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Vision-related quality of life Core Measure (VCM1) showed low-impact differential item functioning between groups with different administration modes

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Abstract

Objective: To assess psychometric quality of the vision-related quality of life core measure (VCM1) and feasibility in a community-based sample.

Study Design and Setting: Cross-sectional data were used from an observational study among visually impaired patients ($n = 296$) and a community-based sample with low vision ($n = 98$) from the Longitudinal Aging Study Amsterdam. Calibration was performed within the graded response model on the patient sample, including item fit, differential item functioning (DIF), DIF impact, and psychometric information. DIF between both samples was investigated for assessing feasibility of the VCM1 in community-based studies.

Results: All items fitted the model. There was no significant DIF within the patient sample, except between self-report and proxy report subgroups. The maximum difference in expected scores was −0.42. Item information was highest for item 4 ''depression'' and lowest for item 1 ''embarrassment.'' Test information showed full coverage of the disability continuum. DIF was present between patient and community-based samples. However, DIF items had low impact on the expected test scores.

Conclusions: DIF that was found on single items between administration type subgroups and sample subgroups was negligible at the level of the expected test scores. This means that DIF had no substantial impact on the VCM1. Therefore, psychometric quality and feasibility of the VCM1 can be considered satisfactory.

Keywords: Visual impairment; Vision-related quality of life; Administration modes; Item response theory; Graded response model; Differential item functioning; DIF impact

1. Introduction

The prevalence of visual impairment and blindness increases significantly with age and is expected to grow in the next decades. Large population-based studies in the United States, Australia, and Europe have reported prevalence rates (according to criteria of the World Health Organization [WHO]) ranging from 0.6% to 2.1% for visual impairment and from 0.1% to 0.9% for blindness [1]. However, prevalence of visual impairment and blindness increases rapidly for persons around the age of 70 years [2]. The WHO defines low vision as a visual acuity <0.3 and/or visual field $<20°$ and defines blindness as visual acuity <0.05 and/or visual field $<10°$ [3]. In the United States, low vision is defined as a visual acuity <0.5. In Western society with its rapidly changing demands, people with mild vision loss (ie, visual acuity between 0.3 and 0.5) more often ask for low-vision aids or a referral to low-vision rehabilitation [4]. The field of low-vision rehabilitation mainly aims to enhance ability with the patient's remaining vision, for

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What is new?

- The psychometric quality of the vision-related quality of life core measure (VCM1) seemed satisfactory based on item fit to the graded response model and most DIF outcomes. The VCM1 was problematic with respect to DIF between groups with different administration types, that is, self-report vs. assistance by proxy.
- The magnitude of DIF for polytomous items was presented as a maximum difference in expected item scores between the administration type subgroups and between the patient and community-based samples.
- The impact of DIF was examined at the level of the expected test scores and was found to be negligible.

example, by prescribing low-vision aids, providing occupational therapy, or offering social work.

It is considered increasingly important to also consider the broader aspects of the life of low-vision patients. Therefore, the focus has shifted from how vision disability interferes with practical problems in daily life that are directly caused by the impairment, such as problems with reading, writing, and watching TV, to quality of life (QoL) issues, which reflect physical, psychological, and social functioning. Consequently, vision-related quality of life (VRQOL) questionnaires consist of items that largely reflect the disability suffered by the patient in daily life [5−9]. Moreover, the patient's subjective perception in terms of VRQOL is increasingly recognized as a meaningful representation of the patient's disability before and after medical treatment or rehabilitation [10,11].

Most VRQOL questionnaires have been developed and validated among patient populations in hospitals or low-vision rehabilitation centers [5,6,12]; some were designed to measure the outcome of a specific medical treatment, for example, cataract surgery [13], or a rehabilitation program for persons with irreversible eye conditions, for example, age-related macular degeneration [12]. However, it remains unclear whether VRQOL questionnaires used to assess patient populations reflect the same construct when administered in the community; this latter group may not consult an ophthalmologist or visit a low-vision rehabilitation service for their visual impairment. With the same questionnaire, people in the community may express mild symptoms, whereas patients may express their disease and subsequent disability. Consequently, the questionnaire may be interpreted differently by patients and community members, even if their perceived disability is similar.

The present study examined the psychometric quality of the vision-related quality of life core measure (VCM1) [14] to establish whether it was feasible for detecting problems related to vision loss in the general community. The VCM1 is a 10-item QoL questionnaire developed in the UK for patients with a visual impairment, irrespective of the cause of the impairment. The VCM1 was previously translated into Dutch to measure the outcome of cataract surgery [15]. Construct validity and responsiveness were thoroughly investigated in a sample of visually impaired patients [16,17]. VRQOL outcomes of low-vision rehabilitation have also been investigated [18,19].

In the present study, we use data from the same sample of visually impaired patients [16−19] and from a community-based sample with low vision, from the Longitudinal Aging Study Amsterdam (LASA). First, in the patient sample [18,19], the psychometric quality in the context of item response theory (IRT) [20,21] is investigated, that is, item goodness of fit to the graded response model, differential item functioning (DIF), the impact of DIF, and psychometric information. Then, we investigate whether the item parameter estimates of the questionnaire can be generalized to a community-based sample with low vision.

2. Patients and methods

2.1. Design and participants

Cross-sectional data were obtained from two longitudinal studies: visually impaired older patients (mean age 78 years) from an observational study on the VRQOL effects of two types of low-vision rehabilitation (optometrist service and multidisciplinary rehabilitation service) [16−19] and a community-based sample with low vision of the LASA (http://www.lasa-vu.nl/) [22]. Both study protocols were approved by the medical ethics committee of the VU University Medical Center Amsterdam and conducted according to the principles of the Declaration of Helsinki.

In the study on the effects of low-vision rehabilitation, consecutive patients ($n = 357$) were recruited from the ophthalmology departments of four Dutch hospitals between July 2000 and January 2003. The eligibility requirements for inclusion in the study were referral to either the optometrist or the multidisciplinary low-vision service by an ophthalmologist, age 50 years or older, no previous contact with low-vision rehabilitation services, irreversible vision loss, adequate understanding of the Dutch language, and adequate cognitive abilities. Patients who met the inclusion criteria were informed about the study and invited to participate. From the eligible patients, 17.1% did not participate [18]. Data of 296 patients were available. Written consent was obtained from all participants.

The LASA sampling and response details are described elsewhere [22]. To summarize, a random sample of older persons (aged 55−85 years), stratified for age, gender, and level of urbanization was drawn from the population registers in 11 municipalities from culturally distinct