible	Not Possible	2	2	1	ROP	Blind
PB32	6	F	NLP	NLP	NLP	NR	NR	NLP	NLP	NLP	Anophthalmia	Blind
PB33	6	M	1.4	1.4	0.9	−3.25/−4.25 × 78	−2.75/−5.00 × 65	0.72	0.72	0.3	Congenital Glaucoma)	Moderate VI
PB34	13	M	1.1	1.2	0.8	0.75/−3.50 × 115	1.00/−3.75 × 118	0.46	0.4	0.2	OCA	Mild VI
PB35	15	F	1.12	1.06	0.5	1.75/−5.25 × 17	2.50/−5.75 × 23	0.6	0.5	0	Nystagmus	Moderate VI
PB36	10	M	1.3	NLP	1	−6.25/−3.75 × 171	NR	1.3	NLP	1	Hypoplasia	Blind
PB37	11	M	1.32	2.02	1	−0.75/−1.00 × 93	−2.50/−1.75 × 06	1.32	2.02	1	Retinoschisis Secondary Optic atrophy	Severe VI
PB38	9	F	1.32	NLP	1.06	1.75/−5.50 × 169	0.50/−2.00 × 180	1.32	NLP	1.06	Congenital Glaucoma)	Blind
PB39	10	F	1.1	NLP	NR	9.25/−1.00 × 137	NR	0.6	NLP	NR	Aphakia Cataract	Severe VI
PB40	12	M	0.84	1.52	0.6	3.50/−4.75 × 1	6.75/−3.50 × 180	0.48	0.56	0.08	OCA	Mild VI
PB41	8	F	1.3	1.3	0.72	−2.75/−4.25 × 43	−3.25/−3.75 × 123	0.46	0.4	0	OCA	Mild VI
PB42	14	M	1.2	1	0.32	0.75/−8.25 × 03	0.50/−9.50 × 105	0.7	0.56	0.12	Keratoconus	Moderate VI
PB43	17	M	0.86	0.88	0.4	3.00/−4.75 × 18	3.00/−3.75 × 11	0.42	0.46	0	OCA	Mild VI
PB44	9	M	1.32	1.34	0.5	2.50/−4.25 × 100	2.50/−5.25 × 113	1.02	1.04	0.3	Keratoconus	Severe VI
PB45	8	F	1.1	1.1	0.3	4.75/−3.25 × 90	5.25/−3.75	0.28	0.36	0	OCA	RE
PB46	6	F	2	LP	NR	NR	NR	NR	NR	NR	Aniridia	Blind
PB47	10	F	0.46	0.46	0.7	1.25/−2.50 × 179	1.50/−2.25 × 111	0.14	0.14	0	OCA	RE
PB48	9	F	2	2	1	13.00/−0.75 × 90	12.25/−0.75 × 93	0.84	0.84	0.4	Aphakia	Moderate VI
PB49	11	M	1.1	1.2	0.6	PL/−6.25 × 15	1.00/−5.75 × 173	0.48	0.5	0.08	OCA	Mild VI

F = Female; M = Male; Dist-UVA = Distance Unaided Visual Acuity; R-eye = Right eye; L-eye = Left eye; Near-UVA = Near Unaided Visual Acuity; OU = Both eyes; Cyclo-Auto-Ref = Cycloplegic Auto Refraction; Dist-AVA = Distance Aided Visual Acuity; Near-AVA = Near Aided Visual Acuity; NAD = No Abnormality Detected; NR = No Record; OCA = Oculocutaneous Albinism; ROP = Retinopathy of Prematurity; RE = Refractive Error; VI = Visual Impairment.

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CHAPTER 5: THE PSYCHOMETRIC PROPERTIES OF THE CVF-QoL INSTRUMENT

Chapter Four presented the development and validation of two distinct versions of the Children's Visual Function Quality of Life (CVF-QoL) instrument. These versions were subsequently administered to groups of learners representing our targeted population. The data gathered from this administration were subjected to rigorous statistical analysis to evaluate the instrument's internal consistency and reliability. Cronbach's alpha test was used to assess internal consistency, ensuring that the items within each version of the CVF-QoL instrument measured the same underlying construct. The test-retest reliability to evaluate the instrument's stability over time was assessed, confirming that it yields consistent results across multiple administrations.

The findings and methodologies related to this assessment are thoroughly detailed in Chapter Five, which is structured in a manuscript format and currently under review with Scientific Reports, an open-access peer-reviewed journal (manuscript ID: f8c5391b-8fb1-4ff7-8067-472d56f94aac). The manuscript is titled "Reliability and Validity of the Children's Visual Function Quality of Life (CVF-QoL) Instrument." This work directly addresses objective 6 of the research study, which was:

- To assess each version's reliability and validity, making any necessary modifications based on the statistical analyses to enhance the validity of the CVF-QoL instrument further.

Reliability and validity of the Children's Visual Function Quality of Life (CVF-QoL) instrument

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Abstract

Purpose: This study aims to evaluate the reliability and validity of the Children's Visual Function Quality of Life (CVF-QoL) instrument in assessing the impact of visual impairment on the quality of life related to visual function among rural school children in the Sekhukhune district, Limpopo, South Africa.

Methods: Two versions of the CVF-QoL instrument (Version 1.1 for children aged 10-17 years and Version 2.2 for children aged 6-9 years) were administered to a sample of 80 learners from rural schools in the Sekhukhune district. The learners underwent a vision screening, which included measurement of visual acuity, visual field assessment, cycloplegic autorefraction, and fundus evaluation, based on which they were stratified according to their visual status (normal vision, refractive error, visual impairment, and blindness). Learners with additional impairments were excluded. Learners filled out the questionnaire following the vision screening and then again ten days after the initial completion. To assess the reliability of the CVF-QoL instrument, internal consistency was assessed using the Cronbach alpha score. The results from the first and second administrations of the questionnaire were compared to evaluate the instrument's reliability. The instrument's validity was assessed by comparing the average scores among learners with normal vision, refractive errors, visual impairments, and blindness.

Results: A total of 41 learners, aged 10 to 17 years, completed Version 1.1 of the CVF-QoL, the majority of whom were female (61%). Thirty-nine learners (aged 6 to 9 years) participated in Version 2.1, where females made up 61.5% of the sample, with all visual acuity categories similarly well represented. The Cronbach's alpha scores were 0.946 for Version 1.1, indicating excellent reliability, and 0.777 for Version 2.1, indicating moderate reliability. The test-retest results showed alpha scores were closely aligned with the initial results. All versions of the CVF-QoL instrument are sensitive to visual status, with participants with normal vision achieving higher scores than blind participants, who had significantly lower scores.

Conclusion: The CVF-QoL instrument is a reliable and valid tool for measuring the impact of visual impairment on visual function among school children in rural areas.

Keywords: psychometric property, reliability, validity, school children, visual function, quality of life, visual impairment.

Introduction

Health-related quality of life (HRQOL) instruments are essential for assessing patient outcomes in clinical research[1]. To develop reliable and valid HRQOL tools, it is necessary to rigorously test their psychometric properties, which include validity and reliability[2]. Reliability demonstrates that the results can be reproduced, while validity ensures that the instrument measures what it claims to measure[3]. There are various ways of assessing the reliability of HRQOL tools, including internal consistency, test-retest reliability, and inter-rater reliability[4]. Test-retest reliability is commonly assessed using kappa statistics for categorical questions and intraclass correlation coefficients for continuous measures[5,6]. Internal consistency is often evaluated with Cronbach's alpha, where values above 0.7 are considered acceptable. It is important to note that reliability may vary among different demographic subgroups, so it should be evaluated in specific populations[5].

Common types of validation include external validation, which looks at correlations and associations, and internal validation, which employs methods such as factor analysis and item response theory[7]. The key psychometric properties that enhance the quality of an instrument include content validity, internal consistency, structural validity, and construct validity[8]. However, many instruments still lack thorough internal validation and adequate cross-cultural adaptation, indicating the need for improved development and validation processes[9].

The choice of HRQoL measure depends on the specific research question, domain, and disease state[10]. In ophthalmic research, tools to assess vision-related quality of life have been developed to evaluate the effects of vision problems on daily functioning and overall quality of life[11,12].

Several vision-related instruments for children have been created and validated, including the Cardiff Visual Ability Questionnaire for Children (CVAQC)[13,14], the vision-related quality of life for children and young people (VQoL_CYP)[15], the Visual Impairment Developmental Autonomy (VIDA) scale[16], and the impact of vision impairment for children (IVI_C)[17]. These instruments assess various aspects of visual ability, quality of life, and adaptive skills in visually impaired children. The development process included item generation, cognitive testing, and psychometric evaluation[15,18]. While some instruments are designed for specific conditions[19], others cater to broader populations of visually impaired children[20]. The importance of age-appropriate measures is emphasised, with some instruments providing versions tailored for different age groups[12]. However, there remains a need for further research

and development of instruments in this area[21]. This study aims to evaluate the reliability and validity of the Children's Visual Function Quality of Life (CVF-QoL) instrument designed for school-going children with visual impairments. The development of the CVF-QoL involved several steps: generating items based on a literature review and focus group discussions, validating the content with experts, and conducting face validation with children, the details of which have been included in another manuscript published elsewhere[22]. The current part of the study focuses on further assessing the psychometric properties of the two versions of the newly developed CVF-QoL instrument.

Materials and Methods

Design:

This study aimed to evaluate the psychometric properties of two English versions of the Children's Visual Function Quality of Life (CVF-QoL) instrument designed specifically for rural school-going children in South Africa. Version 1.1 was for children aged 10 to 17 years, while Version 2.1 was intended for younger children aged 6 to 9 years. The research received ethical approval from the Biomedical Research Ethical Committee (BREC) at the University of KwaZulu-Natal (BREC/00003939/2022). It was further authorised by the Limpopo Department of Education Ethical Board (Ref: 2/2/2). The study adhered to the Declaration of Helsinki regarding studies involving human participants. The parents and learners completed informed Consent and assent forms before participation.

Study Steps:

Step 1: Sampling and Vision Screening of Participants

The study was conducted in three schools in the Sekhukhune district of Limpopo province, South Africa: Moreko High School, Leduma Primary School, and Bosele Special School. Convenience sampling was used to select participants, who were required to be aged 10-17 years to validate Version 1.1 of the CVF-QoL instrument and aged 6-9 years for validating Version 2.1. Learners were excluded from the study if they had any impairments other than visual. To estimate the sample size, categories of visual acuity in decimal notation outlined in Table 1 were utilised along with the one-way ANOVA test for assessing group effects, as highlighted in the methodology.

Table 1: Classification of visual status based on presenting visual acuity in decimal notation

Decimal notation visual acuity	Classification
≥ 1.0	Normal vision

0.50 - 1.00	Refractive error
0.05 – 0.50	Visual impairment
< 0.05	Blindness

Estimated sample size for one-way ANOVA, F test for group effect

Estimated sample sizes: N = 32, N (minimum) per group = 8

This means the required minimum sample size was 32 children for each version, with at least eight children per visual acuity category outlined in Table 1. However, the sample size targeted was 40 learners per version to account for potential dropouts. To confirm the learners' visual status, they underwent a series of tests, including visual acuity measurement using the Early Treatment of Diabetic Retinopathy Study (ETDRS) chart, visual field assessments using a handheld arc perimeter, fundus examination using direct ophthalmoscopy, cycloplegic using 1% of cyclopentolate eye drops, three drops per eye, and cycloplegic autorefraction with Charpos CR-1 Autorefractor.

Step 2: CVF-QoL Instrument and Administration

All learners selected according to the criteria in Step 1 completed the age-appropriate CVF-QoL questionnaires. During the first administration of the questionnaire, they were allowed to ask the field worker any questions. Learners who were blind received assistance from the field worker to complete the questionnaires. Additionally, learners were given a second questionnaire to complete at home 10 days after the initial questionnaire, which they were to return to the school administrator. This method has been used by other studies that developed similar tools for children[12,23,24]. The learners who were living with blindness were assisted by the hostel matrons to complete the questionnaire for a second time.

The CVF-QoL instrument contents:

Supplementary Table S1 outlines the items in Version 1.1 of the CVF-QoL instruction set. This version contains a total of 89 items organised into eight domains as follows:

- School and Learning (SL) - 16 items [1-8, 37-44]
- Mobility and Orientation (MO) - 8 items [9-14, 45, and 46]
- Daily Living Skills (DLS) - 18 items [15-29, 47,48, and 71]
- Hobbies, Leisure, and Sport (HLS) - 8 items [30-32, 49-52, and 72]
- Social Interaction (SI) - 7 items [33-36, 53-55]
- Psychological or Emotional Function (PEF) - 17 items [56-64, 73,74, 76-81]
- Treatment (T) - 8 items [65-68, 82-85]
- Sociocultural (SC) - 7 items [69,70,75, 86-89]

Supplementary Table S2 outlines 63 items organised also into eight domains as follows:

- School and Learning (SL) - 13 items [1-8, 27-31]
- Mobility and orientation - 7 [9-13, 32, and 33]
- Daily Living Skills (DLS) - 10 items [14-22, and 34]
- Hobbies, Leisure, and Sport (HLS) - 8 items [23-26, 35-37, and 51]
- Social Interaction (SI) - 2 items [38 and 39]
- Psychological or Emotional Function (PEF) - 9 items [40-43, 52, 53,55-57]
- Treatment (T) - 8 items [44-47, 58-61]
- Sociocultural (SC) - 6 items [48-50, 54, 62, and 63]

Each domain focuses on different aspects of quality-of-life assessment.

Rating scales and scoring:

The rating scales and scoring for all items are detailed in Table 2. For example, the question "Indicate how much difficulty you have with the following activities due to vision problems" would be rated as follows:

- 3 (Very difficult) with a score of 0
- 2 (A little bit difficult) with a score of 50
- 1 (Not difficult) with a score of 100
- 0 (Does not apply to me), which is scored as "#" to indicate a missing response; this score should not be included when calculating the average scores.

Table 2: Rating scales and rating values for the two versions of the CVF-QoL instrument

Version 1.1		
Responds	**Change the original response category**	**To record the value of:**
Indicate how much difficulty you have with the following activities because of vision problems		
Very difficult	3	0
A little bit difficult	2	50
Not difficult	1	100
Does not apply to me	0	# (missing)
Please indicate if these things happen to you		
Yes	3	0
Sometimes	2	50
No	1	100
Does not apply to me	0	#(missing)
Indicate how often this happens		
All the times	3	0
Sometimes	2	50
Never	1	100
Do not apply to me	0	#(missing)
Version 2.1		
Responds	**Change the original response category**	**To record the value of:**
How hard or easy is it for you to do the following things because of your eyesight problems		
Very hard for me	3	0
Not so easy for me	2	50
Very easy for me	1	100
I do not do this thing	0	# (missing)
Please indicate if these things happen to you		
Yes	2	0
No	1	100
Does not apply to me	0	#(missing)
How many times does this happens to you		
All the times	3	0
Sometimes	2	50

Never	1	100
Do not apply to me	0	#(missing)

The overall composite score for both versions of the CVF-QoL instrument was calculated as an average of the scores of the vision-targeted domains. This method gives equal weight to each domain instead of averaging individual items, which would favour domains with more items. A higher score indicates a better quality of life.

Score Interpretation:

The overall scores were categorised as follows:

- 75-100 = Good QoL
- 50-74 = Fair QoL
- 25-49 = Poor QoL
- 0-24 = Very poor QoL

A score of 0 represents the worst possible quality of life, while a score of 100 indicates optimal quality of life.

Step 3: Statistical Analyses

The principal investigator collected, cleaned and captured the data. A statistician then analysed the data using the Cronbach alpha test, with a 95% confidence interval, to determine the instrument's stability by comparing each learner's scores from the first and second attempts at answering the questionnaire[25]. In addition, Cronbach's Alpha test analyses were performed on the overall versions of the CVF-QoL instrument by assessing if any domain affects the overall reliability and internal consistency of the CVF-QoL instrument. The one-way ANOVA statistical tests were conducted to compare and contrast the clinical findings with the responses to the different versions of the CVF-QoL instruments. A one-way ANOVA (Analysis of Variance) test was used to compare the means of three or more domains to determine if there's a statistically significant difference between them. Additionally, the average mean scores were compared based on visual status to evaluate the instrument's sensitivity to visual status.

Results:

A total of 41 learners completed version 1.1 of the Children's Visual Function Quality of Life Instrument (CVF-QoL). Most participants were female (61%), and 29% of children had visual impairment (VI), as shown in Table 3. In version 2.1, 39 learners completed the questionnaire, with a slightly higher percentage of females participating (61.5%). Additionally, 28% of the participants had VI, as indicated in Table 3.

Table 3: Demographic information of the participants who completed Version 1.1 and Version 2.1 of the CVF-QoL instrument.

Version 1.1								
Participant code	**Age**	**Gender**	**Unaided V/A in LogMAR(decimal)**	**Near Unaided V/A LogMAR**	**Cycloplegic Autorefraction**	**Aided V/A**	**Diagnosis**	**VI classification**
PA1	15	M	R: 0.12 (0.8)	R: 0.00	R: -0.75	R: 0.00(1.00)	Myopia	RE
			L: 0.34 (0.50)	L: 0.00	L: -1.00	L: 0.00(1.00)		
PA2	15	F	R: 0.36 (0.50)	R: 0.00	R: +1.25/-1.25X85	R: 0.00 (1.00)	Hyperopia Astigmatism	RE
			L: 0.38 (0.40)	L: 0.00	L: +1.25/-1.25X90	L: 0.00 (1.00)		
PA3	17	F	R: 1.04 (0.10)	R: 0.20	R: -14.00/-1.25X15	R: 0.62 (0.25)	High Myopia Astigmatism	VI
			L: 1.08 (0.10)	L: 0.20	L: -13.00/-2.00X160	L: 0.60 (0.25)		
PA4	14	F	R: 0.38 (0.40)	R: 0.00	R: +0.50/-1.25X10	R: 0.00 (1.00)	Hyperopia Astigmatism	RE
			L: 0.14 (0.80)	L: 0.00	L: +0.50	L: 0.00 (1.00)		
PA5	16	F	R: 0.62 (0.25)	R: 0.00	R: -1.25/-0.50X180	R: 0.00 (1.00)	Myopia Astigmatism	RE
			L: 0.60 (0.25)	L: 0.00	L: -1.00/-0.50X08	L: 0.00 (1.00)		
PA6	14	F	R: 0.20 (0.63)	R: 0.00	R: +0.25/-0.75X60	R: 0.00 (1.00)	Hyperopia Astigmatism	RE
			L: 0.04 (0.80)	L: 0.00	L: +0.50/-0.50X123	L: 0.00 (1.00)		
PA7	15	F	R: 0.30 (0.50)	R: 0.00	R: PL/-0.50X130	R: 0.00 (1.00)	Hyperopia Astigmatism	RE
			L: 0.22 (0.63)	L: 0.00	L: +0.25/-0.75X150	L: 0.00 (1.00)		
PA8	16	F	R: 0.02 (1.00)	R: 0.00	R: +0.25/-0.25X98	R: 0.00 (1.00)	Emmetropia	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.50/-0.25X87	L: 0.00 (1.00)		
PA9	16	F	R: 0.00 (1.00)	R: 0.00	R: +0.00/-0.25X19	R: 0.00 (1.00)	Emmetropia	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.25/-0.50X173	L: 0.00 (1.00)		
PA10	16	F	R: 0.60 (0.25)	R: 0.00	R: -1.00/-0.25X110	R: 0.00 (1.00)	Myopia Astigmatism	RE
			L: 0.64 (0.25)	L: 0.00	L: -1.25/-0.25X40	L: 0.00 (1.00)		
PA11	14	F	R: 0.52 (0.32)	R: 0.12	R: -0.75/-2.50x20	R: 0.18 (0.63)	Myopia Keratoconus	VI
			L: 0.84 (0.16)	L: 0.20	L: -1.50/-5.25X167	L: 0.32 (0.50)		
PA12	14	M	R: 0.26 (0.63)	R: 0.00	R: +0.50/-1.75X17	R: 0.00 (1.00)	Hyperopia Astigmatism	RE
			L: 0.24 (0.63)	L: 0.00	L: +0.75/-0.75X145	L: 0.00 (1.00)		
PA13	13	F	R: 0.70 (0.20)	R: 0.00	R: -1.75/-0.75X40	R: 0.00 (1.00)	Myopia Astigmatism	RE
			L: 0.68 (0.20)	L: 0.00	L: - 1.50/-0.75X140	L: 0.00 (1.00)		
PA14	10	M	R: 0.88 (0.125)	R: 0.80	R: -0.50/-4.50X25	R: 0.62 (0.25)	OCA and Astigmatism	VI
			L: 0.92 (0.125)	L: 0.80	L: PL/-4.25X166	L: 0.62 (0.25)		
PA15	13	M	R: NLP	R: NLP	R: No reading	R: NLP	Corneal ulcer	BLD
			L: 1.4 (0.05)	L: 1.30	L: No reading	L: 1.4 (0.05)		
PA16	12	M	R: NLP (NLP)	R: NLP	No reading	R: NLP (NLP)	Aniridia Proptosis + ulcer	BLD
			L: LP (LP)	L: LP	No reading	L: LP (LP)		
PA17	14	F	R: NLP (NLP)	R: NLP	R: No reading	R: NLP	Cataract	BLD
			L: LP (LP)	L: LP	L: No reading	L: LP		
PA18	12	F	R: NLP (NLP)	R: NLP	R: No reading	R: NLP (NLP)	Optic nerve atrophy	BLD
			L: 1.40 (0.04)	L: 1.00	L: -13/-1.00X120	L: 1.40 (0.04)		

PA19	14	F	R: 0.90 (0.125)	R: 0.20	R: +4.25/-2.25X21	R: 0.56 (0.25)	OCA	VI
			L: 1.00 (0.10)	L: 0.20	L: +3.25/-3.50X180	L: 0.68 (0.20)	Nystagmus	
PA20	15	M	R: 0.00 (1.00)	R: 0.00	R: +0.50/-0.25X80	R: 0.00 (1.00)	NAD	NS
			L: -0.10 (1.25)	L: 0.00	L: PL/-0.50X73	L: 0.00 (1.00)		
PA21	14	M	R: 0.00 (1.00)	R: 0.00	R: +0.25/-0.50X85	R: 0.00 (1.00)	NAD	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.25/-0.25X77	L: 0.00 (1.00)		
PA22	14	M	R: 0.00 (1.00)	R: 0.00	R: +0.25	R: 0.00 (1.00)	NAD	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.25	L: 0.00 (1.00)		
PA23	16	F	R: 0.42 (0.40)	R: 0.10	R: +2.25/-0.75X173	R: 0.00 (1.00)	Hyperopia	RE
			L: 0.82 (0.16)	L: 0.30	L: +7.75/-1.25X12	L: 0.22 (0.63)	Astigmatism	
PA24	15	F	R: 0.00 (1.00)	R: 0.00	R: +0.50	R: 0.00 (1.00)	NAD	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.75	L: 0.00 (1.00)		
PA25	17	F	R: 0.00 (1.00)	R: 0.00	R: +0.50/-0.25X98	R: 0.00 (1.00)	NAD	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.25/-0.25X72	L: 0.00 (1.00)		
PA26	15	F	R: 0.00 (1.00)	R: 0.00	R: +0.50/-0.50x105	R: 0.00	NAD	NS
			L: 0.02 (1.00)	L: 0.00	L: +0.50/-0.50X77	L: 0.00		
PA27	17	F	R: -0.10 (1.25)	R: 0.00	R: PL/-0.50X18	R: -0.10 (1.25)	NAD	NS
			L: -0.12 (1.25)	L: 0.00	L: PL/-0.25X54	L: -0.12 (1.25)		
PA28	14	F	R: 1.10 (0.08)	R: 0.30	R: -4.00/-4.00X14	R: 0.22 (0.63)	Keratoconus	RE
			L: 1.20 (0.80)	L: 0.30	L: -4.75/-4.50X175	L: 0.24 (0.63)		
PA29	14	M	R: 0.96 (0.10)	R: 1.5	R: -9.00/-6.75X166	R: 0.96 (0.10)	Keratoconus,	VI
			L: LP (LP)	L: LP	L: No reading	L: LP (LP)	Corneal scar	
PA30	17	M	R: HM (HM)	R: HM	R: No reading	R: HM (HM)	Optic Nerves	BLD
			L: HM (HM)	L: HM	L: No reading	L: HM (HM)	deformities	
PA31	16	F	R: LP	R: LP	R: No reading	R: LP	Aniridia	BLD
			L: LP	L: LP	L: No reading	L: LP	Cataract	
PA32	13	M	R: 0.88 (0.125)	R: 0.60	R: +2.25/-3.75X22	R: 0.56 (0.25)	OCA	VI
			L: 0.90 (0.125)	L: 0.60	L: +1.75/-4.25X163	L: 0.78 (0.16)		
PA33	15	M	R: 1.52 (0.03)	R: 0.70	R: -5.75/3.50X55	R: 0.90 (0.125)	OCA	VI
			L: 0.90 (0.125)	L: 0.70	L: -1.50/-1.75X94	L: 0.58 (0.25)	Nystagmus	
PA34	16	M	R: CF@3M	R: 0.90	R: -2.25/-0.75X141	R: CF@3M	Glaucoma	BLD
			L: CF@3M	L: 0.90	L: No reading	L: CF@3M		
PA35	11	F	R: 0.72 (0.20)	R: 0.20	R: -1.25/-0.75X149	R: 0.60 (0.25)	OCA	VI
			L: 0.84 (0.16)	L: 0.20	L: -1.50	L: 0.60 (0.25)	Nystagmus	
PA36	10	F	R: 0.98 (0.10)	R: 0.20	R: -3.50/-4.75X177	R: 0.72 (0.20)	OCA	VI
			L: 0.92 (0.125)	L: 0.20	L: -2.75/-3.50X5	L: 0.70 (0.20)	Nystagmus	
PA37	14	M	R: 0.78 (0.16)	R: 0.10	R: -2.25/-2.50X57	R: 0.30 (0.50)	Aniridia	VI
			L: NLP	L: NLP	L: No reading	L: NLP	Glaucoma	
PA38	11	F	R: 0.98 (0.10)	R: 0.32	R: +4.50/-3.50X8	R: 0.72 (0.20)	OCA	VI
			L: 0.96 (0.10)	L:0.32	L: +4.25/-3.25X10	L: 0.88 (0.125)	Nystagmus	
PA39	17	M	R: HM	R: HM	R: +0.25/-0.25x172	R: HM	Congenital glaucoma	BLD
			L: HM	L: HM	L: +0.25/-0.50x45	L: HM		
PA40	12	M	R: NL	R: NL	R: No reading	R: NL	Non-responsive	BLD
			L: NL	L: NL	L: No reading	L: NL	Cataract	
PA41	14	F	R: 1.52 (0.03)	R: 1.00	R: -10.50/-1.25X157	R: 0.90 (0.125)	High Myopia	VI
			L: 1.50 (0.03)	L: 1.00	L: -11.00/-1.75X14	L: 0.90 (0.125)	Maculopathy	

Version 2.1

Participant code	Age	Gender	Unaided V/A in LogMAR(decimal)	Near Unaided V/A LogMAR	Cycloplegic Auto	Aided V/A	Diagnosis	VI classification
PB1	09	F	R: NLP (NLP)	R: NLP	R: No reading	R: NLP	Congenital Glaucoma	BLD
			L: NLP (NLP)	L: NLP	L: No reading	L: NLP		
PB2	09	F	R: LP (LP)	R: LP	R: No reading	R: LP	Corneal ulcer	BLD
			L: LP (LP)	L: LP	L: No reading	L: LP	Cataract	
PB3	08	F	R: 0.82 (0.16)	R: 0.32	R: +3.75/-2.00X12	R: 0.42 (0.40)	OCA	VI
			L: 0.82 (0.16)	L: 0.32	L: +2.00/-3.00X175	L: 0.40 (0.40)		
PB4	08	M	R: 0.62 (0.25)	R: 0.32	R: +1.25/-2.25X64	R: 0.36 (0.40)	Retinoblastoma	VI
			L: NLP (NLP)	L: NLP	L: +0.50/-0.75X116	L: NLP	Cataract	
PB5	07	F	R: 0.96 (0.10)	R: 0.70	R: -6.25/-1.25X70	R: 0.82 (0.16)	OCA	VI
			L: 0.88 (0.125)	L: 0.70	L: -4.00/-1.50X94	L: 0.72 (0.20)	Myopia	
PB6	08	M	R: NLP (NLP)	R: NLP	No reading	R: NLP (NLP)	Corneal ulcers	BLD
			L: LP (LP)	LP: LP	No reading	L: LP (LP)	Glaucoma	
PB7	08	F	R: NLP (NLP)	R: NLP	No reading	R: NLP (NLP)	Cataract	VI
			L: 1.02 (0.10)	L: 1.00	No reading	L: 1.02 (0.10)	Corneal scar	
PB8	09	F	R: 1.04 (0.10)	R: 1.00	R: -7.25/-1.25X2	R: 0.68 (0.20)	OCA	VI
			L: 1.50 (0.03)	L: 1.00	L: -13.00/-1.00X33	L: 0.72 (0.20)	Maculopathy	
PB9	08	M	R: 1.60 (0.025)	R: 1.00@20cm	R: -25.00/-1.75X75	R: 1.60 (0.025)	Cataract	BLD
			L: LP (LP)	L: LP	L: No reading	L: LP	Optic Neuropathy	
PB10	07	F	R: LP (LP)	R: LP	R: No reading	R: LP (LP)	Retinal vessels	BLD
			L: NLP (NLP)	L: NLP	L: No reading	L: NLP (NLP)	occlusion + Cataract	
PB11	08	M	R: 0.92 (0.125)	R: 0.50	R: +4.50/-1.25X18	R: 0.76 (0.16)	OCA	VI
			L: 0.90 (0.125)	L: 0.50	L: +4.50/-2.00X158	L: 0.82 (0.16)	Nystagmus	
PB12	08	M	R: 0.86 (0.16)	R: 0.60	R: -1.25/-3.25X15	R: 0.60 (0.25)	OCA	VI
			L: 0.86 (0.16)	L: 0.52	L: -0.75/-3.25X164	L: 0.52 (0.32)	Nystagmus	
PB13	09	M	R: 1.22 (0.06)	R: 0.30	R: -7.25/-3.25X33	R: 0.68 (0.20)	Maculopathy	VI
			L: 1.26 (0.05)	L: 0.30	L: -8.50/-2.00X161	L: 0.68 (0.20)		
PB14	07	M	R: 0.72 (0.20)	R: 0.20	R: -2.50/-1.75X4	R: 0.28 (0.50)	OCA	RE
			L: 0.72 (0.20)	L: 0.20	L: +0.50/-2.75X2	L: 0.30 (0.50)		
PB15	06	M	R: 1.00 (0.10)	R: 0.90	R: -6.50/-4.00X11	R: 0.80 (0.16)	Keratoconus	VI
			L: 1.22 (0.06)	L: 0.90	L: -8.75/-4.50X178	L: 1.02 (0.10)	Myopia	
PB16	09	F	R: 0.70 (0.20)	R: 0.50	R: +0.25/-2.00X166	R: 0.22 (0.63)	OCA	RE
			L: 0.82 (0.16)	L: 0.50	L: -2.25/-1.25X35	L: 0.36 (0.40)	Astigmatism	
PB17	07	F	R: 0.68 (0.20)	R: 0.20	R: +1.00/-1.25X140	R: 0.40 (0.40)	OCA	VI
			L: 0.66 (0.20)	L: 0.20	L: +1.25/-2.25X14	L: 0.40 (0.40)	Nystagmus	
PB18	08	F	R: LP (LP)	R: LP	R: No reading	R: LP (LP)	OCA	BLD
			L: NLP (NLP)	L: NLP	L: No reading	L: NLP (NLP)	Cataract	
PB19	09	F	R: 1.32 (0.05)	R: 1.00	R: No reading	R: 1.32 (0.05)	Maculopathy	BLD
			L: 1.40 (0.04)	L: 1.00	L: No reading	L: 1.40 (0.04)		
PB20	07	F	R: 0.76 (0.16)	R: 0.32	R: +4.75/-2.00X169	R: 0.62 (0.25)	OCA	VI

			L: 0.78 (0.16)	L: 0.32	L: +6.00/-3.00X04	L: 0.60 (0.25)	Nystagmus	
PB21	06	M	R: -0.10 (1.25)	R: 0.00	R: +0.75/-0.25X17	R: -0.10 (1.25)	NAD	NS
			L: -0.10 (1.25)	L: 0.00	L: +1.00/-0.25X12	L: -0.10 (1.25)		
PB22	06	F	R: LP	R: LP	R: No reading	R: LP	Cataract	NS
			L: -0.20 (1.60)	L: 0.00	L: +0.25/-0.50X50	L: -0.20 (1.60)		
PB23	09	M	R: -0.10 (1.25)	R: 0.00	R: +0.75/-0.50X75	R: -0.10 (1.25)	NAD	NS
			L: -0.10 (1.25)	L: 0.00	L: +0.50/-0.50X115	L: -0.10 (1.25)		
PB24	08	F	R: 0.00	R: 0.00	R: +0.25/-0.25X68	R: 0.00	NAD	NS
			L: 0.00	L:0.00	L: +0.25/-0.25X38	L: 0.00		
PB25	09	F	R: 0.00	R: 0.00	R +0.75/-0.75x85	R: 0.00	NAD	NS
			L: 0.00	L: 0.00	L: +0.75/-0.50x73	L: 0.00		
PB26	06	M	R: 0.52 (0.32)	R: 0.00	R: PL/-1.25X108	R: 0.00	Hyperopia	RE
			L: 0.38 (0.40)	L: 0.00	L: +0.75/-1.00X119	L: 0.00	Astigmatism	
PB27	09	F	R: CF @3M	R: CF	R: No reading	R: CF@3M	Keratoconus	BLD
			L: 1.90	L: 1.00	L: -1.50/6.75X165	L: 1.32	Apical scarring	
PB28	06	M	R: LP	R: LP	R: No reading	R: LP	Traumatic cataract	NS
			L: 0.00	L: 0.00	L: +1.00/-0.25X137	L: 0.00		
PB29	06	F	R: -0.10 (1.25)	R: 0.00	R: +0.50/-0.25X42	R: -0.10 (1.25)	NAD	NS
			L: -0.10 (1.25)	L: 0.00	L: +0.25	L: -0.10 (1.25)		
PB30	09	M	R: 0.00 (1.00)	R: 0.00	R: +0.50/-0.25X176	R: 0.00	NAD	NS
			L: 0.00 (1.00)	L: 0.00	L: +0.25/-0.25X91	L: 0.00		
PB31	08	F	R: 0.82 (0.16)	R: 0.20	R: +2.25/-4.50X07	R: 0.24 (0.63)	Hyperopia	RE
			L: 0.78 (0.16)	L: 0.20	L: +2.00/-3.50X173	L: 0.18 (0.63)	Astigmatism	
PB32	09	F	R: 0.52 (0.32)	R: 0.00	R: -1.50/-0.75X96	R: 0.00 (1.00)	Myopia	RE
			L: 0.46 (0.32)	L: 0.00	L: -1.50/-0.25X91	L: 0.00 (1.00)	Astigmatism	
PB33	06	F	R: 0.00 (1.00)	L: 0.00	R: +0.75/-0.25X144	R: 0.00 (1.00)	NAD	NS
			L: 0.00 (1.00)	R: 0.00	L: +0.50/-0.25X30	L: 0.00 (1.00)		
PB34	09	M	R: 0.76 (0.16)	R: 0.00	R: -1.75/-0.75X65	R: 0.00 (1.00)	Myopia	RE
			L: 0.64 (0.20)	L: 0.00	L: -1.25/-0.50X68	L: 0.00 (1.00)	Astigmatism	
PB35	08	F	R: 0.00 (1.00)	R: 0.00	R: +0.25/-0.25X148	R: 0.00 (1.00)	NAD	NS
			L: 0.00 (1.00)	L: 0.00	L: +1.00/-1.00X15	L: 0.00 (1.00)		
PB36	07	F	R: 0.96 (0.10)	R 0.00	R: -4.75/-0.75X10	R: 0.00	Myopia	RE
			L: 0.96 (0.10)	L: 0.00	L: -4.75/-0.75X10	L: 0.00	Astigmatism	
PB37	06	F	R: 0.34 (0.50)	R: 0.00	R: PL/-1.50X99	R: 0.00 (1.00)	Astigmatism	RE
			L: 0.36 (0.40)	L: 0.00	L: +0.25/-1.75X76	L: 0.00 (1.00)		
PB38	09	F	R: 0.42 (0.40)	R: 0.00	R: -1.50/-0.25X116	R: 0.00 (1.00)	Myopia	RE
			L: 0.54 (0.32)	L: 0.00	L: -1.25/-1.25X153	L: 0.00 (1.00)	Astigmatism	
PB39	07	F	R: HM	R: HM	R: +0.25	R: HM	Congenital Glaucoma	BLD
			L: HM	L: HM	L: +0.25/-0.25X03	L: HM		

F= Female, M= Male, V/A= Visual acuity, LogMAR= Logarithmic Measure of Angle of Resolution, R= Right eye, L= Left eye, NLP= No light perception, LP= Light perception, HM= Hand motion, CF= Count fingers, NAD= No abnormalities, OCA= Oculocutaneous albinism, NS= Normal sighted, RE= Refractive error, VI= Visual impairment, BLD= Blindness

Table 4 presents the mean, standard deviation, and Cronbach's alpha scores for both versions of the CVF-QoL instrument. Version 1.1 has an overall Cronbach's alpha score of 0.946, indicating excellent internal consistency and high reliability. Six out of the eight domains scored above 0.80, while the remaining two scored above 0.70, as shown in Table 4. In contrast, Version 2.1 has an overall Cronbach's alpha score of 0.777, which indicates good internal consistency and moderate reliability. All domains in this version performed well except for the social interaction domain, which had a low alpha score of 0.352 due to the small number of items in this domain.

Table 4: Mean, standard deviations and Alpha values for both English Versions of the CVF-QoL instrument for each domain and overall QoL score

	CVF-QoL Version 1.1				CVF-QoL Version 2.1			
Domain	**Number of items averaged**	**Mean**	**SD**	**Alpha**	**Number of items averaged**	**Mean**	**SD**	**Alpha**
School and learning	16	48,820	12,788	0,862	13	67,814	15,675	0,881
Mobility and Orientation	8	67,810	9,769	0,933	7	63,910	12,337	0,897
Daily living skills	18	72,470	8,503	0,927	10	78,056	15,139	0,888
Hobbies, leisure, and sport	8	56,140	9,304	0,879	8	64,718	19,285	0,820
Social interaction	7	80,980	7,667	0,730	2	89,744	20,454	0,352
Psychological or Emotional Function	17	61,920	15,738	0,858	9	68,056	16,923	0,589
Treatment	8	73,330	10,690	0,734	8	78,570	10,356	0,681
Sociocultural	7	83,429	7,277	0,808	6	79,167	22,830	0,671
Overall	89	58,070	18,350	0,946	63	62,833	21,866	0,777

Tables 5 and 6 present the results comparing the performance of both versions of the CVF-QoL when administered 10 days after the initial attempt. The outcomes for both versions were nearly identical. This consistency indicates that the CVF-QoL instrument is reliable.

Table 5: Alpha and standard deviation for Re-administered English Versions 1.1 of the CVF-QoL Instrument

Version 1.1		**First-attempt ANOVA results**			**Second attempt ANOVA results**		
Domain	**Number of items**	**Mean**	**SD**	**Alpha**	**Mean**	**SD**	**Alpha**
SL	16	48,820	12,788	0,862	49,770	13,245	0,809
MO	8	67,810	9,769	0,933	67,550	9,682	0,930
DLS	18	72,470	8,503	0,927	71,510	8,137	0,927
HLS	8	56,140	9,304	0,879	55,850	9,649	0,887
SI	7	80,980	7,667	0,730	80,000	8,216	0,740

PEF	17	61,920	15,738	0,858	64,710	16,397	0,804
T	8	73,330	10,690	0,734	73,330	10,691	0,734
SC	7	83,429	7,277	0,808	83,429	7,277	0,808
Overall	89	58,070	18,350	0,946	57,303	18,637	0,940

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leisure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural, SD= Standard Deviation

Table 6: Alpha and standard deviation for Re-administered English Versions 2.1 of the CVF-QoL Instrument

Version 2.1		**First-attempt ANOVA results**			**Second attempt ANOVA results**		
Domain	**Number of items**	**Mean**	**SD**	**Alpha**	**Mean**	**SD**	**Alpha**
SL	13	67,814	15,675	0,881	66,700	248,260	0,890
MO	7	63,910	12,337	0,897	63,910	143,616	0,895
DLS	10	78,056	15,139	0,888	77,780	222,480	0,890
HLS	8	64,718	19,285	0,820	64,516	373,123	0,825
SI	2	89,744	20,454	0,352	89,744	20,454	0,352
PEF	9	68,056	16,923	0,589	68,056	16,923	0,589
T	8	78,570	10,356	0,681	78,570	10,356	0,681
SC	6	79,167	22,830	0,671	79,167	22,830	0,671
Overall	63	62,833	21,866	0,777	62,349	20,823	0,800

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leisure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural, SD= Standard Deviation

Both versions of the CVF-QoL instrument are sensitive to the severity of vision problems based on one-way ANOVA analysis. Normal-sighted learners scored higher mean QoL scores across all domains, while those with severe visual impairment or blindness had lower mean scores in each domain, as detailed in Table 7. Furthermore, the mean scores for all domains between all four categories of visual status were significantly different, as found with Anova analysis (all p-values < 0.001)).

Table 7: One-way ANOVA analysis of the mean scores for each domain for both versions of the CVF-QoL instrument based on visual status levels.

CVF-QoL Version 1.1									
Domain	**Visual status based on presenting VA**								**ANOVA p-value**
	Normal Sighted		**Refractive error**		**Visual impairment**		**Blindness**		
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	
SL	97.40	3.08	64.26	20.41	51.02	16.07	35.09	9.00	<0.001

MO	99.65	1.47	82.10	21.76	57.29	20.74	25.15	14.64	<0.001
DLS	100.00	0.00	85.15	12.68	73.55	18.33	44.97	14.43	<0.001
HLS	100.00	0.00	69.10	22.57	51.00	22.25	27.25	12.74	<0.001
SI	100.00	0.00	83.14	15.46	77.78	16.79	59.72	19.23	<0.001
PEF	100.00	0.00	74.37	19.59	66.89	19.73	65.28	19.47	<0.001
T	100.00	0.00	79.51	27.85	77.97	17.41	65.10	24.15	<0.001
SC	100.00	0.00	95.25	9.26	81.00	17.64	63.82	25.85	<0.001
CVF-QoL Version 2.1									
Domain	**Visual status based on presenting VA**								**ANOVA p-value**
	Normal Sighted		**Refractive error**		**Visual impairment**		**Blindness**		
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	
SL	97.29	3.56	67.95	11.95	59.24	15.49	41.30	8.04	<0.001
MO	99.64	1.60	74.21	15.52	51.30	18.79	26.98	10.59	<0.001
DLS	99.75	1.12	84.72	15.00	79.32	13.74	52.22	18.17	<0.001
HLS	98.71	2.66	63.89	11.25	53.87	11.41	41.02	9.32	<0.001
SI	100.00	0.00	94.44	10.69	90.91	14.53	76.39	15.98	<0.001
PEF	98.17	4.98	68.81	16.08	68.97	15.12	66.61	20.10	<0.001
T	96.15	13.87	92.86	12.22	86.37	10.76	67.48	20.38	<0.001
SC	98.33	7.45	92.50	10.15	86.21	13.58	76.67	21.39	<0.001

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leisure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural, SD= Standard Deviation

Discussion

Visual impairment (VI) in children significantly affects their quality of life, educational achievement, and social development[26]. Globally, an estimated 19 million children are visually impaired[27,28]. Research indicates that childhood VI often occurs alongside other impairments or systemic disorders. In clinical studies, instruments that measure vision-related quality of life (VRQoL) are essential for assessing patient outcomes[23,29,30]. It is crucial to thoroughly examine the psychometric properties of these instruments, such as validity and reliability, to ensure they are trustworthy and accurate[8]. The CVF-QoL instrument is a two-version questionnaire designed to assess the impact of visual impairment on rural school-going children in South Africa. This self-administered tool is intended for children aged 6 to 17 years, as research has shown that children can effectively respond to health-related quality of life assessments when the tool is crafted with their cognitive abilities in mind[31,32].

It is commonly known that HRQoL instruments should assess five areas, which are physical functions, psychological well-being, subject symptoms, social functioning, and cognitive functioning [1,33], which is achieved with the CVF-QoL instrument over eight domains. The school and learning domain evaluate how vision problems affect children's education. This domain includes items related to difficulties in taking notes from the chalkboard, reading, and

writing in books, as well as experiencing eye strain when attempting to read and symptoms like itching and tearing during reading activities. The mobility and orientation domain assesses overall movement in individuals, focusing on the challenges faced by visually impaired children, particularly in unfamiliar places due to poor vision. The physical activities that children engage in daily and how visual impairments impact those activities are examined in the daily living skills domain, while the hobbies, leisure, and sports domain explores how visual impairment affects children's play, sports participation, and recreational activities. The social interaction domain analyses how visual impairment influences social activities, including making friends, spending time with friends, visiting family members, and maintaining eye contact while conversing. The relationship between visual impairment and mental health is assessed in the psychological and emotional domain, which also explores self-perception and self-esteem related to visual impairment. The treatment domain evaluates the effects of eye treatments on children, such as the discomfort from eye drop instillation, the strain and heaviness associated with wearing spectacles, and the bullying that may result from wearing glasses. Finally, the sociocultural domain examines the influence of the surrounding community on managing visual impairment and includes items that connect visual impairment with being perceived as cursed or bewitched.

Forty-one learners participated in the validation of Version 1.1 of the CVF-QoL, surpassing the anticipated number of 32 participants. Classifying these learners based on their visual status was crucial and was successfully achieved with a vision screening, with a minimum of eight participants in each visual category. Notably, there were significantly more female participants than male. Although the prevalence of visual impairment can be influenced by gender, it should not affect the validation of the tool. For Version 2.1 of the CVF-QoL, thirty-nine learners participated. Similar to Version 1.1, the minimum requirement of eight participants in each visual category was met, with again a higher number of female participants. It has been reported that the common causes of childhood visual impairment include refractive errors, amblyopia, retinal disorders, and congenital conditions such as cataracts and glaucoma[27]. These conditions were also observed in the study participants.

Reliability is the consistent ability to reproduce results over time and among different observers. It includes coherence, stability, equivalence, and homogeneity, making it a crucial quality criterion for any instrument[8,34,35]. In the context of the CVF-QoL instrument, reliability primarily pertains to the internal consistency, stability, and equivalence of the measures used. To assess internal consistency, the Cronbach’s alpha score is employed. For Version 1.1 of the instrument, the overall Cronbach's alpha score was 0.946, indicating high reliability. In contrast, Version 2.1 received a score of 0.777, which is considered to be moderately reliable. The lower alpha score for version 2.1 compared to version 1.1 is primarily attributed to the

Social Interaction domain, which had the lowest score of 0.352. The low score for this domain is likely due to the limited number of items included in this domain; research indicates that having fewer items can lower the alpha value[8]. Specifically, the Social Interaction domain in version 2.1 consists of only two items, whereas version 1.1 contains six items in this same domain. Additionally, the lower alpha score may be linked to age differences, as research in instrument development has shown that instrument reliability increases with age[36].

The stability of an instrument measures how similar the results are when assessed at two different times[37]. For the CVF-QoL instrument, we used test-retest reliability to evaluate this stability. Generally, the test-retest reliability tends to decrease when the interval between tests is extended[5,37]. The time span between measurements affects the interpretation of reliability; therefore, an interval of 10 to 14 days is considered adequate for testing and retesting[37]. In this study, participants completed the CVF-QoL questionnaire for the second time at home 10 days after their initial attempt. This approach has been previously utilised in the development of several tools for children[12,23,24]. The test-retest scores were 0.940 for version 1.1 and 0.800 for version 2.1, indicating that these scores are more than 93% similar to the original scores obtained during the first administration of the questionnaires.

The CVF-QoL instrument is sensitive to visual classification, as demonstrated by the comparison of mean scores among participants with normal vision versus those living with refractive error (RE), visual impairment (VI), and blindness. On average, participants with normal vision score higher than all other groups, indicating a better quality of life. In contrast, those with severe visual impairment or blindness score much lower, suggesting they experience a reduced quality of life, as has been noted by previous studies[38–40].

To enhance the Cronbach alpha score of Version 2.1 of the CVF-QoL instrument, the social interaction domain was modified by incorporating four additional items from the already validated Version 1.1 of the CVF-QoL. It is recognised that increasing the number of items in the relevant domain can improve the alpha score[8], this resulted in the new CVF-QoL instrument, Version 2.2, which now comprises 67 items attached as Supplimentary Table S3 below.

Limitations and future recommendations

The method of using Cronbach's alpha test was used in this instrument development based on the previous instrument development studies, for example, Hatt SR et al (2019), Birch EE et al (2005), Felius J et al (2004), Sacchette M et al (2007), Robertson AO (2020), Wadhwani M et al (2022) anc etc. However, the authors acknowledge the potential limitations that could arise when interpreting the results.

The sample size was estimated based on categories of visual acuity in decimal notation. However, the authors acknowledged that the sample size may not have been sufficient. This is the first phase of development and validation, and it is recognised that the validation process is ongoing. The candidate further recommended continuing the validation of this tool with a larger sample size.

Conclusion

The CVF-QoL instrument has been noted to be reliable and valid for evaluating the quality of life-related to visual function, specifically among rural school-aged children in South Africa. This assessment tool is designed to capture the unique visual challenges and experiences faced by children in these communities, ensuring that the cultural and contextual factors of South Africa are considered. Through its comprehensive approach, the CVF-QoL instrument provides valuable insights into how visual impairments impact various aspects of daily life and educational experiences for these children, ultimately informing interventions and support strategies to enhance their overall well-being.

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Author Contributions

T.S.S.M., R.H., and Z.N.X. conceived and planned the experiments. T.S.S.M. conducted the experiments and data collection. R.H. and Z.N.X supervised the data collection. T.S.S.M., R.H., and Z.N.X. reviewed and analysed the results. T.S.S.M. drafted the manuscript, while R.H. and Z.N.X. edited and made modifications to it. All authors have accepted the final version and approved it for submission to the journal.

Data Availability Statement

All data associated with this manuscript can be obtained from the corresponding author, MTSS, via their email address.

Competing Interests Statement

We declare no conflicts of interest related to this work.

Supplementary Table S1: List of items from version 1.1 of the CVF-QoL instrument

Version 1.1 of the CVF-QoL instrument		
Item number and description [domain]	**Item number and description [domain]**	**Item number and description [domain]**
1. Seeing clearly what is written on the chalkboard [SL]	31. Playing ball games (soccer, tennis, Mokoloti, etc.) [HLS]	61. I feel sad when I get corrected on things I did not see clearly [PEF]
2. Drawing [SL]	32. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu [HLS]	62. I feel sad when friends laugh at me because I cannot see well [PEF]
3. Matching colours (e.g., while colouring or painting) [SL]	33. Playing games requires me to see things in the near such as Morabaraba, Diketo, Mmela, etc [HLS]	63. I feel like I am a burden to my family members and the people around me because of my eyesight [PEF]
4. Using a pair of scissors to get the desired shapes [SL]	34. Maintaining eye contact when talking with your friend [SI]	64. I have low confidence in myself because of my poor eyesight [PEF]
5. Completing my school work on time [SL]	35. Taking part in various activities (like sporting events) with friends [SI]	65. I spend a lot of time on vision treatment (eye doctor appointments, patching, eye drops, and therapy) [T]
6. Reading from books including my textbooks [SL]	36. Making friends [SI]	66. I find it hard to clean my glasses [T]
7. Seeing pictures clearly in my book (e.g., Map book) [SL]	37. My eyesight affects how fast I can read and write [SL]	67. The eyedrop is uncomfortable for my eyes [T]
8. Reading or writing along a line in a book [SL]	38. My eyes hurt and tear up when I read or do close work [SL]	68. I cannot see clearly even when I wear my glasses [T]
9. Using public transport (e.g., taxi or bus) [MO]	39. Words become double when I read [SL]	69. My family members are ashamed of me because of my eyesight [SC]
10. Moving around by yourself without bumping into objects or people [MO]	40. I think I would benefit better from the special school for people who cannot see well [SL]	70. I feel like I am cursed for not seeing well [SC]
11. Walking safely in new places without help [MO]	41. I do not do as well in my tests and exams as others, because of my eyesight [SL]	71. I am afraid of drowning when fetching water by the river [DLS]
12. Walking home [MO]	42. I struggle to read what other people have written because of my eyesight [SL]	72. I get closer to the television (TV) screen so that I can see what's happening on TV [HLS]
13. Walking on uneven ground [MO]	43. I get headaches after reading for some time [SL]	73. I am scared that I might go blind [PEF]

14. Seeing someone across the street when they are calling out to you [MO]

15. Fetching water [DLS]

16. Going to the toilet [DLS]

17. Locking or unlocking the door [DLS]

18. Making out differences in coins or notes when I want to pay because of my eyesight [DSL]

19. Taking goats and cows to the field for grazing [DLS]

20. Washing my school uniform so that it gets clean [DLS]

21. Doing household chores (like sweeping, washing dishes, cooking, preparing a meal [DLS]

22. Seeing the time on a wall clock [DLS]

23. Seeing the time on a wristwatch [DLS]

24. Taking something out from a cupboard [DLS]

25. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.) [DLS]

26. Pouring water/drink into a cup or glass [DLS]

27. Seeing the food on my plate while eating [DLS]

44. I copy from other classmate's notes because I struggle to see clearly on the board [SL]

45. I am not sure of how far a car or taxi is to me when I am crossing the road [MO]

46. I often fall when I walk because I cannot see well [MO]

47. I often need someone to stay at home with me because I cannot see well [DLS]

48. I struggle to look after my siblings when we are left home alone [DLS]

49. I often lose in most games due to my eyesight [HLS]

50. It is difficult to read the story books because of my eyesight [HLS]

51. It is difficult to create crafts with clay or boxes because of my eyesight [HLS]

52. I find it difficult to do knitting because of my eyesight [HLS]

53. People are getting frustrated with you because of your eyesight [SI]

54. Other children don't want to play with me because I cannot see [SI]

55. It is hard to see if someone is happy, sad, or angry when they are talking to me [SI]

56. I become stressed when I have to go for my eye check-up [PEF]

57. I feel different from other children because my eyes are crossed [PEF]

74. I am worried about my poor vision [PEF]

75. I get bullied at school because I wear glasses [SC]

76. People think I am less intelligent because of my poor eyesight [PEF]

77. I am afraid to tell the teacher that I cannot see well in class [PEF]

78. I am bothered because my parents tend to treat me differently as compared to my other siblings due to eyesight [PEF]

79. I feel worthless because I cannot see well [PEF]

80. It is hard for me to defend myself verbally, even if I am right [PEF]

81. I feel ashamed about attending a special school [PEF]

82. When I wear my glasses, I have to squint to see things [T]

83. Glasses hurt my nose/ ears [T]

84. I feel dizzy/nausea when I wear my glasses [T]

85. My glasses sometimes break or fall off while I am wearing them [T]

86. I have been told that I am cursed or bewitched for not being able to see clearly [SC]

87. I am treated differently from other children in my village because of eye problems [SC]

28. Going to the tuckshop alone [DLS]	58. Wearing glasses makes me feel different from other children [PEF]	88. Some people believe I cannot think properly because of my eye problem [SC]
29. Using the cell phone (for example to dial a number or read messages) [DLS]	59. I feel like people are impatient with me due to my eyesight [PEF]	89. Some people think that God is punishing my parents because of my eye problems [SC]
30. Taking part in athletics (running, jumping, throwing, and race walking) [HLS]	60. I feel sad because I may not be able to choose the career I want because of my eyesight [PEF]	

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leasure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural.

Supplementary Table S2: The items of version 2.1 of the CVF-QoL instrument

Version 2.1 of the CVF-QoL instrument		
Item number and description [domain]	**Item number and description [domain]**	**Item number and description [domain]**
1. Seeing clearly what is written on the chalkboard [SL]	22. Using the cell phone (for example to dial a number or read messages) [DLS]	43. I feel sad when friends laugh at me because I cannot see well [PEF]
2. Drawing [SL]	23. Taking part in athletics (running, jumping, throwing, and race walking) [HLS]	44. I find it hard to clean my glasses [T]
3. Matching colours (e.g., while colouring or painting) [SL]	24. Playing ball games (soccer, tennis, Mokoloti, etc.) [HLS]	45. I don't like it when someone puts drops in my eyes [T]
4. Using a pair of scissors to get the desired shapes [SL]	25. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu [HLS]	46. I cannot see clearly even when I wear my glasses [T]
5. Finishing my school work on time [SL]	26. Playing games requires me to see things that are near such as Morabaraba, Diketo, Mmela, etc. [HLS]	47. I do not like the way I look when wearing glasses [T]
6. Reading from books including my textbooks [SL]	27. My eyes hurt when I read [SL]	48. My family is ashamed of me because of my poor eyesight [SC]
7. Copying correctly from the board or books [SL]	28. I cannot see what other people write in their books [SL]	49. My parents think I am under a curse or bewitched because of my eyesight [SC]
8. Reading or writing along a line in a book [SL]	29. Words are becoming double when I read [SL]	50. I feel like I am cursed for not seeing well [SC]
9. Moving around by yourself without tripping into objects or people [MO]	30. I have a sore head when I read [SL]	51. I go closer to the TV so that I can see better [HLS]
10. Moving around safely by myself in places I don't know [MO]	31. People are getting annoyed with me because of my eyesight [SL]	52. I am scared that I might go blind [PEF]
11. Walking home [MO]	32. I often fall when I walk because I cannot see well [MO]	53. I am worried that I cannot see well [PEF]
12. Walking on bumpy ground [MO]	33. I am not sure of how far a car or taxi is to me when I am crossing the road [MO]	54. I get bullied at school because I wear glasses [SC]
13. Seeing someone across the street when they are calling out to you [MO]	34. I need someone to stay at home with me because I cannot see well [DLS]	55. People think I am not clever because of my poor eyesight [PEF]
14. Going to the toilet [DLS]	35. I often lose in most games because I cannot see [HLS]	56. I am afraid to tell the teacher that I cannot see well in class [PEF]
15. Seeing the right money when at the shop [DLS]	36. It is difficult to read the story books because of my eyesight [HLS]	57. I feel ashamed about attending a special school [PEF]

16. Seeing the time on a wall clock [DLS]	37. It is difficult to create crafts with clay or boxes because of my eyesight [HLS]	58. When I wear my glasses, I have to cross my eyes to see things [T]
17. Seeing the time on a wristwatch [DLS]	38. Other children don't want to play with me because of my eyesight [SI]	59. Glasses hurt my nose/ ears [T]
18. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.) [DLS]	39. It is hard to see if someone is happy, sad, or angry when they are talking to me [SI]	60. I feel dizzy when I wear my glasses [T]
19. Pouring water/drink into a cup or glass [DLS]	40. I don't like going for my eye check-up [PEF]	61. My glasses sometimes break or fall off while I am wearing them [T]
20. Seeing the food on my plate when eating [DLS]	41. I feel different from other children because my eyes are crossed [PEF]	62. I am being mistreated by other children in my village because of my eye problems [SC]
21. Going to the tuckshop alone [DLS]	42. Wearing glasses makes me feel different [PEF]	63. I cannot see so people say I cannot think well [SC]

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leasure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural.

Supplementary Table S3: The CVF-QoL Version 2.2 Instrument

The CVF-QoL Version 2.2					
Domain	**Item number and description**	**Rating scale**	**Domain**	**Item number and description**	**Rating scale**
School and learning	1. Seeing clearly what is written on the chalkboard 2. Drawing 3. Matching colours (e.g., while colouring or painting) 4. Using a pair of scissors to get the desired shapes 5. Finishing my school work on time 6. Reading from books including my textbooks 7. Copying correctly from the board or books 8. Reading or writing along a line in a book	3. Very hard for me 2. Not so easy for me 1. Very easy for me 0. I do not do this thing	**Social interaction**	38. Other children don't want to play with because of my eyesight 39. It is hard to see if someone is happy, sad, or angry when they are talking to me 64. People are getting frustrated with you because of your eyesight 65. Maintaining eye contact when talking with your friend 66. Taking part in various activities (like sporting events) with friends 67. Making friends	2. Yes 1. No 0. Does not apply to me 3. Very hard for me 2. Not so easy for me 1. Very easy for me 0. I do not do this thing
	27. My eyes hurt when I read 28. I cannot see what other people write in their books 29. Words are becoming double when I read 30. I have a sore head when I read 31. People are getting annoyed with me because of my eyesight 38. Other children don't want to play with because of my eyesight 39. It is hard to see if someone is happy, sad, or angry when they are talking to me	2. Yes 1. No 0. Does not apply to me	**Psychological and Emotional Function**	40. I don't like going for my eye check-up 41. I feel different from other children because my eyes are crossed 42. Wearing glasses makes me feel different 43. I feel sad when friends laugh at me because I cannot see well 52. I am scared that I might go blind 53. I am worried that I cannot see well 55. People think I am not clever because of my poor eyesight 56. I am afraid to tell the teacher that I cannot see well in class 57. I feel ashamed about attending a special school	2. Yes 1. No 0. Does not apply to me 3. All the time 2. Sometimes 1. Never 0. Do not apply to me

Mobility and Orientation	9. Moving around by yourself without tripping into objects or people	3. Very hard for me 2. Not so easy for me 1. Very easy for me 0. I do not do this thing
	10. Moving around safely by myself in places I don't know	
	11. Walking home	
	12. Walking on bumpy ground	
	13. Seeing someone across the street when they are calling out to you	
	32. I often fall when I walk because I cannot see well	2. Yes 1. No 0. Does not apply to me
	33. I am not sure of how far a car or taxi is to me when I am crossing the road	
Daily living skills	14. Going to the toilet	3. Very hard for me 2. Not so easy for me 1. Very easy for me 0. I do not do this thing
	15. Seeing the right money when at the shop	
	16. Seeing the time on a wall clock	
	17. Seeing the time on a wristwatch	
	18. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.)	
	19. Pouring water/drink into a cup or glass	
	20. Seeing the food on my plate when eating	
	21. Going to the tuckshop alone	
	22. Using the cell phone (for example to dial a number or read messages)	
Treatment	44. I find it hard to clean my glasses	2. Yes 1. No 0. Does not apply to me
	45. I don’t like it when someone puts drops in my eyes	
	46. I cannot see clearly even when I wear my glasses	
	47. I do not like the way I look when wearing glasses	
	58. When I wear my glasses, I have to cross my eyes to see things	3. All the time 2. Sometimes 1. Never 0. Do not apply to me
	59. Glasses hurt my nose/ ears	
	60. I feel dizzy when I wear my glasses	
	61. My glasses sometimes break or fall off while I am wearing them	
Sociocultural	48. My family is ashamed of me because of my poor eyesight	2. Yes 1. No 0. Does not apply to me
	49. My parents think I am under a curse or bewitched because of my eyesight	
	50. I feel like I am cursed for not seeing well	
	54. I get bullied at school because I wear glasses	3. All the time 2. Sometimes 1. Never 0. Do not apply to me
	62. I am being mistreated by other children in my village because of my eye problems	
	63. I cannot see, so people say I cannot think well	

Hobbies, Leisure and sport	34. I need someone to stay at home with me because I cannot see well	2. Yes 1. No 0. Does not apply to me
	23. Taking part in athletics (running, jumping, throwing, and race walking) 24. Playing ball games (soccer, tennis, Mokoloti, etc.) 25. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu 26. Playing games requires me to see things that are near such as Morabaraba, Diketo, Mmela, etc.	3. Very hard for me 2. Not so easy for me 1. Very easy for me 0. I do not do this thing
	35. I often lose in most games because I cannot see 36. It is difficult to read the story books because of my eyesight 37. It is difficult to create crafts with clay or boxes because of my eyesight	2. Yes 1. No 0. Does not apply to me
	51. I go closer to the TV so that I can see better	3. All the time 2. Sometimes 1. Never 0. Do not apply to me

CHAPTER 6: TRANSLATING THE ENGLISH VERSION OF THE CVF-QoL INTO SEPEDI

The modified versions of the Children's Visual Function Quality of Life (CVF-QoL) instrument, specifically version 1.1 and version 2.1, developed as described in Chapter Five, underwent a rigorous translation process to ensure their suitability for Sepedi speakers. Professional translators were engaged to carry out this translation, employing the forward-backwards translation method recommended by the World Health Organization's Quality of Life team.

The resulting Sepedi translations, named Sepedi version 1.1 and Sepedi version 2.1, were then subjected to a validation process involving a group of learners. This step was crucial to ensure that the translated instruments accurately measured what they were meant to measure, which was an instrument that was culturally relevant and comprehensible to the targeted population. Additionally, a statistical comparison was conducted between the validated Sepedi and the original English versions of the CVF-QoL instrument. This comparison was instrumental in assessing the reliability of the translation and identifying any discrepancies between the two language versions. All discrepancies were corrected, so the Sepedi Versions were as good as the English Versions.

The process and results of this translation process are detailed in the manuscript titled "Translation of the Children's Visual Function Quality of Life (CVF-QoL) Instrument from English to Sepedi Language." This document has been submitted for publication in Ophthalmic and Physiological Optics (Manuscript ID: OPO-OA-5271), an open-access peer-reviewed journal.

This manuscript addresses objectives 7 and 8 which were effective to:

- Translate the CVF-QoL instrument into the Sepedi language, ensuring cultural and contextual appropriateness.
- Evaluate the reliability of the translated instrument by comparing it against the original English versions, thereby establishing its validity for use within the Sepedi-speaking population.

Translation of the Children's Visual Function Quality of Life (CVF-QoL) Instrument from English to Sepedi Language

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Abstract

Introduction: Translating quality-of-life questionnaires for children is crucial for accurately reflecting their experiences in different cultural contexts. This study aims to translate the Children's Visual Function Quality of Life (CVF-QoL) instrument from English to Sepedi and validate the translated version to ensure reliable data collection on children's well-being in non-English speaking populations.

Methods: This study utilized a forward-backward-forward translation method. Two qualified translators independently translated the CVF-QoL instrument into the Sepedi language for two age groups: 10-17 years and 6-9 years. The principal investigator (PI) reconciled these translations into two finalised Sepedi versions, which were then back-translated into English by a third translator. Discrepancies were addressed in a meeting between the PI and the third translator. Sepedi-speaking learners validated the clarity and relevance of the finalised Sepedi versions. After modifications, the versions were administered to a stratified group of learners based on age and visual status. Internal consistency was assessed, and the stability of the versions was evaluated by having the identical learners complete the questionnaires again 10 days later. Lastly, the alpha scores of the Sepedi versions were compared to those of the English version for further validation.

Results: Two versions of the CVF-QoL instrument were translated into Sepedi: Version 1.1 and Version 2.1. Face validation indicated that both versions are clear and relevant, and minimal modifications are needed. Version 1.1, administered to 41 learners aged 10-17, achieved a Cronbach's alpha of 0.930. Version 2.1 was given to 39 learners aged 6-9, scoring 0.762. Test-retest reliability showed scores of 0.927 for Version 1.1 and 0.712 for Version 2.1 after 10 days. Overall, the Cronbach scores for the Sepedi and English versions of 1.1 were 0.930 and 0.946, showing excellent internal consistency. For version 2.1, the scores were 0.762 and 0.777, indicating good internal consistency and confirming the instrument's validity.

Conclusion: The Sepedi version of the CVF-QoL instrument is a valid and reliable tool.

Keywords: instrument translation, validation, reliability, visual function quality of life, children, quality of life

Introduction

Visual impairment (VI) in children is a significant global concern, affecting approximately 19 million children worldwide[1]. VI prevalence is notably higher among children in middle to low-income regions[2,3]. Many children with VI also experience additional impairments, underscoring the necessity for multidisciplinary assessment and management[4]. Visual impairment can considerably negatively impact the educational achievement, social interactions, and emotional well-being of children, often leading to additional associated economic costs[5,6]. Early detection and intervention in children with VI are thus crucial for maximising visual potential and overall development[7,8]. Additionally, VI significantly affects the quality of life (QoL) of affected children[9].

Recently, there has been increased interest in developing and utilising self-reported outcomes related to QoL and patient satisfaction, specifically for vision-related issues[10]. These outcomes are referred to as vision-related quality of life (VRQoL) tools. Several studies have examined VRQoL tools for children with VI. For example, the Children's Visual Function Questionnaire (CVFQ) was utilised to measure VRQoL in children with bilateral congenital cataracts, revealing lower scores across all subscales compared to the control group[11]. Other instruments, such as the Cardiff Visual Ability Questionnaire for Children (CVAQC)[10], the Impact of Vision Impairment for Children (IVI-C)[12], and the Pediatric Quality of Life Inventory (PedsQL)[13], have also been used to assess functional visual ability and VRQoL in children with glaucoma and cataracts[14].

Researchers have also developed new VRQoL instruments, including the EYE-Q for juvenile idiopathic arthritis-associated uveitis[15] and the VQoL_CYP for visually impaired children[6]. A child-centred approach has led to the creation of age-appropriate extensions of the VQoL_CYP for children aged 8 to 17 years[16,17]. The World Health Organization's Quality of Life (WHOQOL) group has suggested that each country create a tool to measure the impact of diseases and treatments[18]. This tool should be culturally sensitive, age-appropriate, and available in the country's official languages[18].

The Children's Visual Function Quality of Life (CVF-QoL) instrument has thus been designed to assess the QoL for rural school-going children in South Africa. The CVF-QoL instrument has two versions in English: Version 1.1 for children aged 10 to 17 years and Version 2.1 for younger children aged 6 to 9 years. This study aims to translate the validated English versions of the Children's Visual Function Quality of Life (CVF-QoL) Instrument into Sepedi and to validate the translated instrument. This translation is crucial for assessing the impact of VI on children's daily lives across different cultures and languages. Such translations facilitate cross-cultural comparisons and provide valuable insights into patient-reported outcomes[19].

Methodology

This translation and validation study was conducted among rural, school-going children with visual impairments who resided in the Sekhukhune district in Limpopo Province, South Africa. The study adhered to the ethical principles outlined in the Declaration of Helsinki for research involving human participants and received approval from the Biomedical Research and Ethics Committee (BREC) at the University of KwaZulu-Natal (BREC/00003939/2022). Consent and assent forms were completed by the parents and children, respectively. The Ethics Committee of the Limpopo Department of Education also approved this study (Ref: 2/2/2).

The two versions of the CVF-QoL instrument were translated from English to Sepedi using the forward-backward-forward method as outlined by the International Quality of Life Assessment group of the World Health Organization (WHO)[20]. The versions include CVF-QoL Version 1.1 for children aged 10-17 years and Version 2.1 for children aged 6-9 years with visual impairments. Sepedi was selected as the language for translation due to its usage in the study setting, the Sekhukhune district of Limpopo Province, South Africa[21].

The following steps were followed in translating and validating the Sepedi versions of the CVF-QoL instrument:

Step 1: Both English versions of the CVF-QoL instruments were sent to two independent translators. One was a lecturer from the University of Limpopo lecturing on the module Sepedi, and the other was from Afrolingo Translation Services. This South African company translates over 100 national and international languages. Their task was to translate the English versions into Sepedi.

Step 2: After receiving the translations, all items from the two independent Sepedi versions were reviewed and compared by the principal investigator, whose indigenous language is Sepedi. This resulted in a single corrected and reconciled Sepedi version of the CVF-QoL instrument.

Step 3: These reconciled Sepedi versions were then sent to a third translator, a qualified language practitioner, who translated them back into English. The PI and the translator held a Microsoft team meeting to address discrepancies and ensure that the Sepedi versions aligned with the English content. This resulted in a final forward translation with no discrepancies between the English and Sepedi versions of the CVF-QoL instruments.

Step 4: Face validation of the revised Sepedi versions involved presenting the two instruments to 30 learners. The first language of all learners selected was Sepedi, and they were learning Sepedi as their first language at school. Version 1.1, targeted at 10 -17-year-old school children, was validated by 15 learners in the relevant age category, while Version 2.1 was

validated by 15 learners aged 6-9 years. Their role was to assess the items' comprehensibility, formatting, and relevance. Items were retained if more than 70% of the learners agreed that they understood the task and found it important. Modifications were made based on their feedback, leading to the final Sepedi versions of the CVF-QoL instrument.

Step 5: To assess the reliability and validity of the final CVF-QoL Sepedi versions, the two instruments were subsequently administered to a different group of learners than those in Step 4. The initial expected sample size was 32 participants per Sepedi version; however, 40 participants were recruited per version to account for potential dropouts. Learners aged 6 to 9 years completed Sepedi Version 2.1, while those aged 10 to 17 years completed Sepedi Version 1.1. On completion, each learner was given an additional questionnaire to complete at home 10 days later. This approach was also utilised in other studies that developed similar instruments for children in different contexts[22–24].

Step 6: For data analysis, Cronbach's Alpha with a 95% confidence interval was calculated for both final Sepedi versions under the guidance of a statistician. An Alpha score below 0.6 indicates fair internal consistency, scores between 0.6 and 0.8 indicate good internal consistency, and scores above 0.8 indicate excellent internal consistency[25].

Results

Each translator had the opportunity to translate version 1.1 and version 2.1 of the CVF-QoL instrument. The reports from two translators for version 1.1 were combined to create a single Sepedi version 1.1 instrument. In contrast, the reports for version 2.2 were similarly merged into Sepedi version 2.2 by the principal investigator. The Sepedi version 1.1 contained 89 items, whereas the Sepedi version 2.2 had 63 items.

Each Sepedi version underwent face validation with 15 learners aged between 6 and 17 years, whose demographics are detailed in Table 1. The learners rated all content and items of the CVF-QoL instrument as clear, comprehensive, and relevant. They also provided input on word choices, indicating a preference for "raloka" over "bapala," and noted the omission of a game called "Wulu," which they suggested should be included.

As a result of the face validation, both Sepedi versions of the CVF-QoL were modified, leading to the final versions presented in Appendix 1 and Appendix 2. These final versions were then subjected to further validation.

Table 1: Demographics of the learners who participated in the face validation for both versions of the CVF-QoL instrument.

Variables		Version 1.1 Participants	Version 2.1 Participants
		Number (%)	Number (%)
Age in years	6-7	0	6 (40)

	8-9	0	9 (60)
	10-12	4 (27)	0
	13-15	6 (40)	0
	16+	5 (33)	0
Genders	Males	5 (33)	7 (47)
	females	10 (67)	8 (53)
Grades	1-3	0	9 (60)
	4-6	3 (20)	6 (40)
	7-9	7 (47)	0
	10-12	5 (33)	0

Table 2 below outlines the rating scales of the two Sepedi versions, which are Appendices 1 and 2, and the values for each rating scale. For example, the question "Indicate how much difficulty you have with the following activities due to vision problems" translated to "Bontšha gore go bothata gakakaang go wena ka ditiragalo tše di latelago ka lebaka la mathata a go bona ga gago" the responses can be rated as follows:

- 3 (Go thata kudu) with a score of 0
- 2 (Go thatanyana) with a score of 50
- 1 (Ga go thata) with a score of 100
- 0 (Ga ke amege mo), scored as "#" to indicate a missing response. This score should not be included when calculating the average score.

Scores indicate the percentage achieved of the total possible score; for example, a score of 50 indicates 50% of the highest possible score.

Table 2: Rating Scales and Values for the CVF-QoL Instrument

Responds	Change the original response category	To record the value of:
Bontšha gore go bothata gakakaang go wena ka ditiragalo tše di latelago ka lebaka la mathata a go bona ga gago:		
Go thata kudu	3	0
Go thatanyana	2	50
Ga go thata	1	100
Ga ke amege mo	0	# (missing)
Hle bontšha ge e ba dilo tše di a go diragalela:		
Ee	3	0
Ka dinako tše dingwe	2	50
Aowa	1	100
Ga ke amege mo	0	#(missing)
Bontšha gore se se direga makga a makae:		
Ka dinako ka moka	3	0
Ka dinako tše dingwe	2	50
Ga se ke se direge	1	100
Ga ke amege mo	0	#(missing)
Naa go bothata goba bonolo bjang go wena go dira dilo tše di latelago ka lebaka la bothata bja mahlo a gago:		
Go bothata kudu go nna	3	0
Ga go bonolo go nna	2	50
Go bonolo kudu go nna	1	100
Ga ke dire seo	0	# (missing)
Hle bontšha ge e ba dilo tše di a go diragalela:		
Ee	2	0

Aowa	1	100
Ga ke amege mo	0	#(missing)
	Laetša gore se se direga makga a makae:	
Dinako ka moka	3	0
Dinako tše dingwe	2	50
Ga e direge	1	100
Ga ke amege mo	0	#(missing)

Forty-one learners aged 10 to 17 years completed the Sepedi Version 1.1 of the CVF-QoL instrument. The majority of them were female (61%), and their visual status is outlined in Table 3 below. In total, 39 learners aged 6 to 9 years completed the Sepedi Version 2.1 of the CVF-QoL questionnaire, with a higher number of females. Their demographics are detailed in Table 2.

Table 3: Demographic information of participants who completed both Sepedi Versions of the CVF-QoL instrument.

Variables		**Version 1.1 Participants**	**Version 2.1 Participants**
		Number (%)	Number (%)
Ages in years	6-7	0	15 (38.5)
	8-9	0	24 (61.5)
	10-12	7 (12)	0
	13-15	22 (54)	0
	16+	12 (29)	0
Gender	Females	25 (61)	24 (61.5)
	Males	16 (39)	15 (38.5)
Visual status	Normal sighted	9 (22)	10 (26)
	Refractive errors	11 (27)	09 (23)
	Visual impairment	12 (29)	11 (28)
	Blindness	9 (22)	9 (23)

The psychometric properties of the Sepedi version of the CVF-QoL instrument were evaluated. The domains were averaged, and the Cronbach alpha test was conducted. The overall alpha score for Sepedi Version 1.1 was 0.927, which indicates excellent internal consistency. In contrast, Version 2.1 had an alpha score of 0.762, which is considered to demonstrate acceptable internal consistency, as shown in Table 4 below.

Table 4: Alpha Coefficients and Standard Deviations for Both Sepedi Versions of the CVF-QoL Instrument

	Sepedi Version 1.1 of CVF-QoL				**Sepedi Version 2.1 of CVF-QoL**			
Scale/Domain	**Number of items averaged**	**Mean**	**SD**	**Alpha**	**Number of items averaged**	**Mean**	**SD**	**Alpha**
School and learning	17	55,660	10,886	0,896	13	68,295	16,389	0,884

Mobility and Orientation	8	66,150	10,746	0,902	7	65,038	12,029	0,891
Daily living skills	17	73,529	12,992	0,907	10	75,781	16,652	0,864
Hobbies, leisure, and sport	9	56,566	12,050	0,889	8	65,441	16,691	0,844
Social interaction	6	81,250	7,984	0,699	2	91,667	18,596	0,129
Psychological or Emotional function	17	64,118	16,676	0,842	9	64,815	20,833	0,411
Treatment	8	70,980	16,135	0,638	8	81,250	9,161	0,405
Sociocultural	7	79,762	9,058	0,778	6	81,730	12,705	0,778
Overall	89	59,140	20,240	0,930	63	61,190	21,543	0,762

SD=standard deviation,

All learners submitted the questionnaire, which they completed at home 10 days after the initial attempt. Table 5 presents the results of the first and second attempts for Sepedi version 1.1 of the CVF-QoL, while Table 6 summarises the results for Sepedi version 2.1 of the same instrument. The overall Cronbach's alpha scores for version 1.1 in the first and second attempts were 0.930 and 0.927, respectively, indicating excellent internal consistency. Slightly lower overall Cronbach's alpha scores for version 2.1 in the first and second attempts were obtained, i.e. 0.762 and 0.712, respectively. However, both indicate moderate to good internal consistency[25].

Table 5: Cronbach's alpha score for the first and second attempts of Sepedi version 1.1.

Sepedi version 1.1		**First-attempt ANOVA results**			**Second attempt ANOVA results**		
Domain	**Number of items**	**Mean**	**SD**	**Alpha**	**Mean**	**SD**	**Alpha**
SL	16	55,660	10,886	0,896	55,560	10,857	0,884
MO	8	66,150	10,746	0,902	66,010	10,334	0,914
DLS	18	73,529	12,992	0,907	72,129	11,927	0,911
HLS	8	56,566	12,050	0,889	57,320	12,014	0,879
SI	7	81,250	7,984	0,699	80,691	8,105	0,706
PEF	17	64,118	16,676	0,842	63,970	16,514	0,843
T	8	70,980	16,135	0,638	70,980	16,135	0,638
SC	7	79,762	9,058	0,778	79,762	9,058	0,778
Overall	89	59,140	20,240	0,930	59,270	20,364	0,927

***SD**= Standard Deviation*

Table 6: Cronbach's alpha score for the first and second attempts of Sepedi version 2.1.

Sepedi version 2.1		**First-attempt ANOVA results**			**Second attempt ANOVA results**		
Domain	**Number of items**	**Mean**	**SD**	**Alpha**	**Mean**	**SD**	**Alpha**
SL	16	68,295	16,389	0,884	67,880	277,320	0,887

MO	8	65,038	12,029	0,891	64,850	151,613	0,891
DLS	18	75,781	16,652	0,864	75,156	273,680	0,853
HLS	8	65,441	16,691	0,844	65,441	278,670	0,844
SI	7	91,667	18,596	0,129	91,667	18,596	0,129
PEF	17	64,815	20,833	0,411	64,815	20,833	0,411
T	8	81,250	9,161	0,405	81,250	9,161	0,405
SC	7	81,730	12,705	0,778	81,730	12,705	0,778
Overall	89	61,190	21,543	0,762	60,595	21,502	0,712

***SD**= Standard Deviation*

In comparing the overall alpha scores for both versions across all attempts, Table 5 and Table 6 show that the alpha scores for Version 1.1 are 99.7% correlated, and those for Version 2.1 are 93.4% correlated. Therefore, the test-retest reliability for both versions demonstrates that they are reliable.

To ensure cross-cultural validation, we compared the Cronbach alpha scores of the Sepedi versions with those of the original English versions of the CVF-QoL. Detailed scores for the English version are available in another publication currently under review. As shown in Table 7 below, the English and Sepedi version 1.1 demonstrated excellent internal consistency, as indicated by their Cronbach alpha scores. The same is true for both the English and Sepedi version 2.1, which also maintained a good level of internal consistency. Therefore, the translated version is valid and can be used effectively as the English version.

Table 7: Comparison of Cronbach alpha scores between the original English versions and the translated Sepedi version of the CVF-QoL instrument.

Scales/ domain	Eng Ver 1.1 (α)	Sep Ver 1.1 (α)	Eng Ver 2.1 (α)	Sepedi Ver 2.1 (α)
School and learning	0,862	0,896	0,881	0,884
Mobility and Orientation	0,933	0,902	0,897	0,891
Daily living skills	0,927	0,907	0,888	0,864
Hobbies, leisure, and sport	0,879	0,889	0,820	0,844
Social interaction	0,730	0,699	0,352	0,129
Psychological or Emotional function	0,858	0,842	0,589	0,411
Treatment	0,734	0,638	0,681	0,405
Sociocultural	0,808	0,778	0,671	0,778
Overall	0,946	0,930	0,777	0,762

***Eng Ver**= English version of the CVF-QoL instrument, **Sep Ver**=mSepedi version of the CVF-QoL instrument, **α** =Cronbach alpha score*

Discussion

Health-related quality of life (HRQoL) is a critical concept in healthcare, as it measures the impact of health conditions on patients' well-being beyond traditional clinical indicators[26,27]. Translating HRQoL instruments is vital for cross-cultural research and global clinical trials, especially in diverse settings such as South Africa[28,29]. In this study, the newly developed Children's Visual Function Quality of Life (CVF-QoL) instrument was translated from English to Sepedi for rural school-going children. The CVF-QoL instrument is designed for children aged 6 to 17 years and consists of two versions: Version 1.1 for children aged 10 to 17 years and Version 2.1 for children aged 6 to 9 years. Each version covers eight domains, with 89 items in Version 1.1 and 63 items in Version 2.1.

The study utilized the forward-backward-forward translation method, which is widely recommended[19,29–31]. Three professionals were involved in translating the instrument. Thirty targeted children confirmed that the content of both versions of the CVF-QoL was clear, comprehensive, and reliable. This approach to face validation was also employed by Angeles-Han (2011) while validating a vision-related quality-of-life instrument for children aged 8 to 18 years with juvenile idiopathic arthritis-associated uveitis[32]. The study utilised a targeted population to assess if the questionnaire effectively measured its intended construct. The CVF-QoL instrument demonstrated excellent internal consistency for Sepedi Version 1.1 and Version 2.1, as measured by Cronbach's alpha scores. Furthermore, the test-retest reliability analysis indicated that all versions of the CVF-QoL are reliable.

The English versions of the CVF-QoL alpha scores, which are under review and will be published elsewhere, are comparable to the Sepedi version of the CVF-QoL instrument, further validating the translated versions. The social interaction component of version 2.1 contains only two items, which has resulted in a comparatively lower Cronbach alpha score. Research shows fewer items within a domain can lead to a lower alpha score[25]. To address this issue, four items were adopted from the social interaction domain of the already validated version 1.1. This change increases the number of items in version 2.1 from 63 to 67, and it will now be referred to as version 2.2, attached as supporting information **S1**. The adopted items are listed below in Sepedi.

- 64. Batho ba tenega ka wena ka lebaka la pono ya gago
- 65. Go lebelelana ka mahlong ge o boledišana le mogwera wa gago

- 66. Go tšea karolo ka ditiragalong tša go fapafapana (bjalo ka ditiragalo tša dipapadi) le bagwera
- 67. Go dira bagwera

Limitations and Recommendations

Due to limited resources, we could not translate the CVF-QoL instrument into braille. As a result, blind children required assistance to complete the questionnaire. Each child had a trained research assistant to help them with this process. We recommend translating the CVF-QoL into additional languages to ensure it can reach all rural children in South Africa.

Conclusion

The Sepedi version of the CVF-QoL instrument is a valid and reliable tool for measuring the quality of life-related to visual function in rural, school-going children.

Data Availability Statement

The data associated with this manuscript can be accessed via the email address from the corresponding author, TSS Magakwe: sellomagakwe80@gmail.com

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Authors Contribution

T.S.S.M., R.H., and Z.N.X. conceived and planned the experiments. T.S.S.M. conducted the experiments and data collection. R.H. and Z.N.X supervised the data collection. T.S.S.M., R.H., and Z.N.X. reviewed and analysed the results. T.S.S.M. drafted the manuscript, while R.H. and Z.N.X. edited and modified it. All authors have accepted and approved the final version for submission to the journal.

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Appendix 1: The Sepedi version 1.1 of the CVF-QoL instrument

Sedirišwa sa Boleng bja Mohola wa Go bona Ga Bana (CVF-QoL)

(Phetolelo ya CVF-QoL ya ba mengwaga e 10-17)

Hle bona lenaneopotšišo ka mo tlase. Lenaneopotšišo le le go botšiša mabapi le pono ya gago, Ka mo o šomišago mahlo a gago go phethagatša mešomo ya letšatši, le ka mo o ikwago mabapi le pono ya mahlo a gago. Ga go na Karabo ya go nepagala goba ya go se nepagale. Go aetheme ye nngwe le ye nngwe, kgetha karabo yeo o bonago o dumelelana le yona ka go dira sefapano ka lepokising ☒.

Hle leka go itlaletša phatišišo ye ka bowena. Ge o nyaka thušo, o ka botšiša mošomi wa porotšeke. Ga wa swanela go bontšha motho dikarabo tša gago. Se sengwe, ga go motho yo a go tsebago yo a tlogo bona lenaneopotšišo ge o feditše go le tlatša.

Bontšha gore go bothata gakakaang go wena ka ditiragalo tše di latelago ka lebaka la mathata a go bona ga gago:

	Go thata kudu	Go thatanyana	Ga go thata	Ga ke amege mo
1. Go bona gabotse seo se ngwadilwego letlapeng SL	☐	☐	☐	☐
2. Go thala (toroya) SL	☐	☐	☐	☐
3. Go bapetša mebala (mohl, ge o khalara goba o penta) SL	☐	☐	☐	☐
4. Go šomiša sekero go hwetša dibopego tšeo ke di ratago SL	☐	☐	☐	☐
5. Go phetha mešomo ya ka ya sekolo ka nako SL	☐	☐	☐	☐
6. Go bala dipuku go akaretša dipuku tša mešongwana SL	☐	☐	☐	☐
7. Go bona dinepe gabotse pukung ya ka (mohl, puku ya mmapa) SL	☐	☐	☐	☐

8. Go bala goba go ngwala go bapana le mothalo ka pukung SL	☐	☐	☐	☐
9.Go šomiša senamelwa sa bohle (mohl., thekisi goba pese) MO	☐	☐	☐	☐
10. Go sepelasepela ka bowena ntle le go thulana le dilo goba batho MO	☐	☐	☐	☐
11. Go sepela o šireletšegile mafelong a mafsa ntle le thušo MO	☐	☐	☐	☐
12. Go sepela go ya gae MO	☐	☐	☐	☐
13. Go sepela mmileng o sa lekelelanago MO	☐	☐	☐	☐
14. Go bona motho ka mošola wa tsela ge a go bitša MO	☐	☐	☐	☐
15. Go ga meetse DLS	☐	☐	☐	☐
16. Go ya ntlwaneng ya boithomelo DLS	☐	☐	☐	☐
17. Go notlela/khiela goba go notlolla/khiolla lebati DLS	☐	☐	☐	☐
18. Go fapantša tšhelete ya dikhoine goba pampiri ge ke lefela ka lebaka la pono ya ka DLS	☐	☐	☐	☐
19. Go iša dipudi le dikgomo mafulong gore di yo fula DLS	☐	☐	☐	☐
20. Go hlatswa yunifomo ya ka ya sekolo gore e hlweke DLS	☐	☐	☐	☐
21. Go dira mesongwana ya ka gae (go swana le; go swiela, go hlatswa dibjana, go apea, go lokišetša dijo) DLS	☐	☐	☐	☐

22. Go bona nako go sešupanako sa lebotong DLS	☐	☐	☐	☐
23. Go bona nako mo sešupanakong/watšheng ya letsogo DLS	☐	☐	☐	☐
24. Go ntša selo ka khapotong DLS	☐	☐	☐	☐
25. Go itlhokomela (go swana le go hlapa sefahlego, go diriša sesepe sa meno, go gohla meno, go ikapeša, go bofa marala, bj.bj.) DLS	☐	☐	☐	☐
26. Go tšhela meetse/seno ka komiking goba galaseng DLS	☐	☐	☐	☐
27. Go bona dijo ka poleiting ya ka ge ke eja DLS	☐	☐	☐	☐
28. Go ya thakešopong ke le tee DLS	☐	☐	☐	☐
29. Go šomiša selefounu (mohlala, go taela goba go bala molaetša) DLS	☐	☐	☐	☐
30. Go tšea karolo go diatleletiki (go kitima, go taboga, go foša, le go sepela o kitima) HLS	☐	☐	☐	☐
31. Go dira dithaloko tša kgwele (kgwele ya dinao, thenese, Mokoloti, bj.bj) HLS	☐	☐	☐	☐
32. Go raloka dipapadi tsa go nyaka gore ke bone dilo di sa le kgojana go swana le Dithini, Thapo, le Wulu HLS	☐	☐	☐	☐
33. Go raloka dipapadi go nyaka gore ke bone dilo ka bokgauswi go swana le Morabaraba, Diketo, Mmela, bj.bj. HLS	☐	☐	☐	☐

34. Go lebelelana ka mahlong ge o boledišana le mogwera wa gago SI	☐	☐	☐	☐
35. Go tšea karolo ka ditiragalong tša go fapafapana (bjalo ka ditiragalo tša dipapadi) le bagwera SI	☐	☐	☐	☐
36. Go dira bagwera SI	☐	☐	☐	☐

Hle bontšha ge e ba dilo tše di a go diragalela:

	Ee	Ka dinako tše dingwe	Aowa	Ga ke amege mo
37. Ka mo ke bonagao ka gona go ama lebelo leo ke ngwalago le go bala ka lona SL	☐	☐	☐	☐
38. Mahlo aka a ba bohloko le go tšwa megokgo ge ke bala goba ke dira mošomo wa kgauswi SL	☐	☐	☐	☐
39. Mantšu a bonagala gabedi ge ke bala SL	☐	☐	☐	☐
40. Ke nagana gore nka holega bokaone ge ka ya sekolong sa go ikgetha sa batho ba go se bone gabotse SL	☐	☐	☐	☐
41. Ga ke šome gabotse ka melekwana le ditlhahlobo bjalo ka bangwe ka lebaka la pono ya ka SL	☐	☐	☐	☐
42. Ke thatafalelwa ke go bala seo bangwe ba se ngwadilego ka lebaka le la pono ya ka SL	☐	☐	☐	☐
43. Ke opa ke hlogo ka morago ga go bala lebakanyana SL	☐	☐	☐	☐
44. Ke kopolla dinoutse tša barutwanakanna ka ge ke	☐	☐	☐	☐

thatafalelwa ke go bona gabotse mo letlapeng SL				
45. Ga ke na bonnete bja gore koloi goba thekisi e tla bokgole bjo bokakaang ge ke tshela tsela MO	☐	☐	☐	☐
46. Gantši ke awa ge ke sepela ka gobane ga ke kgone go bona gabotse MO	☐	☐	☐	☐
47. Gantši ke nyaka motho yo a ka dulago ka gae le nna ka gobane ga ke kgone go bona gabotse DLS	☐	☐	☐	☐
48. Ke thatafalelwa ke go hlokomela bana bešo ge re šetše re nnoši ka gae DLS	☐	☐	☐	☐
49. Gantši ke lahlegelwa dipapading tše dintši ka baka la pono ya ka HLS	☐	☐	☐	☐
50. Go bothata go bala puku ya ditori ka lebaka la la pono ya ka HLS	☐	☐	☐	☐
51. Go thata go hlama dilo tša letsopa goba mapokisi ka baka la pono yaka HLS	☐	☐	☐	☐
52.Go bothata go loga ka lebaka le la pono ya ka HLS	☐	☐	☐	☐
53. Batho ba tenega ka wena ka lebaka la pono ya gago SI	☐	☐	☐	☐
54. Bana ba bangwe ga ba nyake go bapala le nna ka gobane ga ke kgone go bona SI	☐	☐	☐	☐
55. Go bothata go bona ge motho a thabile, a nyamile goba a befetše ge a bolela le nna SI	☐	☐	☐	☐

56. Ke a gatelega ge ke swanetše go ya go hlahlobja mahlo PEF	☐	☐	☐	☐
57. Ke ikwa ke fapane le bana ba bangwe ka gobane mahlo a ka a rapame PEF	☐	☐	☐	☐
58. Go apara digalase tša mahlo go dira gore ke ikwe ke fapane le bana ba bangwe PEF	☐	☐	☐	☐
59. Ke ikwa eka batho ba mphelela pelo ka lebaka le la pono ya ka PEF	☐	☐	☐	☐
60. Ke ikwa ke nyamile ka ge nka se kgone go kgetha mošomo wo ke o nyakago ka baka le la pono ya ka PEF	☐	☐	☐	☐
61. Ke ikwa ke nyamile ge ke phošollwa dilong tšeo ke sa di bonego gabotse PEF	☐	☐	☐	☐
62. Ke kwa bohloko ge bagwera ba ntshega ka ge ke sa kgone go bona gabotse PEF	☐	☐	☐	☐
63. Ke kwa e ke ke morwalo go ba lapa la ka le batho ba kgauswi ka lebaka le la pono ya ka PEF	☐	☐	☐	☐
64. Ga ke sa itshepa ka baka la mahlo a ka a sa bonego gabotse PEF	☐	☐	☐	☐
65. Ke tšea nako ye ntši ke tšea kalafi ya mahlo (dikopano le ngaka ya mahlo, go phetša, marothodi a mahlo, le kalafong) T	☐	☐	☐	☐
66. Ke hwetša go le thata go hlwekiša digalase tša ka T	☐	☐	☐	☐
67. Marothodi a go tšhela ka mahlong a babiša mahlo a ka T	☐	☐	☐	☐

68. Ga ke bone gabotse le ge ke apare digalase tsa mahlo [T]	☐	☐	☐	☐
69. Ke leša maloko a lapa la ka dihlong ka lebaka le la pono ya ka [SC]	☐	☐	☐	☐
70. Ke kwa eke ke rogakilwe ge ke sa bone [SC]	☐	☐	☐	☐

Bontšha gore se se direga makga a makae:

	Ka dinako ka moka	Ka dinako tše dingwe	Ga se ke se direge	Ga ke amege mo
71. Ke tšhoga go nwelela ge ke yo ga meetse ka nokeng [DLS]	☐	☐	☐	☐
72. Ke batamela sekirini sa thelebišene (TV) gore ke kgone go bona gore go diregang ka TV [HLS]	☐	☐	☐	☐
73. Ke tšhoga gore nka foufala [PEF]	☐	☐	☐	☐
74. Ke tshwenyega kudu ka mahlo a ka a sa bonego [PEF]	☐	☐	☐	☐
75. Ke a tlaišwa ka sekolong ka gobane kea para digalase tsa mahlo [SC]	☐	☐	☐	☐
76. Batho ba nagana gore ga ka hlalefa ka ge ke sa bone gabotse [PEF]	☐	☐	☐	☐
77. Ke tšhaba go botša morutiši gore ga ke bone gabotse ka phapošing [PEF]	☐	☐	☐	☐
78. Ke tshwenywa kudu ka ge batswadi ba ka ba ntshwara ka tsela e fapanego le bana bešo ka ge ke sa bone gabotse [PEF]	☐	☐	☐	☐

79. Ke ikwa ke se na mohola ka ge ke sa bone gabotse PEF	☐	☐	☐	☐
80. Go thata gore ke itwele ka mantšu, le ge ke tseba gore ke bolela nnete PEF	☐	☐	☐	☐
81. Ke hlabja ke dihlong go tsena sekolo sa go ikgetha PEF	☐	☐	☐	☐
82.Ge ke apara digalase tsa mahlo, ke swanetše go tomola mahlo go bona dilo T	☐	☐	☐	☐
83. Digalase tsa mahlo di nkgobatša nko/ ditsebe tsa ka T	☐	☐	☐	☐
84. Ke kwa modikologa/go belekega ge ke apara digalase tša ka T	☐	☐	☐	☐
85. Digalase tša ka tsa mahlo ka nako ye nngwe di a robega goba di a wa ge ke di apere T	☐	☐	☐	☐
86. Ke boditšwe gore ke rogakilwe goba ke loilwe ge ke sa bone gabotse SC	☐	☐	☐	☐
87. Ke swarwa go fapana le bana ba bangwe mo Motseng ka lebaka la bothata bja mahlo a ka SC	☐	☐	☐	☐
88. Batho ba bangwe ba nagana gore ga ke nagana gabotse ka lebaka la bothata bja ka bja mahlo SC	☐	☐	☐	☐
89. Batho ba bangwe ba nagana gore Modimo o otla batswadi ba ka ka bothata bja ka bja mahlo SC	☒	☐	☐	☐

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leasure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural

Appendix 2: The Sepedi version 2.1 of the CVF-QoL instrument

Sedirišwa sa Boleng bja Mohola wa Go bona Ga Bana (CVF-QoL)

(Phetolelo ya CVF-QoL ya ba mengwaga e 6-9)

Hle bona letlakala la go šomela ka mo tlase. Letlakala le la go šomela le tla go botšiša mabapi le mokgwa wo o bonago, ka moo o šomišago mahlo a gago mo mešomong ya ka mehla, le ka mokgwa wo o ikwago mabapi le ka mokgwa wo o bonago. Ga go na Karabo ya go nepagala goba ya phošo. Go lefoko le lengwe le le lengwe, dira leswao ☑ mo sefahlegong seo se laetšago ka mo o ikwago mabapi le go ba bonolo goba bothata ge o dira dilo.

Hle leka go tlatša letlakala la go šomela ka bowena. Ge o nyaka thušo, o ka botšiša mošomi wa porotšeke. Ga wa swanela go bontšha motho dikarabo tša gago. Se sengwe, ga go motho yo a go tsebago yo a tlogo bona lenaneopotšišo ge o feditše go le tlatša.

Naa go bothata goba bonolo bjang go wena go dira dilo tše di latelago ka lebaka la bothata bja mahlo a gago:

	Go bothata kudu go nna	Ga go bonolo go nna	Go bonolo kudu go nna	Ga ke dire seo
1. Go bona gabotse seo se ngwadilwego letlapeng SL	☹	😐	☺	⊘
2. Go thala(toroya) SL	☹	😐	☺	⊘
3. Go bapetša mebala (mohl, ge o khalara goba go penta) SL	☹	😐	☺	⊘
4. Go šomiša sekero go hwetša dibopego tšeo ke di ratago SL	☹	😐	☺	⊘
5. Go phetha mešomo ya ka ya sekolo ka nako SL	☹	😐	☺	⊘
6. Go bala dipuku go akaretša dipuku tša go ithuta SL	☹	😐	☺	⊘

7. Go kopolla ka tshwanelo go tšwa letlapeng goba ka pukung SL



8. Go bala le go ngwala go bapana le mothalo wa puku SL



9. Go sepelasepela ka bowena ntle le go raga dilo goba go wela batho MO



10. Go sepelasepela ga go bolokega ka bowena mo mafelong ao o sa a tsebego MO



11. Go sepela go ya gae MO



12. Go sepela tseleng ya go se lekalekane MO



13. Go bona motho yo a lego ka lehlakoreng le lengwe la seterata ge a go bitša MO



14. Go ya ntlwaneng ya boithomelo DLS



15. Go bona tšhelete ya maleba ge o le šophong DLS



16. Go bona nako go sešupanako sa lebotong DLS



17. Go bona nako mo sešupanakong/watšheng ya letsogo DLS



18. Go itlhokomela (go swana le go hlapa sefahlego, go diriša sesepe sa go hlapa meno, go gohla meno, go ikapeša, go bofa marala, bj.bj.) DLS



19. Go tšhela meetse/seno ka komiking goba galaseng DLS



20. Go bona dijo ka poleiting ge ke eja DLS



21. Go ya thakešopong ka noši DLS



22. Go šomiša selefounu (mohlala go taela goba go bala melaetša) DLS



23. Go tšea karolo go diatleletiki (go kitima, go taboga, go lahlela, le go šiana ka go sepeleša) HLS				
24. Go raloka dipapadi tša kgwele (kgwele ya dinao, thenese, Mokoloti, bj.bj) HLS				
25. Go raloka dipapadi go nyaka gore ke bone dilo di sa le kgojana go swana le Dithini, Thapo, le Wulu HLS				
26. Go raloka dipapadi go nyaka gore ke bone dilo di le kgauswi go swana le Morabaraba, Diketo, Mmela, bj.bj. HLS				

Hle bontšha ge e ba dilo tše di a go diragalela:

	Ee	Aowa	Ga ke amege mo
27. Mahlo a ka a bohloko ge ke bala SL	Ee	Aowa	?
28. Ga ke bone seo batho ba bangwe ba se ngwalago dipukung tša bona SL	Ee	Aowa	?
29. Mantšu a bonagala gabedi ge ke bala SL	Ee	Aowa	?
30. Ke opa ke hlogo ge ke bala SL	Ee	Aowa	?
31. Ke tena batho ka lebaka le la pono ya ka SL	Ee	Aowa	?
32. Gantši ke awa ge ke sepela ka gobane ga ke kgone go bona gabotse MO	Ee	Aowa	?
33. Ga ke na bonnete bja gore koloi goba thekisi e tla bokgole bjo bokakaang ge ke tshela tsela MO	Ee	Aowa	?
34. Ke nyaka motho yo mongwe go dula le nna ka gae ka gobane ga ke bone gabotse DLS	Ee	Aowa	?
35. Gantši ke lahlegelwa dipapading tše dintši ka ge ke sa kgone go bona HLS	Ee	Aowa	?
36. Go bothata go bala dipuku tša ditori ka lebaka la pono ya ka HLS	Ee	Aowa	?

37. Go bothata go hlama dilo tša go dirwa ka diatla ka letsopa goba mapokisi ka lebaka la la pono ya ka HLS	Ee	Aowa	?
38. Bana ba bangwe ga ba nyake go raloka lenna ka lebaka la pono ya ka SI	Ee	Aowa	?
39. Go bothata go bona ge motho a thabile, a nyamile goba a befetšwe ge a bolela le nna SI	Ee	Aowa	?
40. Ga ke rate go ya go hlahloba mahlo a ka PEF	Ee	Aowa	?
41. Ke ikwa ke fapane le bana ba bangwe ka gobane mahlo a ka a rapame PEF	Ee	Aowa	?
42. Go apara digalase tsa mahlo go dira gore ke ikwe ke fapane PEF	Ee	Aowa	?
43. Ke a nyama ge bagwera ba ka ba ntshega ka lebaka la gore ga ke bone gabotse PEF	Ee	Aowa	?
44. Ke hwetša go le thata go hlwekiša digalase tša ka T	Ee	Aowa	?
45. Ga ke rate ge motho a ntšhela marothodi a mahlo ka mahlong T	Ee	Aowa	?
46. Ga ke kgone go bona gabotse le ge ke apere digalase T	Ee	Aowa	?
47.Ga ke rate ka mokgwa wo ke lebelegago ge ke apere digalase T	Ee	Aowa	?
48. Ke leša ba lapa lešo dihlong ka lebaka la pono ya ka SC	Ee	Aowa	?
49. Batswadi ba ka ba nagana gore ke rogakilwe goba ke loilwe ka lebaka le la pono ya ka SC	Ee	Aowa	?
50. Ke kwa e ke ke rogakilwe gore ke se bone gabotse SC	Ee	Aowa	?

Laetša gore se se direga makga a makae:

	Dinako ka moka	Dinako tše dingwe	Ga e direge	Ga ke amege mo
51. Ke batapela TV gore ke kgone go bona gabotse HLS	☹	😐	☺	🚫

52. Ke tšhoga gore nka foufala PEF	
53. Ke a tshwenyega gore ga ke bone gabotse PEF	
54. Ke tlaišwa sekolong ka ge ke apara digalase tsa mahlo SC	
55. Batho ba nagana gore ga ka hlalefa ka ge ke sa bone gabotse PEF	
56. Ke tšhaba go botša morutiši gore ga ke bone gabotse ka phapošing PEF	
57. Ke jewa ke dihlong mabapi le go tsena sekolo sa go ikgetha PEF	
58. Ge kea para digalase ke swanetše go fapantša mahlo go bona dilo T	
59. Digalase di nkgobatša nko/ditsebe T	
60. Ke a dikologa ge ke apara digalase T	
61. Ka nako ye nngwe digalase tša ka di a thubege goba di a wa ge ke di apere T	
62. Ke swerwe gampe ke bana ba bangwe mo Motseng wa gešo ka lebaka la bothata bja mahlo aka SC	
63. Ga ke bone gabotse, bjale batho ba re mabjoko a ka ga se a felela SC	

SL= School and Learning, MO= Mobility and Orientation, DLS= Daily Living Skills, HLS= Hobbies, Leasure and Sport, SI= Social Interaction, PEF= Psychological or Emotional Function, T= Treatment, SC= Sociocultural

Supporting Information S1: The Sepedi Version 2.2 of the CVF-QoL instrument

Sedirišwa sa Boleng bja Mohola wa Go bona Ga Bana (CVF-QoL)

(Phetolelo ya CVF-QoL ya ba mengwaga e 6-9)

Version 2.2

Hle bona letlakala la go šomela ka mo tlase. Letlakala le la go šomela le tla go botšiša mabapi le mokgwa wo o bonago, ka moo o šomišago mahlo a gago mo mešomong ya ka mehla, le ka mokgwa wo o ikwago mabapi le ka mokgwa wo o bonago. Ga go na Karabo ya go nepagala goba ya phošo. Go lefoko le lengwe le le lengwe, dira leswao ☑ mo sefahlegong seo se laetšago ka mo o ikwago mabapi le go ba bonolo goba bothata ge o dira dilo.

Hle leka go tlatša letlakala la go šomela ka bowena. Ge o nyaka thušo, o ka botšiša mošomi wa porotšeke. Ga wa swanela go bontšha motho dikarabo tša gago. Se sengwe, ga go motho yo a go tsebago yo a tlogo bona lenaneopotšišo ge o feditše go le tlatša.

Naa go bothata goba bonolo bjang go wena go dira dilo tše di latelago ka lebaka la bothata bja mahlo a gago:

	Go bothata kudu go nna	Ga go bonolo go nna	Go bonolo kudu go nna	Ga ke dire seo
1. Go bona gabotse seo se ngwadilwego letlapeng [SL]	☹	😐	☺	⊘
2. Go thala(toroya) [SL]	☹	😐	☺	⊘
3. Go bapetša mebala (mohl, ge o khalara goba go penta) [SL]	☹	😐	☺	⊘
4. Go šomiša sekero go hwetša dibopego tšeo ke di ratago [SL]	☹	😐	☺	⊘

5. Go phetha mešomo ya ka ya sekolo ka nako [SL]



6. Go bala dipuku go akaretša dipuku tša go ithuta [SL]



7. Go kopolla ka tshwanelo go tšwa letlapeng goba ka pukung [SL]



8. Go bala le go ngwala go bapana le mothalo wa puku [SL]



9. Go sepelasepela ka bowena ntle le go raga dilo goba go wela batho [MO]



10. Go sepelasepela ga go bolokega ka bowena mo mafelong ao o sa a tsebego [MO]



11. Go sepela go ya gae [MO]



12. Go sepela tseleng ya go se lekalekane [MO]



13. Go bona motho yo a lego ka lehlakoreng le lengwe la seterata ge a go bitša [MO]



14. Go ya ntlwaneng ya boithomelo [DLS]



15. Go bona tšhelete ya maleba ge o le šophong [DLS]



16. Go bona nako go sešupanako sa lebotong [DLS]



17. Go bona nako mo sešupanakong/watšheng ya letsogo [DLS]



18. Go itlhokomela (go swana le go hlapa sefahlego, go diriša sesepe sa go hlapa meno, go gohla meno,



go ikapeša, go bofa marala, bj.bj.) [DLS]

19. Go tšhela meetse/seno ka komiking goba galaseng [DLS]				
20. Go bona dijo ka poleiting ge ke eja [DLS]				
21. Go ya thakešopong ka noši [DLS]				
22. Go šomiša selefounu (mohlala go taela goba go bala melaetša) [DLS]				
23. Go tšea karolo go diatleletiki (go kitima, go taboga, go lahlela, le go šiana ka go sepeleša) [HLS]				
24. Go raloka dipapadi tša kgwele (kgwele ya dinao, thenese, Mokoloti, bj.bj) [HLS]				
25. Go raloka dipapadi go nyaka gore ke bone dilo di sa le kgojana go swana le Dithini, Thapo, le Wulu [HLS]				
26. Go raloka dipapadi go nyaka gore ke bone dilo di le kgauswi go swana le Morabaraba, Diketo, Mmela, bj.bj. [HLS]				
27. Go lebelelana ka mahlong ge o boledišana le mogwera wa gago [SI]				
28. Gotšea karolo ka ditiragalong tša gofapanafapana (bjalo ka ditiragalo tsa dipapadi) le bagwera [SI]				
29. Go dira bagwera [SI]				

Hle bontšha ge e ba dilo tše di a go diragalela:

	Ee	Aowa	Ga ke amege mo
30. Mahlo a ka a bohloko ge ke bala [SL]	Ee	Aowa	**?**
31. Ga ke bone seo batho ba bangwe ba se ngwalago dipukung tša bona [SL]	Ee	Aowa	**?**
32. Mantšu a bonagala gabedi ge ke bala [SL]	Ee	Aowa	**?**
33. Ke opa ke hlogo ge ke bala [SL]	Ee	Aowa	**?**
34. Ke tena batho ka lebaka le la pono ya ka [SL]	Ee	Aowa	**?**
35. Gantši ke awa ge ke sepela ka gobane ga ke kgone go bona gabotse [MO]	Ee	Aowa	**?**
36. Ga ke na bonnete bja gore koloi goba thekisi e tla bokgole bjo bokakaang ge ke tshela tsela [MO]	Ee	Aowa	**?**
37. Ke nyaka motho yo mongwe go dula le nna ka gae ka gobane ga ke bone gabotse [DLS]	Ee	Aowa	**?**
38. Gantši ke lahlegelwa dipapading tše dintši ka ge ke sa kgone go bona [HLS]	Ee	Aowa	**?**
39. Go bothata go bala dipuku tša ditori ka lebaka la pono ya ka [HLS]	Ee	Aowa	**?**
40. Go bothata go hlama dilo tša go dirwa ka diatla ka letsopa goba mapokisi ka lebaka la la pono ya ka [HLS]	Ee	Aowa	**?**
41. Bana ba bangwe ga ba nyake go raloka lenna ka lebaka la pono ya ka [SI]	Ee	Aowa	**?**

42. Go bothata go bona ge motho a thabile, a nyamile goba a befetšwe ge a bolela le nna [SI]	Ee	Aowa	?
43. Ga ke rate go ya go hlahloba mahlo a ka [PEF]	Ee	Aowa	?
44. Ke ikwa ke fapane le bana ba bangwe ka gobane mahlo a ka a rapame [PEF]	Ee	Aowa	?
45. Go apara digalase tsa mahlo go dira gore ke ikwe ke fapane [PEF]	Ee	Aowa	?
46. Ke a nyama ge bagwera ba ka ba ntshega ka lebaka la gore ga ke bone gabotse [PEF]	Ee	Aowa	?
47. Ke hwetša go le thata go hlwekiša digalase tša ka [T]	Ee	Aowa	?
48. Ga ke rate ge motho a ntšhela marothodi a mahlo ka mahlong [T]	Ee	Aowa	?
49. Ga ke kgone go bona gabotse le ge ke apere digalase [T]	Ee	Aowa	?
50.Ga ke rate ka mokgwa wo ke lebelegago ge ke apere digalase [T]	Ee	Aowa	?
51. Ke leša ba lapa lešo dihlong ka lebaka la pono ya ka [SC]	Ee	Aowa	?
52. Batswadi ba ka ba nagana gore ke rogakilwe goba ke loilwe ka lebaka le la pono ya ka [SC]	Ee	Aowa	?
53. Ke kwa e ke ke rogakilwe gore ke se bone gabotse [SC]	Ee	Aowa	?
54. Batho ba tenega ka wena ka lebaka la pono ya gago [SI]	Ee	Aowa	?

Laetša gore se se direga makga a makae:

	Dinako ka moka	Dinako tše dingwe	Ga e direge	Ga ke amege mo

55. Ke batapela TV gore ke kgone go bona gabotse [HLS]



56. Ke tšhoga gore nka foufala [PEF]



57. Ke a tshwenyega gore ga ke bone gabotse [PEF]



58. Ke tlaišwa sekolong ka ge ke apara digalase tsa mahlo [SC]



59. Batho ba nagana gore ga ka hlalefa ka ge ke sa bone gabotse [PEF]



60. Ke tšhaba go botša morutiši gore ga ke bone gabotse ka phapošing [PEF]



61. Ke jewa ke dihlong mabapi le go tsena sekolo sa go ikgetha [PEF]



62. Ge kea para digalase ke swanetše go fapantšha mahlo go bona dilo [T]



63. Digalase di nkgobatša nko/ditsebe [T]



64. Ke a dikologa ge ke apara digalase [T]



65. Ka nako ye nngwe digalase tša ka di a thubege goba di a wa ge ke di apere [T]



66. Ke swerwe gampe ke bana ba bangwe mo Motseng wa gešo ka lebaka la bothata bja mahlo aka [SC]



67. Ga ke bone gabotse, bjale batho ba re mabjoko a ka ga se a felela [SC]



CHAPTER 7: SYNTHESIS OF THE ENTIRE RESEARCH STUDY

7.1 Bridging Text

This chapter details the comprehensive synthesis and evaluation of the content presented throughout the project. It will not only highlight the primary findings but also engage in a thorough discussion about the implications of these results in relation to the existing body of literature. Moreover, the chapter will offer suggestions for future research paths, focusing on particular areas that require more detailed exploration and investigation due to gaps identified during the research. This chapter 7 outlines the flow in which the tool was developed and validated.

Additionally, the chapter will carefully address the limitations encountered during this study. This will include a discussion on methodological limitations, possible biases, and any external elements that might have impacted the results or limited the scope of this research. The chapter seeks to provide a well-rounded perspective on the study's findings by tackling these limitations.

To conclude the chapter, there will be a summary that highlights the main points and findings of the research. This summary will emphasise the significance of the study's contributions to the field, underscoring their potential implications for theory and practice. By doing this, the chapter aims to provide a comprehensive understanding of the study’s impact and suggest directions for future research.

The CVF-QoL instrument valuable tool for evaluating the quality of life related to visual function in rural school-aged children with visual impairments (VIs). Particularly pertinent in South Africa, these instruments tackle the specific challenges faced by this population. They offer insights into how VI influences daily living and overall well-being, and they can also monitor changes in the quality of life following interventions, thereby aiding the assessment of management strategies.

7.2 Introduction

Visual impairment (VI) significantly affects children's quality of life (QoL), as many daily activities depend on vision[1]. The WHO estimates that around 18.94 million children are visually impaired, with 1.42 million classified as blind[2]. Many children with early-onset severe VI face developmental delays in motor skills, language, and social-emotional areas[3]. VI can lead to difficulties in reading, limited activity engagement, and increased risks of anxiety and depression[4–7]. Current assessments primarily focus on objective measures of visual function, often neglecting patients' subjective experiences, especially in children, which are crucial for understanding the full impact of VI[6,8]. The demand for patient-reported data has led to the creation of reliable questionnaires for assessing health-related quality of life (HR-QOL) in children[6]. However, context-specific tools are lacking for those in low- and middle-income countries[9]. Two versions of a visual function quality of life (CVF-QoL) instrument for school-age children in rural South Africa were developed using a rigorous questionnaire development method to address these gaps.

The CVF-QoL Version 1.2, intended for children aged 10 to 17 years **Appendix H**, includes 89 items that assess eight different domains and is designed for older children. In contrast, the CVF-QoL Version 2.1 **Appendix I**, aimed at children aged 6 to 9 years, consists of 63 items that also evaluate eight domains, making it appropriate for younger children. The study began with a systematic literature review to guide its overall direction. Focus group discussions were conducted to generate relevant items and domains. Content validation was completed with the input of experts, and to ensure the instrument's clarity and relevance, feedback was gathered from schoolchildren. The instrument was administered to a group of children from rural areas in Sekhukhune district for further reliability and validity testing. Additionally, both versions of the CVF-QoL were translated into Sepedi **Appendix J and K** to improve its accessibility and reliability.

7.3 Chapters mapping

Chapter One: This chapter provided a comprehensive introduction to the research study. It began with a detailed introduction that contextualises the study within the existing body of knowledge. The chapter then articulates a clear problem statement, outlining the specific issues that the research seeks to investigate. Additionally, the chapter detailed the primary research questions that guided the study alongside the overarching aim and objectives that the research intended to achieve. Finally, a methodology summary was included, which provided an overview of the research design and methods employed to gather and analyse data throughout the project.

Chapter Two provides an in-depth examination of the scoping literature review focused on the various tools available for assessing vision-related QoL in children and adolescents. A scoping review was

utilised as it is a methodological approach that is particularly beneficial for mapping out the existing research landscape on a broad topic[10]. It helps identify knowledge gaps and understand the diversity and nature of the evidence at hand, especially in domains that are complex, emerging, or lacking thorough prior review[10]. This makes scoping reviews a crucial preliminary step for informing subsequent research endeavours[10]. This particular scoping review adhered to the guidelines set forth by the Joanna Briggs Institute (JBI) in 2020[11] and the methodological framework developed by Arksey and O'Malley, later expanded by Levac *et al*. in 2010[12]. The scoping review was registered on the Open Science Framework to ensure transparency and avoid duplicative efforts. Additionally, the protocol that outlined the specific methodologies used in the review and objectives was published in F1000Research, marking it as the first publication within Chapter Two.

In conducting the scoping review, the pre-established protocol to evaluate 20 instruments that assess vision-related quality of life was systematically applied. This review's findings are presented per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension designed for scoping reviews (PRISMA-ScR), ensuring rigour in the reporting[13]. Out of the twenty tools reviewed, a significant majority (nine tools) were developed specifically for children residing in the United States. In comparison, three tools were designed for children in low-middle-income countries. Notably, no tools were developed for children from African countries, which highlights the gap.

In conclusion, the scoping review has illuminated a critical need for the development of more tailored assessment tools, which will be designed specifically for the population of children living in middle- and low-income countries, with a particular emphasis on African children. This underscores the importance of bridging the existing gaps in research and tool availability to better address to better address the unique vision-related QoL challenges these populations to face.

The conclusion of Chapter Two emphasised the gap. It stressed the need to develop an instrument to assess the visual functions of rural school children with visual impairments in the South African context. The development began by generating items, themes, and domains, taking into account the work of previous researchers in this field. The study utilised a deductive approach for item and domain generation by adopting all the items, domains, and rating scales from the 20 instruments reviewed in the chapter. These domains served as baseline themes for the project and the corresponding rating scales. The items from this section were subsequently combined with those generated in Chapter Three.

This chapter is presented in two published manuscripts:

- Protocol for scoping review: Instruments for assessing vision-specific health-related quality of life in children and adolescents with visual impairment.

- Vision-specific tools for assessment of health-related quality of life (HR-QoL) in children and adolescents with visual impairment

It addresses objective one, which was to systematically review previous studies focused on QoL and respective measurement tools for school-going children to identify domains and items.

Chapter Three detailed the use of FGDs in this study, which was used to generate the items from experts and children in rural areas of Limpopo, ensuring that the content was relevant to their specific context. FGDs were chosen for this study as a standard method for exploring participants' feelings, motivations, insights, and experiences on various topics[14,15]. The FGDs are a quick and cost-effective method for gathering new insights and gaining a deeper understanding of the issues at hand. They provide an opportunity for participants to share their perceptions openly[14, 16]. The primary aim of the FGDs was to identify the activities that school-aged children from rural South Africa engage in, the challenges that children with VI face in these activities, and how these limitations impact their lives. The experts in this part of the study included teachers working in rural schools, occupational therapists at rural public hospitals, optometrists specialising in children's eye health, and a pediatric nurse.

The FGDs centred on children from the rural areas of the Sekhukhune District in Limpopo. It is well known that VI is associated with a decreased QoL, encompassing various complex traits, including visual functioning, patient symptoms, emotional well-being, and social relationships[4]. To address these traits in the CVF-QoL instrument, domains such as daily living skills, distance vision, visual discomfort, emotional well-being, psychological aspects, and social interaction were adopted and modified. Children with VI often face restrictions on activities, limitations in mobility, and decreased employment opportunities in the future[4, 6]. In response, the domains were expanded to include sports, hobbies, leisure activities, financial impact, education, near vision, and treatment options.

The FGDs also generated a unique domain specifically for this population: the sociocultural domain. This sociocultural domain comprises 13 items that examine how cultural beliefs, such as attributing visual impairment to witchcraft or relying on traditional herbal medicine, can lead to delays in diagnosis and appropriate management of visual impairment. Additionally, the findings suggest that a child's VI may be exacerbated by their family's poverty, resulting in differential treatment of the child.

The chapter is presented as a published manuscript titled "Impact of Vision Problems on Children's Daily Activities: Insight from a Focus Group Discussion".

It addresses objective two, which is to conduct FGDs with experts and children to generate items for the CVF-QoL instrument.

In **Chapter Four**, the domains from Chapters Two and Three were modified and combined into eight key domains, which served as the foundational themes for developing the CVF-QoL instrument.

Additionally, items from the scoping review and FGDs were revised and consolidated into 90 potential questions for the CVF-QoL instrument, designed for children aged 6-17 years. These questions were evaluated using the WebFX readability checker to ensure they were suitable for children's reading and comprehension levels. As a result of this process, the CVF-QoL instrument was divided into two versions: version 1.1, intended for children aged 10-17 years, containing 91 items, and version 2.1, designed for children aged 6-9 years, containing 66 items.

Both versions of the CVF-QoL instrument underwent content validation by seven experts in tool development, academia, low vision, and quality of life assessments. After calculating the validity index, the two versions were validated, leading to modifications that included deleting one item from version 1.1 and three items from version 2.1. The rating scales were revised based on Chapter One, while the scoring scales were adapted from the National Eye Institute Visual Functioning Questionnaire (VFQ-25).

For face validation, the study utilised the method established by Angeles-Han in 2011 for developing a VRQOL instrument for children aged 8-18 years with juvenile idiopathic arthritis-associated uveitis[17]. Fifteen learners aged 10-17 years evaluated the compression, clarity, and relevance of the contents of version 1.1, while another group of 15 learners aged 6-9 years assessed version 2.1. The learners also suggested additional items not included in the original instrument.

The chapter is presented as a Published manuscript titled: Development of Children's Visual Function Quality of Life (CVF-QoL) Instrument for Rural School-going Children with Visual Impairment within a South African Context: Item Generation and Validation.

It addresses objectives iii, iv and v, as follows:

iii. to draft the first version of the instrument using content from existing tools and focus group discussions.

iv. to validate the contents of the CVF-QoL instrument using a panel of experts

v. to evaluate the clarity, relevance, and format of the CVF-QoL instrument with the consent of school children.

Chapter Five details the evaluation of the psychometric properties of the versions of the CVF-QoL. It presents the report on administering versions 1.1 and 2.1 of the CVF-QoL instrument, which was given to 41 learners for version 1.1 and 39 for version 2.1. The participants who took version 1.1 were between 10 and 17, while the younger children aged 6 to 9 took version 2.1. The instrument was self-administered, but field workers were available to assist with clarity-seeking questions, particularly for learners who were completely blind.

The learners were categorised by visual status to assess the sensitivity of the CVF-QoL instrument to different levels of the degrees of VI. The Cronbach alpha test scores indicated excellent internal consistency for both versions. Ten days after the initial administration, the same groups of learners completed the questionnaires again at home. The test-retest results confirmed excellent, very good, and very good internal consistency, indicating that both versions of the CVF-QoL instrument were stable over time.

The mean scores were compared among four groups of learners: those with normal vision, those with refractive errors, those with VI, and those who are blind. The results showed that learners with normal vision scored very high, while learners who were blind scored very poorly.

This chapter is presented as the formatted manuscript titled “Reliability and Validity of the Children’s Visual Function Quality of Life (CVF-QoL) instrument”. It addresses the objective (vi), which is to test the reliability of the CVF-QoL instrument.

Chapter Six details the process of getting the CVF-QoL versions translated into Sepedi using the forward-backwards translation method recommended by the World Health Organization (WHO)[18]. Two independent translators worked on translating both version 1.1 and version 2.1. The principal investigator, a native Sepedi speaker, merged the translations from the two translators into a single version. The finalised Sepedi version was then back-translated into English by a third translator. The translated English version was compared to the original English version, and any discrepancies were addressed in both the back-translated English and the Sepedi versions to ensure alignment.

The Sepedi versions were face-validated by 30 learners and administered to 80 learners, showing that their internal consistency was comparable to that of the English version. Both Sepedi versions were valid and similar to the English versions.

This chapter is presented as a formatted manuscript titled: Translation of the Children’s Visual Function Quality of Life (CVF-QoL) instrument from English to Sepedi language.

This chapter addresses objectives vii. and viii. which are as follows:

vii. to translate the CVF-QoL instrument into the Sepedi language.

viii. to assess the reliability of the translated instrument against the English version.

7.4 Discussion

The CVF-QoL Version 1.1, intended for children aged 10 to 17 years, includes 89 items assessing eight domains and is designed for older children. In contrast, the CVF-QoL Version 2.2, aimed at children

aged 6 to 9 years, consists of 63 items that also evaluate eight domains, making it appropriate for younger children.

This study followed three key steps recommended by best practices for developing and validating scales in health, social, and behavioural research: domain and item generation, content validation, and pre-testing questions [19]. First, the domains and some items were adopted from existing literature and modified as necessary. Several tools were developed in a similar manner [20–22]. Thereafter, an inductive method of data collection to identify items directly from the affected individuals was employed. This approach was undertaken to capture the specific visual needs of the current population, as such an effort had not been made before. As a result, an essential and unique domain for these population studies termed the sociocultural domain, was identified. This domain encompasses how cultural, historical, and social contexts shape perceptions of VI, how affected individuals are treated, and how VI is managed. It includes significant aspects, such as the association of VI with witchcraft or curses.

Both versions of the CVF-QoL instrument have demonstrated satisfactory content validity. The Scores Content Validity Index Universal (S-CVI UA) for CVF-QoL Version 1.1 is 0.85, and for Version 2.1, it is 0.86. Both scores exceed the accepted cut-off score of 0.83 [23], which is applicable for a panel of six to eight experts, with the current study utilising seven experts in the evaluation. After addressing the expert recommendations, the content of the instrument was deemed clear, comprehensive, and relevant for effectively measuring VFQOL. To ensure the questions and answers were meaningful to the targeted population, both versions of the CVF-QoL instrument were administered to 30 learners, with fifteen assigned to each version, guided by the research design of Angeles-Han (2011) which used 13 learners for this step of the study when developing the VRQOL instrument for children aged 8-18 years with juvenile idiopathic arthritis-associated uveitis [17].

The CVF-QoL instrument consists of an average of 152 items distributed across eight domains that assess the QoL related to visual function. It utilises a 4-point Likert scale to measure the level of difficulty, the level of agreement, and the frequency of issues, along with a 3-point Likert scale for agreement in Version 2.1. The scoring method, domain averaging, and score interpretation were adopted from the National Eye Institute-Visual Function Questionnaire (NEI VFQ-25) manual, one of the most widely used instruments to assess the visual function QoL [24].

Reliability is the consistent ability to reproduce consistent results over time and among different populations. It includes coherence, stability, equivalence, and homogeneity, essential quality criteria for any questionnaire or tool.[25–27]. In the context of the CVF-QoL instrument, we primarily focused on the internal consistency and stability of the measures used to assess reliability. To assess the internal consistency of the CVF-QoL instrument, the study employed Cronbach's alpha score. For Version 1.1

of the instrument, the overall Cronbach's alpha score was 0.946, indicating high reliability. Version 2.1 received a score of 0.777, which is considered to be moderate or good reliability. The lower alpha score for version 2.1 compared to version 1.1 is primarily attributed to the 'Social Interaction' domain, which had the lowest score of 0.352. The low score for this domain is likely due to the limited number of items included; research indicates that having fewer items can lower the alpha value[27]. Precisely, the 'Social Interaction' domain in Version 2.1 consists of only two items, whereas Version 1.1 contains six items in this same domain. Additionally, the lower alpha score may be linked to age differences, as research in instrument development has shown that instrument reliability increases with age[28].

The stability of an instrument measures how similar the results are when assessed at two different times[29]. For the CVF-QoL instrument, test-retest reliability was used to evaluate this stability. Generally, the test-retest reliability tends to decrease when the interval between tests is extended[29, 30]. The time span between measurements affects the interpretation of reliability; therefore, an interval of 10 to 14 days is considered adequate for testing and retesting[29]. In this study, participants completed the CVF-QoL questionnaire for the second time at home 10 days after their initial attempt. This approach has been previously utilised in the development of several tools for children[17, 31, 32]. The test-retest scores were 0.940 for Version 1.1 and 0.800 for Version 2.1, indicating that these scores are more than 93% similar to the original scores obtained during the first administration of the questionnaires.

The CVF-QoL instrument is sensitive to visual classification, as demonstrated by comparing mean scores among participants with normal vision versus those living with RE, VI, and blindness. On average, participants with standard vision score higher than all other groups, indicating a better quality of life. In contrast, those with severe VI or blindness score much lower, suggesting they experience a reduced QoL, as has been noted by previous studies[33–35]. To enhance the Cronbach alpha score of Version 2.1 of the CVF-QoL instrument, the 'Social Interaction' domain was modified by incorporating four additional items from the already validated Version 1.1 of the CVF-QoL. It is recognised that increasing the number of items in the relevant domain can improve the alpha score[27]; this resulted in the new CVF-QoL instrument, Version 2.2, which now comprises 67.

Translating HRQoL instruments is vital for cross-cultural research and global clinical trials, especially in diverse settings such as South Africa[36, 37]. In this study, the newly developed CVF-QoL instrument was translated from English to Sepedi for rural school-going children. The study utilised the forward-backward-forward translation method, which is widely recommended[37–40]. Three professionals were involved in translating the instrument. Thirty targeted children confirmed that the content of both versions of the CVF-QoL was clear, comprehensive, and reliable. This approach to face validation was also employed by Angeles-Han (2011) while validating a VRQOL instrument for children aged 8 to 18 years with juvenile idiopathic arthritis-associated uveitis[41]. The above-

mentioned study utilised a targeted population to assess whether the questionnaire effectively measured its intended construct [41]. The CVF-QoL instrument demonstrated excellent internal consistency for Sepedi Version 1.1 and Version 2.1, as measured by Cronbach's alpha scores. Furthermore, the test-retest reliability analysis indicated that all versions of the CVF-QoL are reliable.

The English versions of the CVF-QoL alpha scores, which will be published elsewhere, are comparable to the Sepedi version of the CVF-QoL instrument, further validating the translated versions. To enhance the validation of the social interaction domain in Version 2.1, four items from Version 1.1 were adopted, increasing the total number of items in this domain from two to six. As a result, the overall number of items in the questionnaire changed from 63 to 67, leading to Version 2.2 of the CVF-QoL Instrument.

7.5 Limitations

- The experts who contributed to the development of the CVF-QoL instrument were all from the local area, enabling a concentrated awareness of the issues affecting children specific to the area consent. Nevertheless, bringing in international experts might have provided further insights and viewpoints.
- The children who participated in the development process came from a single region in Limpopo, Sekhukhune district, which may not encompass the diverse experiences of all children in South Africa, particularly those in rural areas. Nonetheless, the CVF-QoL instrument stands out as a valuable resource, being the only QoL instrument for visually impaired individuals developed within an African and rural context.
- Due to resource constraints, the current study could not include a translation of the CVF-QoL instrument into braille; consequently, blind children required assistance in completing the questionnaire. Each child was provided with a trained research assistant to facilitate this process. While it notes that research assistants helped blind children, the potential implications of this assistance on response bias or the construct validity were never explored in more depth.

- The Sepedi translation was done before the English version 2.2 could be produced. This was done so because the Sepedi version 2.1 and English versions 2.2 were both presented at the same time. This might have only compromised the reliability of the social interaction domain of both English and Sepedi versions 2.2. However, the extra items added were adopted from the already validated version 1.1 of both English and Sepedi.

7.6 Future research

- It is recommended that the CVF-QoL be translated into more languages to guarantee it can adequately reach all rural children in South Africa, modify and validate for urban context and or causes of visual impairment. Additionally, it should be validated across different communities and demographic groups.

- The sample size was estimated based on categories of visual acuity in decimal notation. However, the candidate acknowledged that the sample size may not have been sufficient. This is the first phase of development and validation, and it is recognised that the validation process is ongoing. The candidate further recommended continuing the validation of this tool with a larger sample size.
- Furthermore, it is recommended that the VRQOL questionnaires should be used in clinical settings. This method will allow for assessing the effects of visual impairment directly from the patients, rather than depending exclusively on clinical diagnoses.

7.7. Conclusion

The newly developed CVF-QoL instruments are reliable tools designed to assess the QoL related to visual function, specifically for children in rural areas who experience VI. This assessment is particularly relevant in the South African context, as it addresses the unique challenges and environmental factors these children face. By utilising these instruments, researchers and healthcare professionals can gain valuable insights into how VI affects daily life and overall well-being in this demographic. A multi-stage approach was employed, consisting of a literature review, focus groups, and pre-testing, to ensure the validity of the questionnaire, which has been shown to be highly valid.

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APPENDICES

Appendix A: BREC Ethical Approval Certification

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

15 November 2022

Mr Tshubelela Sello Simon Magakwe (218074043)
School of Health Sciences
Westville

Dear Mr Magakwe,

Protocol reference number: BREC/00003939/2022
Project title: Development and validation of a Children s Visual Function Quality of Life (CVF-QoL) instrument for rural school-going children with Visual Impairment within a South African context
Degree: PhD

EXPEDITED APPLICATION: APPROVAL LETTER

A sub-committee of the Biomedical Research Ethics Committee has considered and noted your application.

The conditions have been met and the study is given full ethics approval and may begin as from 15 November 2022. Please ensure that any outstanding site permissions are obtained and forwarded to BREC for approval before commencing research at a site.

This approval is valid for one year from 15 November 2022. To ensure uninterrupted approval of this study beyond the approval expiry date, an application for recertification must be submitted to BREC on RIG on the appropriate BREC form 2-3 months before the expiry date.

Any amendments to this study, unless urgently required to ensure safety of participants, must be approved by BREC prior to implementation.

Your acceptance of this approval denotes your compliance with South African National Research Ethics Guidelines (2015), South African National Good Clinical Practice Guidelines (2020) (if applicable) and with UKZN BREC ethics requirements as contained in the UKZN BREC Terms of Reference and Standard Operating Procedures, all available at http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx.

BREC is registered with the South African National Health Research Ethics Council (REC-290408-009). BREC has US Office for Human Research Protections (OHRP) Federal-wide Assurance (FWA 678).

The sub-committee's decision will be noted by a full Committee at its next meeting taking place on 13 December 2022.

Yours sincerely,

[redacted]

Prof D Wassenaar
Chair: Biomedical Research Ethics Committee

Biomedical Research Ethics Committee
Chair: Professor D R Wassenaar
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Email: BREC@ukzn.ac.za
Website: http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

INSPIRING GREATNESS

Appendix B: BREC Ethical Approval Certification renewal

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

21 December 2023

Mr Tshubelela Sello Simon Magakwe (218074043)
School of Health Sciences
Westville

Dear Mr Magakwe,

Protocol reference number: BREC/00003939/2022
Project title: Development and validation of a Children s Visual Function Quality of Life (CVF-QoL) instrument for rural school-going children with Visual Impairment within a South African context
Degree: PhD

RECERTIFICATION APPLICATION APPROVAL NOTICE

Approved:	**15 November 2023**
Expiration of Ethical Approval:	**14 November 2024**

I wish to advise you that your application for recertification for the above study has been **noted and approved** by a subcommittee of the Biomedical Research Ethics Committee (BREC). The start and end dates of this period are indicated above.

Note to PI: Note to PI on completing the RIG form: If data are still being collected, then the answer to the question "Are current research activities confined to data analysis and reporting?" must be 'No'.

If any modifications or adverse events occur in the project before your next scheduled review, you must submit them to BREC for review. Except in emergency situations, no change to the protocol may be implemented until you have received written BREC approval for the change.

The committee will be notified of the above approval at its next meeting to be held on 13 February 2024.

Yours sincerely

[redacted]

Ms A Marimuthu
(for) Prof D Wassenaar
Chair: Biomedical Research Ethics Committee

Biomedical Research Ethics Committee
Chair: Professor D R Wassenaar
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Website: http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

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Appendix C: Approval Certification from The Limpopo Department of Education ethical committee.

LIMPOPO
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EDUCATION

CONFIDENTIAL

Ref: 2/2/2 Enq: Makola MC Tel No: 015 290 9448 E-mail:MakolaMC@edu.limpopo.gov.za

Makgakwe TSS
P.O. Box 283
Nebo
1059

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

1. The above bears reference.

2. The Department wishes to inform you that your request to conduct research has been approved. Topic of the research proposal: "**DEVELOPMENT AND VALIDATION OF CHILDREN'S VISUAL FUNCTION QUALITY OF LIFE (CVF- QOL) INSTRUMENT FOR RURAL SCHOOL – GOING CHILDREN WITH VISUAL IMPAIRMENT WITHIN A SOUTH AFRICAN CONTEXT."**

3.The following conditions should be considered:

3.1 The research should not have any financial implications for Limpopo Department of Education.

3.2 Arrangements should be made with the Circuit Office and the School concerned.

3.3 The conduct of research should not in anyhow disrupt the academic programs at the schools.

3.4 The research should not be conducted during the time of Examinations especially the fourth term.

3.5 During the study, applicable research ethics should be adhered to; in particular the principle of voluntary participation (the people involved should be respected).

3.6 Upon completion of research study, the researcher shall share the final product of the research with the Department.

Cnr 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X 9489, Polokwane, 0700
Tel:015 290 7600/ 7702 Fax 086 218 0560

4 Furthermore, you are expected to produce this letter at Schools/ Offices where you intend conducting your research as an evidence that you are permitted to conduct the research.

5 The department appreciates the contribution that you wish to make and wishes you success in your investigation.

Best wishes.

[redacted]

14/12/2022

Mashaba KM
DDG: CORPORATE SERVICES

Date

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Appendix D: List of Items and Domain adopted from a scoping review of the literature.

Supplementary Document 1:

First Extracted Items for Literature review classified per subscales

Subscale: Education

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find your math's lessons?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find your science lessons?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find your geography lessons?
4. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find your language lessons?
5. Do your eyes make it hard to learn?
6. Do your eyes make it hard to concentrate?
7. My child's vision gets in the way of his/her learning.
8. My child's eyesight has made it difficult for him/her to learn to read.
9. Do you have difficulty using the computer for homework?
10. Do you have difficulty using the computer for lessons?
11. Do you have difficulty taking part in Physical Education?
12. Do you have difficulty taking part in English classes?
13. Do you have difficulty keeping up with the teacher in lessons?
14. Do you have difficulty keeping up with other students in class?
15. When you read a story, how easy is it for you to explain it to someone else?
16. Do you have difficulty Using the computer at school or college to do schoolwork/ coursework?
17. Do you have difficulty keeping up with the teacher or tutor in lessons?
18. Do you have difficulty keeping up with other students in lessons?
19. Do you get enough time in school to complete the work set by the teacher?
20. Do other students help you when you ask them for help?
21. In the classroom, do you get all the same information as other students?
22. Do your teachers understand your special needs?

Subscale: Near vision

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find reading textbooks and work sheets that are given in your school?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find reading the smallest print in your textbook?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find drawing, coloring, or painting?
4. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find reading text messages on your mobile phone?
5. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find reading restaurant menus?
6. It is hard to see where to write on lined notebook paper.

7. It is hard to see the cursor on the computer screen.

8. It is hard to see words on a tablet or computer if I do not make the font larger in size.
9. It is hard to see text messages on a cell phone.

10. Do you have trouble reading close-up?

11. My child enjoys looking at books.
12. Do you have any difficulty in reading your textbooks at an arm's length?
13. Do you have any difficulty in writing along a straight line?
14. Do you have any difficulty in finding the next line while reading when you take a break and then resume reading?
15. Do you have any difficulty in locating dropped objects (pen, pencil, eraser) within the classroom?
16. Do you have any difficulty in threading a needle?
17. How much difficulty do you have in distinguishing be- tween 1 rupee and 2-rupee coins (without touching)?

18. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find reading food packets, labels, or recipes?
19. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Telling the time on a wristwatch

20. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Reading small print textbooks, worksheets, and exam papers
21. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Reading enlarged textbooks, worksheets, and exam papers
22. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Drawing or painting

23. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find reading handwriting
24. How clearly (well) can you see pictures in a book?
25. How easy is it for you to put the pen cap back on?
26. How easy is it for you to cut shapes with scissors?
27. How easy is it for you to draw a straight line with a ruler?

28. How good are you at writing exactly on the line

29. How much do you enjoy reading the smallest print in your textbook?
30. How easy is it for you to draw, colour in a picture or write words at school?
31. How clearly (well) can you see the smallest writing on the board at school?
32. Do you have any difficulty reading food packets, tickets, labels, or recipes
33. Do you have any difficulty reading small print textbooks, worksheets, and exam papers
34. Do you have any difficulty reading other people's handwriting
32. Do you have any difficulty finding correct money to pay when shopping

33. Does your child has any difficulty in reading your textbooks at arm's length?
34. Does your child has any difficulty in writing along a straight line?
35. Does your child has any difficulty in finding the next line while reading when you take a break and then resume reading?
36. Do you have any difficulty in locating/identifying food on your plate while eating?

37. Do you have any difficulty in finding the next line while reading when you take a break and then resume reading?

38. Do you have any difficulty in writing along a straight line?
39. Do you have any difficulty in reading your textbooks at arm's length?

40. Do you have any difficulty in finding out the next line while reading

41. Do you have any difficulty in threading a needle

42. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find copying from your friend's notebook
43. Do you have any difficulty in reading the rates on items (e.g., chips packets, biscuit packets)
44. Do you have any difficulty in reading the phone numbers on mobile phone

45. Do you have any difficulty seeing time in your wristwatch
46. Do you have any difficulty reading from a computer screen

47. Do you have any difficulty reading your books at near

Subscale: Distance vision

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find reading the board in your classroom?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find watching television?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find watching a film at the cinema?

4. It is hard to see the board if I am sitting in the back of the room.

5. It is hard to see someone's facial expressions (smiling, frowning) when they are talking to me.

6. It is hard to see someone's face from across the room.

7. It is hard to see the words in my books if I am holding my book far from my face.
8. Do you have a hard time seeing?

9. Is it hard to see the board at school?

10. Do you have any difficulty in making out whether the person you are seeing across the read is a boy or a girl, during the day?
11. Do you have any difficulty in seeing whether somebody is calling you by waving his or her hand from across the road?
12. Do you have any difficulty in copying from the black- board while sitting on the first bench in your class?
13. Do you have difficulty in reading the bus numbers?
14. Do you have any difficulty in reading the other details on the bus (such as its destination?)
15. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find telling the time on a wall clock

16. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find seeing the board in the class
17. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find recognizing people, e.g., in school corridors
18. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find recognizing other people's facial expressions
19. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find finding friends in the playground

20. How clearly (well) can you see the picture on your TV?
21. How clearly (well) can you see the moving picture in hand-held computer

games?
22. Do you have any difficulty seeing the board in the classroom when sitting at the front
23. Do you have any difficulty in recognising people, for example, in corridors at school/college or shops
24. Do you have any difficulty in recognising other people's facial expressions when they are close to me/at arm's length
25. Do you have any difficulty finding friends in crowded areas
26. Do you have any difficulty getting around outdoors e.g., shops or the park, by myself when it's daylight

27. Do you have any difficulty reading signs and posters at stations or shops

28. Does your child has any difficulty in copying from blackboard while sitting on front bench in your class?
29. Does your child have any difficulty in reading the bus number?

30. Because of your vision how much problem do you have in recognising the face of a person standing near you?

31. Because of your vision how much problem do you have in reading the bus numbers

32. Because of your vision how much problem do you have in recognising people from a distance
33. Do you have any difficulty in reading the bus number?
34. Do you have any difficulty in copying from blackboard while sitting on front bench in your class?
35. Do you have any difficulty in copying the small letters from the board
36. Do you have any difficulty in reading shop names

37. Do you have any difficulty in seeing your friend in the playground while playing
38. When you are in a room, can you recognise people you know before they speak to you?

Subscale: Mobility and Orientation

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find going out alone in the daylight?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find walking in a crowded place?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find using public transport (bus/train)?
4. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find reading bus/train timetable on a screen at a station?

5. It is hard adjusting to see where to sit when I walk into a dark room?
6. It is hard adjusting to see when I go from a dark room to a brightly lit room.

7. My child's eyesight makes it difficult for him/her to learn to walk, run, skip, or jur

8. My child adjusts to changes in lighting (going out into bright sunlight or entering dark room or theatre.)
9. My child's eyesight makes it difficult for him/her to find something on a crowded shelf or in a closet.
10. My child makes eye contact with me and smiles.
11. My child bumps into people, walls, or furniture.
12. My child trips over curbs or steps.
13. My child bumps into other people.
14. Do you have difficulty in walking alone in the corridor at school without bumpir into objects or people?

15. Do you have difficulty in climbing up or down stairs?
16. With the best lighting and contrast for you, and with your glasses, low vision ai or other devices, if you use them, how easy do you find getting around the school yourself
17. With the best lighting and contrast for you, and with your glasses, low vision ai or other devices, if you use them, how easy do you find getting around outdoors b yourself
18. With the best lighting and contrast for you, and with your glasses, low vision ai or other devices, if you use them, how easy do you find reading signs and posters stations or shops
19. With the best lighting and contrast for you, and with your glasses, low vision ai or other devices, if you use them, how easy do you find getting around in crowds b yourself
20. Do you have any difficulty seeing small moving objects, e.g., balls
21. Do you have any difficulty Seeing large moving objects, e.g., cars passing Usi
22. Do you have any difficulty using the escalators

23. How easy is it for you to see steps when you walk up or down stairs?

24. How easy is it for you getting around school/college by myself

25. How easy is it for you seeing big moving objects, such as bikes passing, in daylight

26. Do you have difficulty in getting around in crowds by myself

27. Do you have difficulty in finding my way around an unfamiliar house or a new building
28. Does your child have any difficulty in walking alone in the corridor at school without bumping into objects or people?

29. Because of vision how much problem does your child have in seeing if there are animals or vehicles when walking?

30. Do you have any difficulty in climbing up and down the stairs?
31. Because of your vision how much problem do you have in going to the toilet?
32. Because of your vision how much problem do you have in seeing the steps of the bus when climbing in or out?
33. Because of your vision how much problem do you have in seeing if there are animals or vehicles when walking

34. Do you have difficulty walking without bumping into objects/people
35. Do you have difficulty moving around safely in places you don't know in the daytime
36. Do you have difficulty walking on uneven ground

37. Are you confident in places you don't know?

38. Are you confident that you can move around safely in places you don't know in the daytime?

39. Are you confident to make your own way to school?

40. Do you find it difficult to go downstairs or to step off the footpath?
41. It is hard to see the steps, so I do not trip when going up the stairs.

42. Do you run into things because of your eyes?

Subscale: Social Interaction

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find chatting with your friends?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find recognizing faces or identifying your friends at arm's length?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find seeing your friend in a playground?

4. I feel left out of activities because of my vision.

5. I do not join activities with friends because of my vision.

6. Do you have to do things differently than other people because of your eyes?

7. Do your eyes make it hard to do certain things?

8. Does it bother you that it's hard to play/interact with others because of your eyes?
9. Does your eye condition cause problems in your family?

10. Are you shy because of your eyes?
11. Do other people get frustrated with you because of your eyes?
12. Do you get teased because of your eyes?
13. Do you worry about getting hurt because of your eyes?
14. Do you worry about your eyes getting worse?
15. Do you worry about what other people think about you because of your eyes?
16. Do you worry about getting teased because of your eyes?

17. I notice other children looking at my child.
18. My child likes to visit with relatives.
19. My child is teased because of his/her vision problems.

20. My child makes new friends easily.
21. My child is affectionate.
22. My child gets along well with our other children and friends.

23. My child has a regular sleep routine.

24. My child likes to travel on family vacations.
25. My child enjoys playing with others (sisters and brothers or friends).

26. My child had trouble playing outdoors

27. During the Last Two Weeks, Because of Conjunctivitis you had trouble meeting your friends
28. How much do you feel that other children want to be your friend?
29. If you have a sister or brother, how much do you enjoy playing with them?
30. Do you have many friends?
31. How easy is it for you to make new friends?
32. Do you have difficulty playing outdoor games, such as tag or hide and seek

33. Because of vision how much problem does your child has in going to social functions such as weddings/birthday parties

34. Because of your vision how much problem do you have in going to social functions such as weddings/birthday parties

35. With the best lighting and contrast for you, and with your glasses, low vision aid or other devices, if you use them, how easy do you find locating ball while playing i the daytime

36. When you ask for help, do people understand how much help you need?

37. Do other students understand your special needs?

38. Do people tell you that you can't do the things that you want to do?

39. Do other students help you to join in with them?

40. Do you find it hard to join in with other students?
41. Do you get the chance to go to activities other than sport (such as social groups)?

Subscale: Leisure and Hobbies

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find playing video games e.g., a PlayStation?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find playing computer games?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find using IPOD/ MP3/MP4 to listen to music?

4. My child enjoys watching television, videos, or playing video games.

5. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find watching TV
6. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find playing video and computer games
8. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find playing other games, e.g., board games or card games
9. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Watching films in the cinema
10. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Watching plays and shows in the theatre

11. Do you have difficulty watching TV
12. Do you have difficulty playing video and computer games
13. Do you have difficulty playing indoor games, such as board games or card games
14. Do you have difficulty watching films in the cinema
15. Do you have difficulty Watching shows, such as plays at the theatre

16. Because of your vision how much problem do you have watching TV
17. Because of your vision how much problem do you have seeing animals in zoo
18. Because of your vision how much problem do you have watching a movie at the theatre
19. Because of your vision how much problem do you have selecting a song using iPod
20. Because of your vision how much problem do you have playing video games

Subscale: Sports

1. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find swimming?
2. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find taking part in athletics?
3. Because of your eyesight and with your glasses or low vision aids of you use them how difficult do you find playing ball games?

4. It is hard to play sports that use small balls like in baseball, tennis, or golf.

5. My child can ride a bicycle.
6. My child can play a sport or active game (for example, tag).
7. My child will track a mobile or a moving toy.
8. Do have difficulty in locating a ball while playing in the daylight?

9. During the Last Two Weeks, Because of Conjunctivitis you had trouble practicing sports (football, gym)
10. During the Last Two Weeks, Because of Conjunctivitis you had trouble going to the swimming pool

11. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find playing team sports, e.g., football, without adaptations

12. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find doing sports at school/college
13. Do you have difficulty playing team sports, such as football, without adaptations such as special balls
14. Do you have difficulty seeing small balls when playing games, such as tennis or cricket
15. Do you have difficulty in locating a ball while playing with it in day light?

16. Can you take part in games or sports that you want to play with your friends?

Subscale: Global Vision rating or General vision

1.At the present time, my eyesight using both eyes are (with glasses or contacts, if you wear them): In general, would you say that your child's overall health is:

2. How do you think your vision is compared with that of your normal-sighted friend? Do you think your vision is?

3. How do you think your vision is compared with that of your normal sighted friend?

4. Do you have reduced vision

5. Your vision compared to your normally sighted friend is:

Subscale: Visual Comfort

1. It is hard to do activities because of pain in my eyes.

2. I let my eye disease stop me from doing what I want to do.

3. I do not like getting injections or infusions for my eye disease.

4. Do you have to do certain things to help you see better?

5. Do your eyes get tired easily?

6. During the Last Two Weeks, Because of Conjunctivitis you felt burning in your eyes?
7. During the Last Two Weeks, Because of Conjunctivitis you had to use tissues
8. During the Last Two Weeks, Because of Conjunctivitis you had puffy eyes

9. During the Last Two Weeks, Because of Conjunctivitis you had tearing
10. During the Last Two Weeks, Because of Conjunctivitis you had itchy eyes
11. During the Last Two Weeks, Because of Conjunctivitis you had red eyes
12. During the Last Two Weeks, Because of Conjunctivitis you had blurred vision
13. During the Last Two Weeks, Because of Conjunctivitis you had eye secretion
14. During the Last Two Weeks, Because of Conjunctivitis you had, in the morning, closed and sticky eyes

15. It is hard to see when I first walk outside into the sunlight.

16. During the Last Two Weeks, Because of Conjunctivitis you had problems in the light
17. Because of your vision how much problem do you have in seeing when coming into the house after being in the sunlight

18. Because of your vision how much problem do you have in seeing outside in bright sunlight

19. During the Last Two Weeks, Because of Conjunctivitis you had trouble staying in air-conditioned rooms?

Subscale: Psychological or Emotional functioning

1. I do not like having others know about my eye disease.

2. I get frustrated because I cannot do things because of my vision.

3. I do not like the way my eyes look.

4. I use devices or special aids to help me see, such as: A. large print books, cards or games, B. Magnifying glass? C. Special lamps or lights? And D. Other (not including glasses or contacts)

5. I do not like using devices or special aids to help me see (not including glasses c contacts).

6. Are you bothered by the things you have to do to make your eyes better?
7. Do your eyes make you feel unsure of yourself?
8. Are you frustrated because your eyes aren't getting better?
9. Does it bother you when other people say things or ask questions about your eyes?
10. Do you feel "different" because of your eyes?
11. Does it bother you that you get extra attention because of your eyes?

12. Do you worry about your eyes?

13. Do you worry about what you might have to do to make your eyes better?
14. Do you feel left out because of your eyes?
15. Do you worry that your eyes will make it hard to do things when you're older?
16. Do you worry about not being able to do things because of your eyes?

17. I think that my child's vision will improve.

18. I wear my glasses or contacts like I am supposed to.
19. I do not like to wear my glasses or contacts.

20. Does it bother you because your eyes make it hard to learn?
21. Does it bother you because your eyes make it hard to play sports?
22. Does it bother you because you have a hard time seeing?
23. Does it bother you that you can't do certain things because of your eyes?
24. Does it bother you because your eyes make it hard to do certain things?
25. Does it bother you because it's hard to see the board at school?
26. Does it bother you because it's hard to see steps when you walk?
27. Does it bother you that bright light makes it hard to do things outside?
28. Is taking care of your eye condition hard for you?
29. Does it bother you because your eyes hurt?

30. I am bothered by other people's comments about my child's vision or eyes when I take him/her to a store or mall.

31. My child is happy most of the time.
32. My child cries a lot.

33. How clever do you think you are?
34. How easy is it for you to answer the questions in the class at school?

35. Because of your eye problem do you ashamed that you can't see
36. Because of your eye problem do you feel frightened that you may lose your remaining vision

37. Because of your eye problem do you feel you have become a burden on others

38. Do you get frustrated?

39. When you ask for help, do people understand how much help you need?

40. How much of the time do you worry about your child's eyesight?

41. I am afraid that my child will never have good vision.
42. Taking my child to the eye doctor is stressful.

43. My child feels different from other children.

44. My child gets angry or frustrated because of his vision problem.
45. We stay at home a lot because of my child's vision problem

Subscale: Color Vision

1. Do you have difficulty in identifying colours (e.g., while colouring)?

2. Because of vision how much problem does your child has in seeing differences in colours

Subscale: Night vision

1. Do you have any difficulty in walking home at night (from tuition or a friend's house) without assistance when there are streetlights?

2. Getting around outdoors e.g., shops or the park, by myself when it's dark

3. Because of vision how much problem does your child have in going out at night

4. Because of your vision how much problem do you have in seeing differences in colours

5. Because of your vision how much problem do you have in going out at night
6. Getting around alone in places you know at night-time

7. Moving around safely in places you don't know at night-time
8. Are you confident that you can move around safely in places you don't know at night-time?

Subscale: Personal Care and Independence

1. I worry that my child may not be able to read, watch TV, or drive a car.

2. My child can feed himself/herself.

3. My child plays with toys.
4. My child can recognize faces (friends, relatives) across a room.
5. My child can imitate others (make a face, stick tongue out, play peek-a-book).
6. My child can dress himself/herself.
7. My child can brush his/her teeth.
8. My child can wash his/her face.

9. My child can locate a small piece of food (a raisin or Cheerio) and grasp it.

10. My child can pour liquid into a cup or glass.
11. My child can dial a telephone.
12. My child helps with chores.
13. My child can tell what time it is.
14. My child can identify coins.

15. My child enjoys drawing, painting, or other art activities.
16. Do you have difficulty in lacing your shoes?

17. My child is interested in playing with our pet(s).

18. Do you have difficulty in applying paste on your tooth- brush?
19. Do you have difficulty in locating food on your plate while eating?
20. Doing household chores, e.g., washing up

21. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find reading price tags
22. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find finding correct money to pay

23. How often do you do the right thing?

24. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find doing household chores, for example, washing up or tidying my bedroom
25. Do you have difficulty in looking after my appearance, for example, doing my

hair, shaving, or putting on make-up
26. I find it difficult making myself a snack at home
27. I find it difficult making myself a meal
28. I find it difficult finding objects; I have dropped such as coins or glasses on a low contrast surface

29. I find it difficult crossing the road by myself
30. I find it difficult using public transport, such as trains, buses, or the tube by myself
31.I find it difficult using a mobile phone to text people
32. I find it difficult using a mobile phone or tablet for social networking, for example, Facebook, Twitter, or Myspace
33. Do you have difficulty reading enlarged worksheets and textbooks like dictionaries
34. Do you have difficulty drawing or painting
35. Does your child have any difficulties in locating the dropped objects within the classroom?
36. Does your child has any difficulty in locating/identifying food on your plate while eating?
37. Because of vision how much problem does your child has in locking or unlocking the door

38. Because of vision how much problem does your child has in finding your way indoors
39. Because of your vision how much problem do you have in finding your way indoors?
40. Do you have difficulty in applying tooth paste on your toothbrush?
41. Because of your vision how much problem do you have in making out differences in coins or notes?

42. Do you have difficulty in lacing your shoe?
43. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find locating dropped objects

44. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find Identifying dirt, stains on your own clothes

45. With the best lighting and contrast for you, and with your glasses, low vision aids or other devices, if you use them, how easy do you find seeing the numbers and markings on the scale

46. Are you confident to use public transport (such as buses, trains, ferries) by yourself?

47. Can you find your friends in the playground at lunch and play time?

48. Has your eyesight stopped you from doing the things that you want to do?

49. When you are in the classroom, are you confident about asking for help you need?
50. Do people stop you from doing the things you want to do?

Subscale: Self Image or Self Esteem

1. Usually, how happy do you feel?
2. How much do you think that you are good looking?

Subscale: Family Impact

1. At the present time, would you say that your child's eyesight using both eyes is:
2. If your child has an eyesight problem for only one eye, would you say that your child's eyesight in the affected eye is:

3. Does the time you spend on your child's vision problem (eye doctor appointments, patching, eye drops, therapy) take away from time you would like to spend with your other children or husband/wife?
4. Because of eye problem do you feel frightened that your child may lose remaining vision

5. Does your child has reduced vision

Subscale: Treatment

1. I do not like using eye drops.

2. How much time do you need to spend on treatment for your child's vision problem (eye doctor appointments, patching, eye drops, therapy)?
3. Do you and other family members (your spouse or parents) argue about the medical care your child is getting or about treatment that the doctor has prescribed?
4. I have trouble applying treatment (for example, putting on an eye patch or glasses, giving eye drops or other medication).
5. My child is uncomfortable when treated (for example, while wearing a patch or glasses or when you put in eye drops).
6. My child is less active when treated (for example, when wearing a patch or glasses, or when taking eye drops or medication).
7. I worry when my child refuses treatment (for example, pulls off the patch or glasses, or squeezes eye shut when trying to put in eye drops).
8. I sometimes forget to treat my child.

9. During the Last Two Weeks, Because of Conjunctivitis you had to use eye drops

Appendix E: The Rubric for the Content Validation of Version 10-17 years

CVF-QoL (10-17) Instrument Content and Construct Validity – Rubric/Assessment Response Form

Name of Reviewer: _____ Position: _____

INSTRUCTIONS: This measure is designed to evaluate the content validity of **Children's Visual Function Quality of Life (CVF-QoL) Instrument** . Your input and feedback is required in the last four columns by rating each item as follows:

- Please rate the level of clarity for each item on a scale of 1-4, with 4 being the item is clear and understandable, with good word order. Space is provided for you to comment on the item or suggest revisions.
- Please rate the level of coherence of the item in measuring the aligned domain of the CVF-QoL Instrument on a scale of 1-4, with 4 being the item is completely related to the domain it is measuring. Space is provided for you to comment on the item or suggest revisions.
- Please rate the relevance of the item in measuring the domain of the CVF-QoL Instrument on a scale of 1-4, with 4 being the item is very relevant and should be included. Space is provided for you to comment on the item or suggest revisions.

Domain/ Subscale	**Considering the statement before the item**	**Item measuring the Domain/ Subscale**	**Item rating scale**	**Clarity** (The item can be understood easily by children) **Indicators:** 1 = The item is unclear. 2 = The wording of the item requires several modifications or very large modifications in terms of meaning or wording. 3 = Some of the terms in the items require very precise modification. 4 = The item is clear, with good word order, and understandable.	**Coherence** (The item is logically related to the dimension or indicator it is measuring). **Indicators:** 1 = The item bears no logical relationship to the domain. 2 = The item has a tangential relationship to the domain. 3 = The item has a moderate relationship to the domain it is measuring. 4 = The item is completely related to the domain it is measuring.	**Relevance** (The item is essential or important, meaning that it must be included) **Indicators:** 1 = The removal of the item would not affect the measurement of the domain. 2 = The item is somewhat relevant, but another item may be covering what this item is measuring. 3 = The item is rather important. 4 = The item is very relevant and should be included.	**Comments:**
School and Learning Domain							
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	1. Seeing what is written on the chalkboard	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	2. Drawing, coloring, and painting	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. It does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	3. identifying colors (e.g., while coloring)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	4. Using a pair of scissors	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	5. Completing my school work on time	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me. .	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	6. Reading from books including my textbooks	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	7. Remembering what I have read	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	8. Seeing pictures clearly in my book	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of	9. My eyesight affects how fast I can read and write	**3**. Agree. **2**. Not sure. **1**. Disagree.	1 2 3 4	1 2 3 4	1 2 3 4	

	the following statement:		**0**. Does not apply to me.				
School and Learning	Please indicate how much you agree with each of the following statement:	10. My eyes hurt when I read or do close work	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	11. Words are becoming double when I read	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	12. I need to go to a special school for people who cannot see well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	13. I do not do as well in my tests and exams as others	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	14. I struggle to read what other people have written	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	15. I get headaches after reading for a long time	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	16. I copy from other classmate's notes because I have difficulty seeing the chalkboard	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **School and Learning Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							

To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Mobility and Orientation Domain							
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	1. Using public transport taxi or bus	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	2. Moving around the school by yourself without bumping into objects or people	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	3. Moving around safely in new places	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	4. Walking home	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	5. Walking on uneven ground	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems	6. Finding someone across the street when they are calling out to you	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Please indicate how much you agree with each of the following statement:	7. I am not sure of how far a car or taxi is to me when I am crossing the road	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Please indicate how much you agree with each of the following statement	8. I often fall when I walk because I cannot see well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Mobility and Orientation Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							

Daily living skills Domain							
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	1. Going to the river to fetch water	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	2. Going to the toilet	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	3. Locking or unlocking the door	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	4. Making out differences in coins or notes when I want to pay	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	5. Taking goats and cows to the field for grazing	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	6. Washing my school uniform so that it gets clean	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	7. Doing household chores (like sweeping, washing dishes, cooking, preparing a meal)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	8. Threading a needle	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	9. Telling the time on a wall clock	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	10. Telling the time on a wristwatch	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	11. Taking something out from a cupboard	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	12. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	13. Pouring liquid into a cup or glass.	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems:	14. seeing the food on my plate while eating	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems:	15. Going to the tuckshop alone	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems:	16. Using the cell phone (for example to dial a number)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how often this happens to you:	17. I am afraid of drowning when fetching water by the river	3. Always. 2. Sometimes. 1. Never. 0. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Please indicate how much you agree with each of the following statement:	18. I often need someone to stay at home with me because I cannot see well	3. Agree 2. Not sure 1. Disagree 0. Does not apply to me	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Daily living skills Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							

To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Hobbies, Leisure and Sport Domain							
Hobbies, Leisure and Sport	Indicate how often this happens to you:	1. I get closer to the television (TV) screen so that I can see what's happening on TV	3. Always. 2. Sometimes. 1. Never. 0. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	2. Taking part in athletics (running, jumping, throwing, and race walking)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	3. Playing ball games	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	4. Playing games requires good visibility of distant objects, such as Dithini, Thapo, and Kgati	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	5. Playing games requires me to see things up close, such as Morabaraba, Diketo, Mmela, etc	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Please indicate how much you agree with each of	6. I often lose in most games due to my eyesight	**3**. Agree. **2**. Not sure. **1**. Disagree.	1 2 3 4	1 2 3 4	1 2 3 4	

	the following statement:		**0**. Does not apply to me.				
To the reviewer: What additional items would you recommend including to measure the **Hobbies, Leisure and Sport Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Social Interaction Domain							
Social Interaction	Indicate how much difficulty you have with the following activities because of vision problems:	1. Communicating/ talking with your friends	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Social Interaction	Indicate how much difficulty you have with the following activities because of vision problems:	2. Taking part in various activities (Like sporting events) with friends	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Social Interaction	Please indicate how much you agree with each of the following statement:	3. People are getting frustrated with me because of my eyesight.	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Social Interaction	Please indicate how much you agree with each of the following statement:	4. Other children don't want to play with me because I cannot see	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Social Interaction	Please indicate how much you agree with each of the following statement:	5. Is it hard to see if someone is happy, sad, or angry when they are talking to me	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Social Interaction Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Psychological or Emotional Function Domain							
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	1. I become stressed when I have to go for my eye check-up	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	2. I feel different from other children because my eyes go in and out	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	3. Wearing an eye patch worries me because I will look different from other children	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	4. Wearing glasses makes me feel different from other children	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of	5. I feel like people are impatient with me due to my eyesight	**3**. Agree. **2**. Not sure. **1**. Disagree.	1 2 3 4	1 2 3 4	1 2 3 4	

	the following statement:		**0**. Does not apply to me.				
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	6. I feel sad because I may not be able to choose the career I want	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	7. I am sad when I get corrected on things I did not see clearly	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	8. I feel sad when friends laugh at me because I cannot see well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	9. I feel like I am a burden to my family members and the people around me	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	10. I have low confidence in myself because of my poor eyesight	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	11. I am scared that I might go blind	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	12. I am anxious about my poor vision	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	13. I get bullied at school because of wearing glasses	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Psychological or Emotional function.	Indicate how often this happens to you:	14. People think I am less intelligent because of my poor eyesight	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	15. I am afraid to tell the teacher that I cannot see well in class	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	16. I am bothered because my parents tend to treat me differently as compared to my other siblings	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	17. I struggle to fit in my community during school holidays	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	18. I feel worthless because I cannot see well	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	19. It is hard for me to defend myself even if I am right	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	20. I feel ashamed about attending a special school	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Psychological or Emotional function Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							

To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Treatment Domain							
Treatment	Indicate how often this happens:	1. When I wear my glasses, I have to squint to see things	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Indicate how often this happens:	2. Glasses hurt my nose/ ears	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Indicate how often this happens:	3. I feel dizzy when I wear my glasses	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Indicate how often this happens:	4. My glasses sometimes break or fall off while I am wearing them	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	5. I spend a lot of time on vision treatment (eye doctor appointments, patching, eye drops, and therapy)	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	6. It is hard to put on or take off my glasses or eyepatches	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	7. I find it hard to clean my glasses	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Treatment	Please indicate how much you agree with each of the following statement:	8. I don't like it when someone puts drops in my eyes	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	9. I do not like the way I look when wearing glasses, and so too my friends and other family members	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Treatment Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Sociocultural Domain							
Sociocultural	Indicate how often this happens:	1. I have been told that I am cursed or bewitched for not being able to, see clearly	3. Always. 2. Sometimes. 1. Never. 0. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Indicate how often this happens:	2. I am treated differently from other children in my village	3. Always. 2. Sometimes. 1. Never. 0. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Indicate how often this happens:	3. Some people think I am mentally challenged because of my eye problems	3. Always. 2. Sometimes. 1. Never. 0. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Sociocultural	Indicate how often this happens:	4. Some people think that God is punishing my parents because of my eye problems	3. Always. 2. Sometimes. 1. Never. 0. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Please indicate how much you agree with each of the following statement:	5. My family members are ashamed of me	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Please indicate how much you agree with each of the following statement:	6. I am mistreated by other children and other village members because of my eye problems	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.				
Sociocultural	Please indicate how much you agree with each of the following statement:	7. My parents think I am cursed or bewitched	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Please indicate how much you agree with each of the following statement:	8. I feel like I am cursed for not seeing well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Sociocultural Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							

Any comments you would like to share with the principal investigator to further enhance this instrument can be added below:

Appendix F: The Rubric for the Content Validation of Version 6-9 years

CVF-QoL (6-9) Instrument Content and Construct Validity – Rubric/Assessment Response Form

Name of Reviewer: _____ Position: _____

INSTRUCTIONS: This measure is designed to evaluate the content validity of the **Children's Visual Function Quality of Life (CVF-QoL) Instrument**. Your input is required in the last four columns of the rubric by rating each item as follows:

- Please rate the level of clarity for each item on a scale of 1-4, with 4 being the item is clear and understandable, with good word order. Space is provided for you to comment on the item or suggest revisions.
- Please rate the level of coherence of the item in measuring the aligned domain of the CVF-QoL Instrument on a scale of 1-4, with 4 being the item is completely related to the domain it is measuring. Space is provided for you to comment on the item or suggest revisions.
- Please rate the relevance of the item in measuring the domain of the CVF-QoL Instrument on a scale of 1-4, with 4 being the item is very relevant and should be included. Space is provided for you to comment on the item or suggest revisions.

Domain/ Subscale	**Considering the statement before the item**	**Item measuring the Domain/ Subscale**	**Item rating scale**	**Clarity** (The item can be understood easily by children) **Indicators:** 1 = The item is unclear. 2 = The wording of the item requires several modifications or very large modifications in terms of meaning or wording. 3 = Some of the terms in the items require very precise modification. 4 = The item is clear, with good word order, and understandable.	**Coherence** (The item is logically related to the dimension or indicator it is measuring). **Indicators:** 1 = The item bears no logical relationship to the domain. 2 = The item has a tangential relationship to the domain. 3 = The item has a moderate relationship to the domain it is measuring. 4 = The item is completely related to the domain it is measuring.	**Relevance** (The item is essential or important, meaning that it must be included) **Indicators:** 1 = The removal of the item would not affect the measurement of the domain. 2 = The item is somewhat relevant, but another item may be covering what this item is measuring. 3 = The item is rather important. 4 = The item is very relevant and should be included.	**Comments:**
School and Learning Domain							
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	1. Seeing what is written on the chalkboard	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	2. Drawing, coloring, and painting	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. It does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	3. identifying colors (e.g., while coloring)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	4. Using a pair of scissors	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	5. Completing my school work on time	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me. .	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	6. Reading from books including my textbooks	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	7. Remembering what I have read	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Indicate how much difficulty you have with the following activities because of vision problems:	8. Seeing pictures clearly in my book	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of	9. My eyes hurt when I read	**3**. Agree. **2**. Not sure. **1**. Disagree.	1 2 3 4	1 2 3 4	1 2 3 4	

	the following statement:		**0**. Does not apply to me.				
School and Learning	Please indicate how much you agree with each of the following statement:	10. I struggle to read what other people have written	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
School and Learning	Please indicate how much you agree with each of the following statement:	11. I cannot see well from the chalkboard	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **School and Learning Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Mobility and Orientation Domain							
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	1. Moving around the school by yourself without bumping into objects or people	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	2. Moving around safely in new places	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	3. Walking home	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems:	4. Walking on uneven ground	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Indicate how much difficulty you have with the following activities because of vision problems	5. Finding someone across the street when they are calling out to you	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Mobility and Orientation	Please indicate how much you agree with each of the following statement	6. I often fall when I walk because I cannot see well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Mobility and Orientation Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							

Daily living skills Domain							
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	1. Going to the toilet	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	2. Making out differences in coins or notes when I want to pay	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	3. Telling the time on a wall clock	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	4. Telling the time on a wristwatch	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	5. Taking something out from a cupboard	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	6. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems	7. Pouring liquid into a cup or glass.	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems:	8. seeing the food on my plate while eating	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems:	9. Going to the tuckshop alone	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Indicate how much difficulty you have with the following activities because of vision problems:	10. Using the cell phone (for example to dial a number)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Daily living skills	Please indicate how much you agree with each of the following statement:	11. I often need someone to stay at home with me because I cannot see well	**3**. Agree **2**. Not sure **1**. Disagree **0**. Does not apply to me	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Daily living skills Domain**? If you have no suggestions, please enter "none."							

To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Hobbies, Leisure and Sport Domain							
Hobbies, Leisure and Sport	Indicate how often this happens to you:	1. I get closer to the television (TV) screen so that I can see what's happening on TV	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	2. Taking part in athletics (running, jumping, throwing, and race walking)	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	3. Playing ball games	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	4. Playing games like Dithini, Thapo, and Kgati	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Hobbies, Leisure and Sport	Indicate how much difficulty you have with the following activities because of vision problems:	5. Playing games like Morabaraba, Diketo, Mmela, etc	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Hobbies, Leisure and Sport	Please indicate how much you agree with each of the following statement:	6. I often lose in most games due to my eyesight	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Hobbies, Leisure and Sport Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Social Interaction Domain							
Social Interaction	Indicate how much difficulty you have with the following activities because of vision problems:	1. Talking with your friends	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Social Interaction	Indicate how much difficulty you have with the following activities because of vision problems:	2. Taking part in sporting events with friends	**3**. Very difficult. **2**. A little bit difficult. **1**. Not difficult. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Social Interaction	Please indicate how much you agree with each of the following statement:	3. Other children don't want to play with me	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Social Interaction	Please indicate how much you agree with each of the following statement:	4. Is it hard to see if someone is happy, sad, or angry when they are talking to me	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

To the reviewer: What additional items would you recommend including to measure the **Social Interaction Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Psychological or Emotional Function Domain							
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	1. I don't like going for my eye check-up	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	2. I feel different from other children because my eyes go in and out	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	3. Wearing an eye patch worries me because I will look different from other children	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	4. Wearing glasses makes me feel different	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of the following statement:	5. I feel sad when friends laugh at me because I cannot see well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Please indicate how much you agree with each of	6. I don't like the way I am	**3**. Agree. **2**. Not sure. **1**. Disagree.	1 2 3 4	1 2 3 4	1 2 3 4	

	the following statement:		**0**. Does not apply to me.				
Psychological or Emotional function.	Indicate how often this happens to you:	7. I am scared that I might go blind	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	8. I am worried about my poor vision	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	9. I get bullied at school because of wearing glasses	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	10. People think I am cleaver less because of my poor eyesight	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	11. I am afraid to tell the teacher that I cannot see well in class	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	12. I do not feel good about myself because I cannot see well	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	13. It is hard for me to defend myself even if I am right	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Psychological or Emotional function.	Indicate how often this happens to you:	14. I feel ashamed about attending a special school	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

To the reviewer: What additional items would you recommend including to measure the **Psychological or Emotional function Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Treatment Domain							
Treatment	Indicate how often this happens:	1. When I wear my glasses, I have to squint to see things	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Indicate how often this happens:	2. Glasses hurt my nose/ ears	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Indicate how often this happens:	3. I feel dizzy when I wear my glasses	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Indicate how often this happens:	4. My glasses sometimes break or fall off while I am wearing them	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	5. It is hard to put on or take off my glasses or eyepatches	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Treatment	Please indicate how much you agree with each of the following statement:	6. I find it hard to clean my glasses	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	7. I don't like it when someone puts drops in my eyes	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Treatment	Please indicate how much you agree with each of the following statement:	8. I do not like the way I look when wearing glasses	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Treatment Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							
Sociocultural Domain							
Sociocultural	Indicate how often this happens:	1. I have been told that I am cursed or bewitched for not being able to, see clearly	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Indicate how often this happens:	2. I am treated differently from other children in my village	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	

Sociocultural	Indicate how often this happens:	3. Some people think I am mentally challenged because of my eye problems	**3**. Always. **2**. Sometimes. **1**. Never. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Please indicate how much you agree with each of the following statement:	4. My family members are ashamed of me	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Please indicate how much you agree with each of the following statement:	5. My parents think I am cursed or bewitched	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
Sociocultural	Please indicate how much you agree with each of the following statement:	6. I feel like I am cursed for not seeing well	**3**. Agree. **2**. Not sure. **1**. Disagree. **0**. Does not apply to me.	1 2 3 4	1 2 3 4	1 2 3 4	
To the reviewer: What additional items would you recommend including to measure the **Sociocultural Domain**? If you have no suggestions, please enter "none."							
To the reviewer: What items would you recommend deleting? If you have no suggestions, please enter "none."							
To the reviewer: Please provide any additional information you believe may be useful in assessing the identified domain with this instrument. If you have no suggestions, please enter "none."							

Any comments you would like to share with the principal investigator to further enhance this instrument can be added below:

Appendix G: Children's Rubric for Phase 2

(CVF-QoL 10-17 years Version)

Questionnaire Instruction:

Please see the questionnaire below. This questionnaire will ask you about your eyesight, how you use your eyes to perform daily tasks, and your feelings about your eyesight. There are no right or wrong answers. For each item, simply choose the answer that best applies to you by making a cross in the box ☒.

Please try to complete the survey by yourself. If you need help, you can ask the project staff. You don't have to show your answers to anyone. Also, no one who knows you will see your questionnaire once you have finished it.

Indicate how much difficulty you have with the following activities because of vision problems:

Questions	Rating scales				Do you perform the mentioned task?		Is being able to perform the mentioned task important?		Do you have any additional comments to include with the question?
	Very difficult	A little bit difficult	Not difficult	Does not apply to me	Yes	No	Yes	no	
1. Seeing clearly what is written on the chalkboard	☐	☐	☐	☐					
2. Drawing									

3. Matching colours (e.g., while colouring or painting)	☐	☐	☐	☐					
4. Using a pair of scissors to get the desired shapes	☐	☐	☐	☐					
5. Completing my school work on time	☐	☐	☐	☐					
6. Reading from books including my textbooks	☐	☐	☐	☐					
7. Seeing pictures clearly in my book (e.g., Map book)	☐	☐	☐	☐					
8. Reading or writing along a line in a book	☐	☐	☐	☐					
9. Using public transport (e.g., taxi or bus)	☐	☐	☐	☐					
10. Moving around by yourself without bumping into objects or people	☐	☐	☐	☐					
11. Walking safely in new places without help	☐	☐	☐	☐					
12. Walking home	☐	☐	☐	☐					

13. Walking on uneven ground									
14. Seeing someone across the street when they are calling out to you	☐	☐	☐	☐					
15. Fetching water	☐	☐	☐	☐					
16. Going to the toilet	☐	☐	☐	☐					
17. Locking or unlocking the door	☐	☐	☐	☐					
18. Making out differences in coins or notes when I want to pay because of my eyesight	☐	☐	☐	☐					
19. Taking goats and cows to the field for grazing	☐	☐	☐	☐					
20. Washing my school uniform so that it gets clean	☐	☐	☐	☐					
21. Doing household chores (like sweeping,	☐	☐	☐	☐					

washing dishes, cooking, preparing a meal									
22. Threading a needle	☐	☐	☐	☐					
23. Seeing the time on a wall clock	☐	☐	☐	☐					
24. Seeing the time on a wristwatch	☐	☐	☐	☐					
25. Taking something out from a cupboard	☐	☐	☐	☐					
26. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.)	☐	☐	☐	☐					
27. Pouring water/drink into a cup or glass	☐	☐	☐	☐					
28. Seeing the food on my plate while eating	☐	☐	☐	☐					
29. Going to the tuckshop alone	☐	☐	☐	☐					
30. Using the cell phone (for example to dial a	☐	☐	☐	☐					

number or read messages)									
31. Taking part in athletics (running, jumping, throwing, and race walking)	☐	☐	☐	☐					
32. Playing ball games (soccer, tennis, Mokoloti, etc.)	☐	☐	☐	☐					
33. Playing games requires me to see things in the distance such as Dithini, Thapo, and Kgati	☐	☐	☐	☐					
34. Playing games requires me to see things in the near such as Morabaraba, Diketo, Mmela, etc	☐	☐	☐	☐					
35. Maintaining eye contact when talking with your friend	☐	☐	☐	☐					
36. Taking part in various activities (like sporting events) with friends	☐	☐	☐	☐					

37. Making friends	☐	☐	☐	☐					
Please indicate how much you agree with each of the following statements:									
Questions	Rating scales				Do you perform the mentioned task? Make **x**		Is being able to perform the mentioned task important? Make **x**		Do you have any additional comments to include with the question?
	Yes	I do not know	No	Does not apply to me	Yes	No	Yes	No	
38. My eyesight affects how fast I can read and write	☐	☐	☐	☐					
39. My eyes hurt when I read or do close work	☐	☐	☐	☐					
40. Words become double when I read	☐	☐	☐	☐					
41. I think I would benefit better from the special school for people who cannot see well	☐	☐	☐	☐					
42. I do not do as well in my tests and exams as others, because of my eyesight	☐	☐	☐	☐					

43. I struggle to read what other people have written because of my eyesight	☐	☐	☐	☐					
44. I get headaches after reading for some time	☐	☐	☐	☐					
45. I copy from other classmate's notes because I struggle to see clearly on the board	☐	☐	☐	☐					
46. I am not sure of how far a car or taxi is to me when I am crossing the road	☐	☐	☐	☐					
47. I often fall when I walk because I cannot see well	☐	☐	☐	☐					
48. I often need someone to stay at home with me because I cannot see well	☐	☐	☐	☐					
49. I struggle to look after my siblings when we are left home alone	☐	☐	☐	☐					

50. I often lose in most games due to my eyesight	☐	☐	☐	☐					
51. It is difficult to read the story books because of my eyesight	☐	☐	☐	☐					
52. It is difficult to create crafts with clay or boxes because of my eyesight	☐	☐	☐	☐					
53. I find it difficult to do knitting because of my eyesight	☐	☐	☐	☐					
54. People are getting frustrated with you because of your eyesight	☐	☐	☐	☐					
55. Other children don't want to play with me because I cannot see	☐	☐	☐	☐					
56. It is hard to see if someone is happy, sad, or angry when they are talking to me	☐	☐	☐	☐					
57. I become stressed when I have to go for my eye check-up	☐	☐	☐	☐					

58. I feel different from other children because my eyes are crossed	☐	☐	☐	☐					
59. Wearing an eye patch worries me because I will look different from other children	☐	☐	☐	☐					
60. Wearing glasses makes me feel different from other children	☐	☐	☐	☐					
61. I feel like people are impatient with me due to my eyesight	☐	☐	☐	☐					
62. I feel sad because I may not be able to choose the career I want because of my eyesight	☐	☐	☐	☐					
63. I feel sad when I get corrected on things I did not see clearly	☐	☐	☐	☐					
64. I feel sad when friends laugh at me because I cannot see well	☐	☐	☐	☐					

65. I feel like I am a burden to my family members and the people around me because of my eyesight	☐	☐	☐	☐					
66. I have low confidence in myself because of my poor eyesight	☐	☐	☐	☐					
67. I spend a lot of time on vision treatment (eye doctor appointments, patching, eye drops, and therapy)	☐	☐	☐	☐					
68. It is hard to put on or take off my glasses or eyepatches	☐	☐	☐	☐					
69. I find it hard to clean my glasses	☐	☐	☐	☐					
70. I don't like it when someone puts drops in my eyes	☐	☐	☐	☐					
71. The eyedrop is uncomfortable for my eyes	☐	☐	☐	☐					

72. I cannot see clearly even when I wear my glasses	☐	☐	☐	☐					
73. I do not like the way I look when wearing glasses, and so too my friends and other family members	☐	☐	☐	☐					
74. My family members are ashamed of me because of my eyesight	☐	☐	☐	☐					
75. I feel like I am cursed for not seeing well	☐	☐	☐	☐					
Indicate how often this happens:									
Questions	Rating scales				Do you perform the mentioned task?		Is being able to perform the mentioned task important?		Do you have any additional comments to include with the question?
	All the times	sometimes	Never	Does not apply to me	Yes	No	Yes	No	
76. I am afraid of drowning when fetching water by the river	☐	☐	☐	☐					

77. I get closer to the television (TV) screen so that I can see what's happening on TV	☐	☐	☐	☐					
78. I am scared that I might go blind	☐	☐	☐	☐					
79. I am worried about my poor vision	☐	☐	☐	☐					
80. I get bullied at school because I wear glasses	☐	☐	☐	☐					
81. People think I am less intelligent because of my poor eyesight	☐	☐	☐	☐					
82. I am afraid to tell the teacher that I cannot see well in class	☐	☐	☐	☐					
83. I am bothered because my parents tend to treat me differently as compared to my other siblings due to eyesight	☐	☐	☐	☐					
84. I am bothered because my parents tend to treat me	☐	☐	☐	☐					

differently as compared to my other siblings due to eyesight									
85. I feel worthless because I cannot see well	☐	☐	☐	☐					
86. It is hard for me to defend myself verbally, even if I am right	☐	☐	☐	☐					
87. I feel ashamed about attending a special school	☐	☐	☐	☐					
88 When I wear my glasses, I have to squint to see things	☐	☐	☐	☐					
89. Glasses hurt my nose/ ears	☐	☐	☐	☐					
90. I feel dizzy/nausea when I wear my glasses	☐	☐	☐	☐					
91. My glasses sometimes break or fall off while I am wearing them	☐	☐	☐	☐					

92. I have been told that I am cursed or bewitched for not being able to, see clearly	☐	☐	☐	☐					
93. I am treated differently from other children in my village because of eye problems	☐	☐	☐	☐					
94. Some people believe I cannot think properly because of my eye problem	☐	☐	☐	☐					
95. Some people think that God is punishing my parents because of my eye problems	☐	☐	☐	☐					
Please evaluate the clarity and understandability of the instructions and questions for each item.									
Comment on the formatting of the questionnaire, the clarity of the items, the readability of the font, and the adequacy of line spacing.									

Indicate if there are any other tasks dependent on the vision that were not addressed in the questionnaire:	

Appendix H: The Final English version 1.1 of the CVF-QoL instrument

Children's Visual Function Quality of Life (CVF-QoL) Instrument

(CVF-QoL 10-17 years Version)

Please see the questionnaire below. This questionnaire will ask you about your eyesight, how you use your eyes to perform daily tasks, and your feelings about your eyesight. There are no right or wrong answers. For each item, simply choose the answer that best applies to you by making a cross in the box ☒.

Please try to complete the survey by yourself. If you need help, you can ask the project staff. You don't have to show your answers to anyone. Also, no one who knows you will see your questionnaire once you have finished it.

Indicate how much difficulty you have with the following activities because of vision problems:

	Very difficult	A little bit difficult	Not difficult	Does not apply to me
1. Seeing clearly what is written on the chalkboard [SL]	☐	☐	☐	☐
2. Drawing [SL]	☐	☐	☐	☐
3. Matching colours (e.g., while colouring or painting) [SL]	☐	☐	☐	☐
4. Using a pair of scissors to get the desired shapes [SL]	☐	☐	☐	☐
5. Completing my school work on time [SL]	☐	☐	☐	☐
6. Reading from books including my textbooks [SL]	☐	☐	☐	☐
7. Seeing pictures clearly in my book (e.g., Map book) [SL]	☐	☐	☐	☐
8. Reading or writing along a line in a book [SL]	☐	☐	☐	☐
9. Using public transport (e.g., taxi or bus) [MO]	☐	☐	☐	☐
10. Moving around by yourself without bumping into objects or people [MO]	☐	☐	☐	☐

11. Walking safely in new places without help [MO]	☐	☐	☐	☐
12. Walking home [MO]	☐	☐	☐	☐
13. Walking on uneven ground [MO]	☐	☐	☐	☐
14. Seeing someone across the street when they are calling out to you [MO]	☐	☐	☐	☐
15. Fetching water [DLS]	☐	☐	☐	☐
16. Going to the toilet [DLS]	☐	☐	☐	☐
17. Locking or unlocking the door [DLS]	☐	☐	☐	☐
18. Making out differences in coins or notes when I want to pay because of my eyesight [DSL]	☐	☐	☐	☐
19. Taking goats and cows to the field for grazing [DLS]	☐	☐	☐	☐
20. Washing my school uniform so that it gets clean [DLS]	☐	☐	☐	☐
21. Doing household chores (like sweeping, washing dishes, cooking, preparing a meal [DLS]	☐	☐	☐	☐
22. Seeing the time on a wall clock [DLS]	☐	☐	☐	☐
23. Seeing the time on a wristwatch [DLS]	☐	☐	☐	☐
24. Taking something out from a cupboard [DLS]	☐	☐	☐	☐
25. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.) [DLS]	☐	☐	☐	☐
26. Pouring water/drink into a cup or glass [DLS]	☐	☐	☐	☐
27. Seeing the food on my plate while eating [DLS]	☐	☐	☐	☐
28. Going to the tuckshop alone [DLS]	☐	☐	☐	☐

29. Using the cell phone (for example to dial a number or read messages) [DLS]	☐	☐	☐	☐
30. Taking part in athletics (running, jumping, throwing, and race walking) [HLS]	☐	☐	☐	☐
31. Playing ball games (soccer, tennis, Mokoloti, etc.) [HLS]	☐	☐	☐	☐
32. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu [HLS]	☐	☐	☐	☐
33. Playing games requires me to see things in the near such as Morabaraba, Diketo, Mmela, etc [HLS]	☐	☐	☐	☐
34. Maintaining eye contact when talking with your friend [SI]	☐	☐	☐	☐
35. Taking part in various activities (like sporting events) with friends [SI]	☐	☐	☐	☐
36. Making friends [SI]	☐	☐	☐	☐

Please indicate if these things happen to you:

	Yes	Sometimes	No	Does not apply to me
37. My eyesight affects how fast I can read and write [SL]	☐	☐	☐	☐
38. My eyes hurt and tear up when I read or do close work [SL]	☐	☐	☐	☐
39. Words become double when I read [SL]	☐	☐	☐	☐
40. I think I would benefit better from the special school for people who cannot see well [SL]	☐	☐	☐	☐
41. I do not do as well in my tests and exams as others, because of my eyesight [SL]	☐	☐	☐	☐
42. I struggle to read what other people have written because of my eyesight [SL]	☐	☐	☐	☐

43. I get headaches after reading for some time [SL]	☐	☐	☐	☐
44. I copy from other classmate's notes because I struggle to see clearly on the board [SL]	☐	☐	☐	☐
45. I am not sure of how far a car or taxi is to me when I am crossing the road [MO]	☐	☐	☐	☐
46. I often fall when I walk because I cannot see well [MO]	☐	☐	☐	☐
47. I often need someone to stay at home with me because I cannot see well [DLS]	☐	☐	☐	☐
48. I struggle to look after my siblings when we are left home alone [DLS]	☐	☐	☐	☐
49. I often lose in most games due to my eyesight [HLS]	☐	☐	☐	☐
50. It is difficult to read the story books because of my eyesight [HLS]	☐	☐	☐	☐
51. It is difficult to create crafts with clay or boxes because of my eyesight [HLS]	☐	☐	☐	☐
52. I find it difficult to do knitting because of my eyesight [HLS]	☐	☐	☐	☐
53. People are getting frustrated with you because of your eyesight [SI]	☐	☐	☐	☐
54. Other children don't want to play with me because I cannot see [SI]	☐	☐	☐	☐
55. It is hard to see if someone is happy, sad, or angry when they are talking to me [SI]	☐	☐	☐	☐
56. I become stressed when I have to go for my eye check-up [PEF]	☐	☐	☐	☐
57. I feel different from other children because my eyes are crossed [PEF]	☐	☐	☐	☐

58. Wearing glasses makes me feel different from other children [PEF]	☐	☐	☐	☐
59. I feel like people are impatient with me due to my eyesight [PEF]	☐	☐	☐	☐
60. I feel sad because I may not be able to choose the career I want because of my eyesight [PEF]	☐	☐	☐	☐
61. I feel sad when I get corrected on things I did not see clearly [PEF]	☐	☐	☐	☐
62. I feel sad when friends laugh at me because I cannot see well [PEF]	☐	☐	☐	☐
63. I feel like I am a burden to my family members and the people around me because of my eyesight [PEF]	☐	☐	☐	☐
64. I have low confidence in myself because of my poor eyesight [PEF]	☐	☐	☐	☐
65. I spend a lot of time on vision treatment (eye doctor appointments, patching, eye drops, and therapy) [T]	☐	☐	☐	☐
66. I find it hard to clean my glasses [T]	☐	☐	☐	☐
67. The eyedrop is uncomfortable for my eyes [T]	☐	☐	☐	☐
68. I cannot see clearly even when I wear my glasses [T]	☒	☐	☐	☐
69. My family members are ashamed of me because of my eyesight [SC]	☐	☐	☐	☐
70. I feel like I am cursed for not seeing well [SC]	☐	☐	☐	☐

Indicate how often this happens:

	All the times	Sometimes	Never	Do not apply to me
71. I am afraid of drowning when fetching water by the river [DLS]	☐	☐	☐	☐

72. I get closer to the television (TV) screen so that I can see what's happening on TV [HLS]	☐	☐	☐	☐
73. I am scared that I might go blind [PEF]	☐	☐	☐	☐
74. I am worried about my poor vision [PEF]	☐	☐	☐	☐
75. I get bullied at school because I wear glasses [SC]	☐	☐	☐	☐
76. People think I am less intelligent because of my poor eyesight [PEF]	☐	☐	☐	☐
77. I am afraid to tell the teacher that I cannot see well in class [PEF]	☐	☐	☐	☐
78. I am bothered because my parents tend to treat me differently as compared to my other siblings due to eyesight [PEF]	☐	☐	☐	☐
79. I feel worthless because I cannot see well [PEF]	☐	☐	☐	☐
80. It is hard for me to defend myself verbally, even if I am right [PEF]	☐	☐	☐	☐
81. I feel ashamed about attending a special school [PEF]	☐	☐	☐	☐
82. When I wear my glasses, I have to squint to see things [T]	☐	☐	☐	☐
83. Glasses hurt my nose/ ears [T]	☐	☐	☐	☐
84. I feel dizzy/nausea when I wear my glasses [T]	☐	☐	☐	☐
85. My glasses sometimes break or fall off while I am wearing them [T]	☐	☐	☐	☐
86. I have been told that I am cursed or bewitched for not being able to, see clearly [SC]	☐	☐	☐	☐
87. I am treated differently from other children in my village because of eye problems [SC]	☐	☐	☐	☐

88. Some people believe I cannot think properly because of my eye problem [SC]	☐	☐	☐	☐
89. Some people think that God is punishing my parents because of my eye problems [SC]	☐	☐	☐	☐

Appendix I: The Final English version 2.2 of the CVF-QoL instrument

Children's Visual Function Quality of Life (CVF-QoL) Instrument

(CVF-QoL 6-9 years Version)

Please see the worksheet below. This worksheet will ask you about your eyesight, how you use your eyes to do everyday work stuff, and your feelings about your eyesight. There are no right or wrong answers. For each sentence, make a tick ☑ on the face that shows how you feel about how easy or hard it is to do that thing.

Please try to complete this worksheet by yourself. If you need help, you can ask the project people. You don't have to show your answers to anyone. Also, no one who knows you will see your worksheet once you have finished it.

How hard or easy is it for you to do the following things because of your eyesight problems:

	Very hard for me	Not so easy for me	Very easy for me	I do not do this thing
1. Seeing clearly what is written on the chalkboard [SL]	☹	😐	☺	⊘
2. Drawing [SL]	☹	😐	☺	⊘
3. Matching colours (e.g., while colouring or painting) [SL]	☹	😐	☺	⊘
4. Using a pair of scissors to get the desired shapes [SL]	☹	😐	☺	⊘
5. Finishing my school work on time [SL]	☹	😐	☺	⊘
6. Reading from books including my textbooks [SL]	☹	😐	☺	⊘
7. Copying correctly from the board or books [SL]	☹	😐	☺	⊘

8. Reading or writing along a line in a book [SL]



9. Moving around by yourself without tripping into objects or people [MO]



10. Moving around safely by myself in places I don't know [MO]



11. Walking home [MO]



12. Walking on bumpy ground [MO]



13. Seeing someone across the street when they are calling out to you [MO]



14. Going to the toilet [DLS]



15. Seeing the right money when at the shop [DLS]



16. Seeing the time on a wall clock [DLS]



17. Seeing the time on a wristwatch [DLS]



18. Taking care of myself (like washing my face, applying toothpaste, brushing my teeth, dressing myself, lacing shoes, etc.) [DLS]



19. Pouring water/drink into a cup or glass [DLS]



20. Seeing the food on my plate when eating [DLS]



21. Going to the tuckshop alone [DLS]



22. Using the cell phone (for example to dial a number or read messages) [DLS]				
23. Taking part in athletics (running, jumping, throwing, and race walking) [HLS]				
24. Playing ball games (soccer, tennis, Mokoloti, etc.) [HLS]				
25. Playing games requires me to see things in the distance such as Dithini, Thapo, and Wulu [HLS]				
26. Playing games requires me to see things that are near such as Morabaraba, Diketo, Mmela, etc. [HLS]				
27. Maintaining eye contact when talking with your friends [SI]				
28. Taking part in various activities (like sporting events) with friends [SI]				
29. Making friends [SI]				

Please indicate if these things happen to you:

	Yes	No	Does not apply to me
30. My eyes hurt when I read [SL]	Yes	No	?
31. I cannot see what other people write in their books [SL]	Yes	No	?
32. Words are becoming double when I read [SL]	Yes	No	?
33. I have a sore head when I read [SL]	Yes	No	?
34. People are getting annoyed with me because of my eyesight [SL]	Yes	No	?

35. I often fall when I walk because I cannot see well [MO]	Yes	No	?
36. I am not sure of how far a car or taxi is to me when I am crossing the road [MO]	Yes	No	?
37. I need someone to stay at home with me because I cannot see well [DLS]	Yes	No	?
38. I often lose in most games because I cannot see [HLS]	Yes	No	?
39. It is difficult to read the story books because of my eyesight [HLS]	Yes	No	?
40. It is difficult to create crafts with clay or boxes because of my eyesight [HLS]	Yes	No	?
41. Other children don't want to play with me because of my eyesight [SI]	Yes	No	?
42. It is hard to see if someone is happy, sad, or angry when they are talking to me [SI]	Yes	No	?
43. I don't like going for my eye check-up [PEF]	Yes	No	?
44. I feel different from other children because my eyes are crossed [PEF]	Yes	No	?
45. Wearing glasses makes me feel different [PEF]	Yes	No	?
46. I feel sad when friends laugh at me because I cannot see well [PEF]	Yes	No	?
47. I find it hard to clean my glasses [T]	Yes	No	?
48. I don't like it when someone puts drops in my eyes [T]	Yes	No	?
49. I cannot see clearly even when I wear my glasses [T]	Yes	No	?

50. I do not like the way I look when wearing glasses [T]	Yes	No	?
51. My family is ashamed of me because of my poor eyesight [SC]	Yes	No	?
52. My parents think I am under a curse or bewitched because of my eyesight [SC]	Yes	No	?
53. I feel like I am cursed for not seeing well [SC]	Yes	No	?
54. People are getting frustrated with you because of your eyesight [SI]	Yes	No	?

How many times does this happens to you:

	All the time	Sometimes	Never	Do not apply to me
55. I go closer to the TV so that I can see better [HLS]				
56. I am scared that I might go blind [PEF]				
57. I am worried that I cannot see well [PEF]				
58. I get bullied at school because I wear glasses [SC]				
59. People think I am not clever because of my poor eyesight [PEF]				
60. I am afraid to tell the teacher that I cannot see well in class [PEF]				
61. I feel ashamed about attending a special school [PEF]				

62. When I wear my glasses, I have to cross my eyes to see things [T]



63. Glasses hurt my nose/ ears [T]



64. I feel dizzy when I wear my glasses [T]



65. My glasses sometimes break or fall off while I am wearing them [T]



66. I am being mistreated by other children in my village because of my eye problems [SC]



67. I cannot see so people say I cannot think well [SC]



Appendix J: The Final Sepedi version 1.1 of the CVF-QoL instrument

Sedirišwa sa Boleng bja Mohola wa Go bona Ga Bana (CVF-QoL)

(Phetolelo ya CVF-QoL ya ba mengwaga e 10-17)

Hle bona lenaneopotšišo ka mo tlase. Lenaneopotšišo le le go botšiša mabapi le pono ya gago, Ka mo o šomišago mahlo a gago go phethagatša mešomo ya letšatši, le ka mo o ikwago mabapi le pono ya mahlo a gago. Ga go na Karabo ya go nepagala goba ya go se nepagale. Go aetheme ye nngwe le ye nngwe, kgetha karabo yeo o bonago o dumelelana le yona ka go dira sefapano ka lepokising ☒.

Hle leka go itlaletša phatišišo ye ka bowena. Ge o nyaka thušo, o ka botšiša mošomi wa porotšeke. Ga wa swanela go bontšha motho dikarabo tša gago. Se sengwe, ga go motho yo a go tsebago yo a tlogo bona lenaneopotšišo ge o feditše go le tlatša.

Bontšha gore go bothata gakakaang go wena ka ditiragalo tše di latelago ka lebaka la mathata a go bona ga gago:

	Go thata kudu	Go thatanyana	Ga go thata	Ga ke amege mo
1. Go bona gabotse seo se ngwadilwego letlapeng [SL]	☐	☐	☐	☐
2. Go thala (toroya) [SL]	☐	☐	☐	☐
3. Go bapetša mebala (mohl, ge o khalara goba o penta) [SL]	☐	☐	☐	☐
4. Go šomiša sekero go hwetša dibopego tšeo ke di ratago [SL]	☐	☐	☐	☐
5. Go phetha mešomo ya ka ya sekolo ka nako [SL]	☐	☐	☐	☐
6. Go bala dipuku go akaretša dipuku tša mešongwana [SL]	☐	☐	☐	☐
7. Go bona dinepe gabotse pukung ya ka (mohl, puku ya mmapa) [SL]	☐	☐	☐	☐
8. Go bala goba go ngwala go bapana le mothalo ka pukung [SL]	☐	☐	☐	☐

9.Go šomiša senamelwa sa bohle (mohl., thekisi goba pese) [MO]	☐	☐	☐	☐
10. Go sepelasepela ka bowena ntle le go thulana le dilo goba batho [MO]	☐	☐	☐	☐
11. Go sepela o šireletšegile mafelong a mafsa ntle le thušo [MO]	☐	☐	☐	☐
12. Go sepela go ya gae [MO]	☐	☐	☐	☐
13. Go sepela mmileng o sa lekelelanago [MO]	☐	☐	☐	☐
14. Go bona motho ka mošola wa tsela ge a go bitša [MO]	☐	☐	☐	☐
15. Go ga meetse [DLS]	☐	☐	☒	☐
16. Go ya ntlwaneng ya boithomelo [DLS]	☐	☐	☐	☐
17. Go notlela/khiela goba go notlolla/khiolla lebati [DLS]	☐	☐	☐	☐
18. Go fapantša tšhelete ya dikhoine goba pampiri ge ke lefela ka lebaka la pono ya ka [DLS]	☐	☐	☐	☐
19. Go iša dipudi le dikgomo mafulong gore di yo fula [DLS]	☐	☐	☐	☐
20. Go hlatswa yunifomo ya ka ya sekolo gore e hlweke [DLS]	☐	☐	☐	☐
21. Go dira mesongwana ya ka gae (go swana le; go swiela, go hlatswa dibjana, go apea, go lokišetša dijo) [DLS]	☐	☐	☐	☐
22. Go bona nako go sešupanako sa lebotong [DLS]	☐	☐	☐	☐

23. Go bona nako mo sešupanakong/watšheng ya letsogo [DLS]	☐	☐	☐	☐
24. Go ntša selo ka khapotong [DLS]	☐	☐	☐	☐
25. Go itlhokomela (go swana le go hlapa sefahlego, go diriša sesepe sa meno, go gohla meno, go ikapeša, go bofa marala, bj.bj.) [DLS]	☐	☐	☐	☐
26. Go tšhela meetse/seno ka komiking goba galaseng [DLS]	☐	☐	☐	☐
27. Go bona dijo ka poleiting ya ka ge ke eja [DLS]	☐	☐	☐	☐
28. Go ya thakešopong ke le tee [DLS]	☐	☐	☐	☐
29. Go šomiša selefounu (mohlala, go taela goba go bala molaetša) [DLS]	☐	☐	☐	☐
30. Go tšea karolo go diatleletiki (go kitima, go taboga, go foša, le go sepela o kitima) [HLS]	☐	☐	☐	☐
31. Go dira dithaloko tša kgwele (kgwele ya dinao, thenese, Mokoloti, bj.bj) [HLS]	☐	☐	☐	☐
32. Go raloka dipapadi tsa go nyaka gore ke bone dilo di sa le kgojana go swana le Dithini, Thapo, le Wulu [HLS]	☐	☐	☐	☐
33. Go raloka dipapadi go nyaka gore ke bone dilo ka bokgauswi go swana le Morabaraba, Diketo, Mmela, bj.bj. [HLS]	☐	☐	☐	☐
34. Go lebelelana ka mahlong ge o boledišana le mogwera wa gago [SI]	☐	☐	☐	☐

35. Go tšea karolo ka ditiragalong tša go fapafapana (bjalo ka ditiragalo tša dipapadi) le bagwera [SI]	☐	☐	☐	☐
36. Go dira bagwera [SI]	☐	☐	☐	☐

Hle bontšha ge e ba dilo tše di a go diragalela:

	Ee	Ka dinako tše dingwe	Aowa	Ga ke amege mo
37. Ka mo ke bonagao ka gona go ama lebelo leo ke ngwalago le go bala ka lona [SL]	☐	☐	☐	☐
38. Mahlo aka a ba bohloko le go tšwa megokgo ge ke bala goba ke dira mošomo wa kgauswi [SL]	☐	☐	☐	☐
39. Mantšu a bonagala gabedi ge ke bala [SL]	☐	☐	☐	☐
40. Ke nagana gore nka holega bokaone ge ka ya sekolong sa go ikgetha sa batho ba go se bone gabotse [SL]	☐	☐	☐	☐
41. Ga ke šome gabotse ka melekwana le ditlhahlobo bjalo ka bangwe ka lebaka la pono ya ka [SL]	☐	☐	☐	☐
42. Ke thatafalelwa ke go bala seo bangwe ba se ngwadilego ka lebaka le la pono ya ka [SL]	☐	☐	☐	☐
43. Ke opa ke hlogo ka morago ga go bala lebakanyana [SL]	☐	☐	☐	☐
44. Ke kopolla dinoutse tša barutwanakanna ka ge ke thatafalelwa ke go bona gabotse mo letlapeng [SL]	☐	☐	☐	☐

45. Ga ke na bonnete bja gore koloi goba thekisi e tla bokgole bjo bokakaang ge ke tshela tsela [MO]	☐	☐	☐	☐
46. Gantši ke awa ge ke sepela ka gobane ga ke kgone go bona gabotse [MO]	☐	☐	☐	☐
47. Gantši ke nyaka motho yo a ka dulago ka gae le nna ka gobane ga ke kgone go bona gabotse [DLS]	☐	☐	☐	☐
48. Ke thatafalelwa ke go hlokomela bana bešo ge re šetše re nnoši ka gae [DLS]	☐	☐	☐	☐
49. Gantši ke lahlegelwa dipapading tše dintši ka baka la pono ya ka [HLS]	☐	☐	☐	☐
50. Go bothata go bala puku ya ditori ka lebaka la la pono ya ka [HLS]	☐	☐	☐	☐
51. Go thata go hlama dilo tša letsopa goba mapokisi ka baka la pono yaka [HLS]	☐	☐	☐	☐
52.Go bothata go loga ka lebaka le la pono ya ka [HLS]	☐	☐	☐	☐
53. Batho ba tenega ka wena ka lebaka la pono ya gago [SI]	☐	☐	☐	☐
54. Bana ba bangwe ga ba nyake go bapala le nna ka gobane ga ke kgone go bona [SI]	☐	☐	☐	☐
55. Go bothata go bona ge motho a thabile, a nyamile goba a befetše ge a bolela le nna [SI]	☐	☐	☐	☐
56. Ke a gatelega ge ke swanetše go ya go hlahlobja mahlo [PEF]	☐	☐	☐	☐

57. Ke ikwa ke fapane le bana ba bangwe ka gobane mahlo a ka a rapame [PEF]	☐	☐	☐	☐
58. Go apara digalase tša mahlo go dira gore ke ikwe ke fapane le bana ba bangwe [PEF]	☐	☐	☐	☐
59. Ke ikwa eka batho ba mphelela pelo ka lebaka le la pono ya ka [PEF]	☐	☐	☐	☐
60. Ke ikwa ke nyamile ka ge nka se kgone go kgetha mošomo wo ke o nyakago ka baka le la pono ya ka [PEF]	☐	☐	☐	☐
61. Ke ikwa ke nyamile ge ke phošollwa dilong tšeo ke sa di bonego gabotse [PEF]	☐	☐	☐	☐
62. Ke kwa bohloko ge bagwera ba ntshega ka ge ke sa kgone go bona gabotse [PEF]	☐	☐	☐	☐
63. Ke kwa e ke ke morwalo go ba lapa la ka le batho ba kgauswi ka lebaka le la pono ya ka [PEF]	☐	☐	☐	☐
64. Ga ke sa itshepa ka baka la mahlo a ka a sa bonego gabotse [PEF]	☐	☐	☐	☐
65. Ke tšea nako ye ntši ke tšea kalafi ya mahlo (dikopano le ngaka ya mahlo, go phetšha, marothodi a mahlo, le kalafong) [T]	☐	☐	☐	☐
66. Ke hwetša go le thata go hlwekiša digalase tša ka [T]	☒	☐	☐	☐
67. Marothodi a go tšhela ka mahlong a babiša mahlo a ka [T]	☐	☐	☐	☐

68. Ga ke bone gabotse le ge ke apare digalase tsa mahlo [T]	☐	☐	☐	☐
69. Ke leša maloko a lapa la ka dihlong ka lebaka le la pono ya ka [SC]	☐	☐	☐	☐
70. Ke kwa eke ke rogakilwe ge ke sa bone [SC]	☐	☐	☐	☐

Bontšha gore se se direga makga a makae:

	Ka dinako ka moka	Ka dinako tše dingwe	Ga se ke se direge	Ga ke amege mo
71. Ke tšhoga go nwelela ge ke yo ga meetse ka nokeng [DLS]	☐	☐	☐	☐
72. Ke batamela sekirini sa thelebišene (TV) gore ke kgone go bona gore go diregang ka TV [HLS]	☐	☐	☐	☐
73. Ke tšhoga gore nka foufala [PEF]	☐	☐	☐	☐
74. Ke tshwenyega kudu ka mahlo a ka a sa bonego [PEF]	☐	☐	☐	☐
75. Ke a tlaišwa ka sekolong ka gobane kea para digalase tsa mahlo [SC]	☐	☐	☐	☐
76. Batho ba nagana gore ga ka hlalefa ka ge ke sa bone gabotse [PEF]	☐	☐	☐	☐
77. Ke tšhaba go botša morutiši gore ga ke bone gabotse ka phapošing [PEF]	☐	☐	☐	☐
78. Ke tshwenywa kudu ka ge batswadi ba ka ba ntshwara ka tsela e fapanego le bana bešo ka ge ke sa bone gabotse [PEF]	☐	☐	☐	☐

79. Ke ikwa ke se na mohola ka ge ke sa bone gabotse [PEF]	☐	☐	☐	☐
80. Go thata gore ke itwele ka mantšu, le ge ke tseba gore ke bolela nnete [PEF]	☐	☐	☐	☐
81. Ke hlabja ke dihlong go tsena sekolo sa go ikgetha [PEF]	☐	☐	☐	☐
82.Ge ke apara digalase tsa mahlo, ke swanetše go tomola mahlo go bona dilo [T]	☐	☐	☐	☐
83. Digalase tsa mahlo di nkgobatša nko/ ditsebe tsa ka [T]	☐	☐	☐	☐
84. Ke kwa modikologa/go belekega ge ke apara digalase tša ka [T]	☐	☐	☐	☐
85. Digalase tša ka tsa mahlo ka nako ye nngwe di a robega goba di a wa ge ke di apere [T]	☐	☐	☒	☐
86. Ke boditšwe gore ke rogakilwe goba ke loilwe ge ke sa bone gabotse [SC]	☐	☐	☐	☐
87. Ke swarwa go fapana le bana ba bangwe mo Motseng ka lebaka la bothata bja mahlo a ka [SC]	☐	☐	☐	☐
88. Batho ba bangwe ba nagana gore ga ke nagana gabotse ka lebaka la bothata bja ka bja mahlo [SC]	☐	☐	☐	☐
89. Batho ba bangwe ba nagana gore Modimo o otla batswadi ba ka ka bothata bja ka bja mahlo [SC]	☐	☐	☐	☐

Appendix K: The Final Sepedi version 2.2 of the CVF-QoL instrument

Sedirišwa sa Boleng bja Mohola wa Go bona Ga Bana (CVF-QoL)

(Phetolelo ya CVF-QoL ya ba mengwaga e 6-9)

Hle bona letlakala la go šomela ka mo tlase. Letlakala le la go šomela le tla go botšiša mabapi le mokgwa wo o bonago, ka moo o šomišago mahlo a gago mo mešomong ya ka mehla, le ka mokgwa wo o ikwago mabapi le ka mokgwa wo o bonago. Ga go na Karabo ya go nepagala goba ya phošo. Go lefoko le lengwe le le lengwe, dira leswao ☑ mo sefahlegong seo se laetšago ka mo o ikwago mabapi le go ba bonolo goba bothata ge o dira dilo.

Hle leka go tlatša letlakala la go šomela ka bowena. Ge o nyaka thušo, o ka botšiša mošomi wa porotšeke. Ga wa swanela go bontšha motho dikarabo tša gago. Se sengwe, ga go motho yo a go tsebago yo a tlogo bona lenaneopotšišo ge o feditše go le tlatša.

Naa go bothata goba bonolo bjang go wena go dira dilo tše di latelago ka lebaka la bothata bja mahlo a gago:

	Go bothata kudu go nna	Ga go bonolo go nna	Go bonolo kudu go nna	Ga ke dire seo
1. Go bona gabotse seo se ngwadilwego letlapeng [SL]	☹	😐	☺	⊘
2. Go thala(toroya) [SL]	☹	😐	☺	⊘
3. Go bapetša mebala (mohl, ge o khalara goba go penta) [SL]	☹	😐	☺	⊘
4. Go šomiša sekero go hwetša dibopego tšeo ke di ratago [SL]	☹	😐	☺	⊘
5. Go phetha mešomo ya ka ya sekolo ka nako [SL]	☹	😐	☺	⊘

6. Go bala dipuku go akaretša dipuku tša go ithuta [SL]



7. Go kopolla ka tshwanelo go tšwa letlapeng goba ka pukung [SL]



8. Go bala le go ngwala go bapana le mothalo wa puku [SL]



9. Go sepelasepela ka bowena ntle le go raga dilo goba go wela batho [MO]



10. Go sepelasepela ga go bolokega ka bowena mo mafelong ao o sa a tsebego [MO]



11. Go sepela go ya gae [MO]



12. Go sepela tseleng ya go se lekalekane [MO]



13. Go bona motho yo a lego ka lehlakoreng le lengwe la seterata ge a go bitša [MO]



14. Go ya ntlwaneng ya boithomelo [DLS]



15. Go bona tšhelete ya maleba ge o le šophong [DLS]



16. Go bona nako go sešupanako sa lebotong [DLS]



17. Go bona nako mo sešupanakong/watšheng ya letsogo [DLS]



18. Go itlhokomela (go swana le go hlapa sefahlego, go diriša sesepe sa go hlapa meno, go gohla meno, go ikapeša, go bofa marala, bj.bj.) [DLS]



19. Go tšhela meetse/seno ka komiking goba galaseng [DLS]				
20. Go bona dijo ka poleiting ge ke eja [DLS]				
21. Go ya thakešopong ka noši [DLS]				
22. Go šomiša selefounu (mohlala go taela goba go bala melaetša) [DLS]				
23. Go tšea karolo go diatleletiki (go kitima, go taboga, go lahlela, le go šiana ka go sepeleša) [HLS]				
24. Go raloka dipapadi tša kgwele (kgwele ya dinao, thenese, Mokoloti, bj.bj) [HLS]				
25. Go raloka dipapadi go nyaka gore ke bone dilo di sa le kgojana go swana le Dithini, Thapo, le Wulu [HLS]				
26. Go raloka dipapadi go nyaka gore ke bone dilo di le kgauswi go swana le Morabaraba, Diketo, Mmela, bj.bj. [HLS]				
27. Go lebelelana ka mahlong ge o boledišana le mogwera wa gago [SI]				
28. Gotšea karolo ka ditiragalong tša gofapanafapana (bjalo ka ditiragalo tsa dipapadi) le bagwera [SI]				
29. Go dira bagwera [SI]				

Hle bontšha ge e ba dilo tše di a go diragalela:

Ee	Aowa	Ga ke amege mo

30. Mahlo a ka a bohloko ge ke bala [SL]	Ee	Aowa	?
31. Ga ke bone seo batho ba bangwe ba se ngwalago dipukung tša bona [SL]	Ee	Aowa	?
32. Mantšu a bonagala gabedi ge ke bala [SL]	Ee	Aowa	?
33. Ke opa ke hlogo ge ke bala [SL]	Ee	Aowa	?
34. Ke tena batho ka lebaka le la pono ya ka [SL]	Ee	Aowa	?
35. Gantši ke awa ge ke sepela ka gobane ga ke kgone go bona gabotse [MO]	Ee	Aowa	?
36. Ga ke na bonnete bja gore koloi goba thekisi e tla bokgole bjo bokakaang ge ke tshela tsela [MO]	Ee	Aowa	?
37. Ke nyaka motho yo mongwe go dula le nna ka gae ka gobane ga ke bone gabotse [DLS]	Ee	Aowa	?
38. Gantši ke lahlegelwa dipapading tše dintši ka ge ke sa kgone go bona [HLS]	Ee	Aowa	?
39. Go bothata go bala dipuku tša ditori ka lebaka la pono ya ka [HLS]	Ee	Aowa	?
40. Go bothata go hlama dilo tša go dirwa ka diatla ka letsopa goba mapokisi ka lebaka la la pono ya ka [HLS]	Ee	Aowa	?
41. Bana ba bangwe ga ba nyake go raloka lenna ka lebaka la pono ya ka [SI]	Ee	Aowa	?
42. Go bothata go bona ge motho a thabile, a nyamile goba a befetšwe ge a bolela le nna [SI]	Ee	Aowa	?

43. Ga ke rate go ya go hlahloba mahlo a ka [PEF]	Ee	Aowa	?
44. Ke ikwa ke fapane le bana ba bangwe ka gobane mahlo a ka a rapame [PEF]	Ee	Aowa	?
45. Go apara digalase tsa mahlo go dira gore ke ikwe ke fapane [PEF]	Ee	Aowa	?
46. Ke a nyama ge bagwera ba ka ba ntshega ka lebaka la gore ga ke bone gabotse [PEF]	Ee	Aowa	?
47. Ke hwetša go le thata go hlwekiša digalase tša ka [T]	Ee	Aowa	?
48. Ga ke rate ge motho a ntšhela marothodi a mahlo ka mahlong [T]	Ee	Aowa	?
49. Ga ke kgone go bona gabotse le ge ke apere digalase [T]	Ee	Aowa	?
50.Ga ke rate ka mokgwa wo ke lebelegago ge ke apere digalase [T]	Ee	Aowa	?
51. Ke leša ba lapa lešo dihlong ka lebaka la pono ya ka [SC]	Ee	Aowa	?
52. Batswadi ba ka ba nagana gore ke rogakilwe goba ke loilwe ka lebaka le la pono ya ka [SC]	Ee	Aowa	?
53. Ke kwa e ke ke rogakilwe gore ke se bone gabotse [SC]	Ee	Aowa	?
54. Batho ba tenega ka wena ka lebaka la pono ya gago [SI]	Ee	Aowa	?

Laetša gore se se direga makga a makae:

	Dinako ka moka	Dinako tše dingwe	Ga e direge	Ga ke amege mo
55. Ke batapela TV gore ke kgone go bona gabotse [HLS]	☹	😐	☺	⊘

56. Ke tšhoga gore nka foufala [PEF]				
57. Ke a tshwenyega gore ga ke bone gabotse [PEF]				
58. Ke tlaišwa sekolong ka ge ke apara digalase tsa mahlo [SC]				
59. Batho ba nagana gore ga ka hlalefa ka ge ke sa bone gabotse [PEF]				
60. Ke tšhaba go botša morutiši gore ga ke bone gabotse ka phapošing [PEF]				
61. Ke jewa ke dihlong mabapi le go tsena sekolo sa go ikgetha [PEF]				
62. Ge kea para digalase ke swanetše go fapantšha mahlo go bona dilo [T]				
63. Digalase di nkgobatša nko/ditsebe [T]				
64. Ke a dikologa ge ke apara digalase [T]				
65. Ka nako ye nngwe digalase tša ka di a thubege goba di a wa ge ke di apere [T]				
66. Ke swerwe gampe ke bana ba bangwe mo Motseng wa gešo ka lebaka la bothata bja mahlo aka [SC]				
67. Ga ke bone gabotse, bjale batho ba re mabjoko a ka ga se a felela [SC]				