

Another important factor that needs to be considered and further investigated is the impact of racial differences on COVID-19 outcome in patients with asthma. The studies that did not find any difference in terms of COVID-19 severity or intubation time in patients with asthma were performed in predominantly non-African American (AA) populations, such as from China, or study populations with only 21% to 26% AAs.³ In our series from the city of Chicago, 59% of COVID-19 patients with asthma were AA.² Interestingly, Peters et al⁶ have demonstrated that, among patients with asthma, AA race was associated with higher expression of ACE2 and TMPRSS2. Consistent with that study, our as yet unpublished follow-up study has shown that AAs with asthma and COVID-19 infection had a significantly higher rate of asthma exacerbation and longer duration of asthma symptoms after COVID-19 compared with their white counterparts. Specifically, 68% of AAs versus 35% of whites ($P = .032$) report symptoms suggestive of asthma exacerbation after COVID, and mean $\pm$ standard deviation durations of asthma exacerbation symptoms were 3.6 ± 2.1 weeks versus 1.5 ± 1.3 weeks in AAs and whites, respectively ($P = .045$). We have also demonstrated that, although asthma is not a risk factor for COVID-19 hospitalization in any age group, AA children are at a significantly higher risk for COVID-19 adverse outcomes.⁷ Multiple inter-related variables, such as uncontrolled comorbidities, reduced access to health care, and other socioeconomic factors, and possibly a genetic predisposition can impact these important results and need to be further investigated.

Kalemci et al¹ also bring up another important concept about the use of inhaled corticosteroids (ICS) for asthma therapy and risk of COVID-19 severity. Based on the impact of ICS on decreasing the expression of ACE2 expression, it was hypothesized that the use of ICS in asthmatics might decrease COVID-19 severity.⁶ However, in a large study, Chhiba et al³ reported that ICS did not increase or decrease the risk of COVID-19 hospitalization in patients with asthma after adjusting for multiple potential confounding factors.

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Quality-of-life researchers in ocular allergy may benefit from the newer methods



To the Editor:

Mikhail et al¹ reviewed the patient-reported outcome measures (PROMs) used to evaluate quality-of-life (QOL) parameters in people with ocular allergy. It is important to note the usefulness of non-allergy-specific (ophthalmic and generic) PROMs depending on the research purpose and intended populations. For example, dry eye questionnaires such as the Ocular Surface Disease Index can be used to evaluate dry eye in ocular allergy.²

Also noteworthy is that all the PROMs reviewed¹ were developed using Classical Test Theory, which uses summary scoring. The scale scores in the summary scoring method are obtained by summing and averaging ordinal data obtained using Likert scales. Each item gets an equal weight for calculating an overall score, and an equal distance between adjacent response categories is assumed. For example, in the Quality of Life in Children with Vernal Keratoconjunctivitis questionnaire, "Problem practising sports" and "Problems meeting friends" items are given the same weights.³ The scores to response options are allocated such that the response option "Sometimes (2)" is considered twice-frequent than "Never (1)" and 0.67 times less-frequent than "Always (3)."³ Assuming the Likert-scale data as continuous data is erroneous. In 2010, Pesudovs⁴ described such PROMs as the first-generation PROMs. Second-generation PROMs address the limitations of the first-generation PROMs by converting the categorical data to interval-level data by log-transformation using Item Response Theory models or Rasch analysis.⁴

In the last 2 decades, the popularity of second-generation PROMs, particularly those using Rasch analysis, has grown exponentially in ophthalmology.⁵ Now QOL researchers in ophthalmology are developing third-generation PROMs, item-banking administered with a computer-adaptive testing (CAT) system.^{4,6,7} An item bank is a pool of questions calibrated using Rasch analysis or other Item Response Theory models. A CAT system administers only the most informative, individually tailored items using an algorithm with predefined step size and stopping criteria. The CAT system uses automatic scoring and provides real-time feedback, and thus has the potential to be used as a clinical tool to promote value-based medicine.^{4,7} Ocular allergy PROMs however are lagging behind.

Researchers interested in QOL outcomes in ocular allergy need to be aware of the advances in QOL research so that the field may benefit. Rasch analysis, in particular, is based on sound scientific principles of measurement and offers several advantages in addition to addressing the limitations of the first-generation

PROMs. Rasch analysis can be used while developing a measure or to optimize a measure.⁴ Rasch analysis methods provide greater insights into the measurement properties such as precision, unidimensionality, discrimination, fit-statistics, differential item functioning, local item dependency, and targeting.^{4,5} In addition, studies have shown that the sensitivity and precision in QOL measurement are higher when Rasch analysis is used compared with the traditional methods. In summary, PROM research in ocular allergy may benefit from advances in the field. In particular, the application of Rasch analysis may offer sound measures for evaluating the impact of ocular allergy.

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Reply to "Quality-of-life researchers in ocular allergy may benefit from the newer methods"



To the Editor:

We thank Kandel and Watson¹ for their interest in our clinical commentary review² and for taking the time to provide insightful and valuable comments concerning our article.

The reference to the Ocular Surface Disease Index (OSDI)³ and other non-allergy-specific questionnaires is noteworthy. We agree with Kandel and Watson¹ that it is important to note the "usefulness of non-allergy-specific (ophthalmic and generic) patient-reported outcome measures (PROMs)."¹ Indeed, this echoes our review conclusion, which states that there is a "dearth in the literature regarding QoL questionnaires targeting all types of" ocular allergy (OA).² This means that there is an obvious lack

of questionnaires specific to the different presentations and etiologies of OA; hence, clinicians and/or researchers currently refer to non-OA-based questionnaires.

We would, however, like to note that the key purpose of our review was to concentrate solely on identifying the gap in the literature regarding OA-related quality-of-life questionnaires.² This review was not intended to include non-OA-specific questionnaires. Furthermore, it is important to highlight that the OSDI is a questionnaire that has not been validated in OA populations. In fact, the original validation study excluded patients with OA altogether.³ Further to this, another study showed that the OSDI score was not correlated with pollen counts.⁴ Thus, we reiterate, there is an urgent need for further formation of tailor-made questionnaires on OA.

With regard to the scoring of the questionnaires, although summarizing the item scores using mean and SD and using parametric statistical methods is common in the reviewed questionnaires specifically, and in general for other Likert-based questionnaires, we would like to emphasize that, according to the central limit theorem, parametric statistics can be used with Likert data although it is a nonnormal distribution.⁵ Furthermore, parametric models can be applied to Likert-type data with small sample sizes, and/or with unequal variances.⁵

As stated by Kandel and Watson,¹ in parametric models each item does get an equal weight, and each response is equidistant. As such, the use of Item Response Theory (IRT) and Rasch Analysis (RA) is an important alternative to Classical Test Theory (CTT), although the decision about the relevant statistical method should be made on a case-by-case basis.^{6,7} It is important to note that the general differences between the CTT, IRT, and RA are minute.^{6,7} Furthermore, as we indicated in our article,² there are various psychometric measures for different questionnaire validation aspects, which vary depending on relevance. Likewise, this applies to the choice of CTT, IRT, and RA. Regarding the currently available OA questionnaires, the only OA questionnaire that used RA was the ESPRINT-15, which was the Spanish questionnaire that cannot be used until validated in other countries.² Table I summarizes the psychometric processes of the other OA-specific quality-of-life questionnaires. This shows the effectiveness of these questionnaires in the ophthalmology field, until the development of future questionnaires.

Once again, we appreciate the additional information from Kandel and Watson.¹ We would like to add that it is up to the creators of future questionnaires to be up to date with the literature regarding the most appropriate development and validation measures needed when developing a questionnaire. Furthermore, a justification for their choice of measures must be clearly established.

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