It would be useful to the readers to have the authors clarify these points.

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Author Response: Metamorphopsia Assessment before and after Vitrectomy for Macular Hole

Dave and Narayanan address the need to clarify a few points in our article, "Metamorphopsia Assessment before and after Vitrectomy for Macular Hole," in which we described the quantification of metamorphopsia in a subset of patients included in the Copenhagen Macular Hole Study, a randomized clinical trial (RCT) comparing different methods of surgical treatment for macular hole.

Dave and Narayanan correctly note that the number of patients enrolled in the RCT was 78, whereas only 55 patients were enrolled in the study describing our novel method of metamorphopsia assessment. In the study of metamorphopsia, 23 patients were excluded because they did not fulfill the inclusion criteria or were unable to complete the test for one of the following reasons: bilateral macular hole or lamellar hole at baseline (n = 12), anisometropia greater than 3 D (n = 3), amblyopia in the fellow eye (n = 1), or inability to complete the test, most commonly because of excessive phoria or exclusive eye dominance (n = 7).

In the group of patients who did not show any change in metamorphopsia after hole closure (n = 4), two had undergone reoperation to close the hole. Another six patients experienced metamorphopsia reduction despite having had two operations.

Dave and Narayanan address the need to validate the test–retest variability of our method. We determined variability by examining patients twice at baseline with a short interval between each test. Calculating the Pearson’s correlation coefficient between the two sets of responses showed a correlation coefficient of 0.71 (P < 0.001).

Dave and Narayanan suggest that the Wilcoxon signed-rank test would be more appropriate for comparing pre- and postoperative metamorphopsia, because the groups under comparison are dependent and cannot be assumed to be normally distributed. We believe that this argument is valid, and consequently we have made the same comparison using the Wilcoxon signed rank test which also shows a significant difference between pre- and postoperative metamorphopsia for all the tested eccentricities (P < 0.001). Means and standard deviations of the metamorphopsia measure before and after surgery are presented graphically in our Figure 1, “Metamorphopsia before and after surgery.”

We used the one-way ANOVA test to compare metamorphopsia before and after surgery. Our data were nonparametric but expressed homogeneity of variance. However, we believe that Dave and Narayanan are correct when arguing that the Kruskal-Wallis one-way analysis of variance may be more appropriate for nonparametric data. Analyzing the effect of eccentricity on metamorphopsia using the Kruskal-Wallis test, however, does not alter our results or our conclusions.

In the Results section, a reference is made to Figure 2 regarding the effect of eccentricity on the degree of metamorphopsia reduction after surgery. The reference should have been made to Figure 3.

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Model-Fitting Adequacy and Clinical Rationality in Multivariate Linear Regression Analysis

I read with great interest the article by Wong et al.¹ reporting the distribution and determinants of ocular biometric parameters in a Singapore Malaysian population. This population-based, cross-sectional study was well designed, and the use of partial coherence interferometry ensured the superior accuracy of the ocular biometric measurements. Two-step multivariate linear regression was used for evaluation of the relationship between ocular parameters and other independent variables. An age- and sex-adjusted model was used for each variable first, and those that were significant during the first step were recruited for second-step multivariate regression with backward selection. However, I was puzzled about Table 5, which showed the results of multivariate linear regression models. For example, the standardized β statistics for “Height, cm” are 0.162, 0.075, and 0.250 for AL, ACD, and CC, respectively. These statistics mean that when body height increases 10 cm, AL and ACD will increase 1.62 and 0.75 mm, respectively, which are quite large numbers for AL, averaging 23.55 mm, and ACD, averaging 3.1 mm. Also, for the model of ACD, the standardized β for “Age, y” is approximately 0.358, which means an average of 0.358 mm decrease of ACD per year, meaning that one’s ACD would decrease to 0 when he or she is 9 years older!

It is possible that the unit of height in regression models was the number of quartiles, not centimeters, or that there was a typographical error in Table 5. If not, perhaps the adequacy of the regression models should be examined. Plots of residuals against questionable variables can be used to check for model-fitting adequacy. For the model of ACD, at least two parameter estimates are extreme (age and height), in which overparameterization or collinearity among independent variables may result. The former should not happen, because there are only five parameters to be estimated for 2788 samples. As for the
problem of collinearity, it is difficult to handle because it does exist. Wong et al. had considered variables that were closely related to one another (which was supposed to be evaluated by Pearson's correlation coefficients or by clinical judgment) and chose only the most significant one. However, correlations among selected variables cannot be totally avoided. The variance inflation factor can be used to evaluate the extent of collinearity, but selection of independent variables should not depend only on that factor. The criterion of $P < 0.05$ may be too strict for backward selection in this study, since the adjusted $R^2$ statistics were all less than 0.2. It is suggested that Mallows’ Cp statistic be used to choose several acceptable models. If the estimates of parameters vary a lot among different models, clinical rationality as well as the adjusted $R^2$ should be considered when choosing the best-fitting one.

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Author Response: Model-Fitting Adequacy and Clinical Rationality in Multivariate Linear Regression Analysis

We are grateful for the interest shown by Hsieh in our paper on the distribution and determinants of ocular biometric parameters in the Singapore Malay Eye Study (SIMES). In his letter, he offers his interpretation of the statistical analyses and results of our paper, and we would like to take this opportunity to provide clarification of some of the points that he raises.

His main concern is that the standardized beta ($\beta$) coefficients derived from the multivariate adjusted linear regression models of the predictors of different biometric parameters, presented in Table 5 of our original paper, may be erroneous. For example, the standardized $\beta$ for “Height, cm” of 0.162 for axial length (AL) is interpreted as implying that “when body height increases 10 cm, AL will increase 1.62 mm.” We fully agree that, were this example the case, the results would be implausible. However, we want to point out that such an interpretation is only appropriately applied to the unstandardized coefficient or regression estimate, typically annotated as $B$ in statistical software. In linear regression, the relationship is described by the equation: dependent variable = ($B \times$ predictor) + constant + error term. The standardized $\beta$ coefficients presented in our table are the surrogates of Pearson’s correlation coefficient and give indications of the relative influences of each predictor on the dependent rather than quantifications of the absolute magnitude of each relationship.

We want to assure Hsieh and all our readers that every effort was made to ensure the greatest validity of the multivariate regression models. As Hsieh has pointed out, overparameterization is unlikely, given the small number of parameters relative to the 2788 observations in our sample. Predictors in the multivariate models were chosen based on biological plausibility and the published literature and were verified with the results of age- and sex-adjusted models before inclusion. Multiple collinearity was determined from the scrutiny of individual Pearson correlation coefficients, residuals, and tolerance measures.

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Presbyopic Spectacles in Elderly Tanzanians

We enjoyed reading the article by Laviers et al., describing a methodology, appended to a RAAB (rapid assessment of avoidable blindness) survey, for measuring the prevalence of presbyopia and presbyopic spectacle coverage. The article provides more evidence of the importance of presbyopia as a condition affecting quality of life, even among those who may not read. It was interesting that there was no difference in coverage between males and females.

By simply adding a question asking each participant if he or she owned near-vision spectacles we learned several interesting things during the Kilimanjaro RAAB. Overall spectacle ownership was 10.9% (95% CI, 9.9–11.9), and the men were 1.42 times (95% CI, 1.14–1.76) more likely than the women to have spectacles. Of interest, people 50 to 70 years of age were 1.42 times (95% CI, 1.11–1.81) more likely to have spectacles than those older, independent of present visual acuity. Finally, there were significant differences in spectacle ownership among the different clusters making up the RAAB sample, suggesting that availability of spectacles in the village is an important factor. Sex, age, and cluster all remained associated with spectacle ownership in multiple logistic regression ($P = 0.001$, 0.05, and $<0.001$, respectively). That (independent of visual acuity) the individuals aged 50 to 70 years were more likely to have spectacles than were the older individuals (who presumably need them more) may indicate more demand for good vision and more willingness to pay for it in the younger group. It could also mean that the older people did not have enough money for spectacles.

Spectacle ownership in a population-based group older than age 50 is not exactly the same as presbyopic spectacle coverage in the same group; however, it is a reasonable proxy for coverage, adds nothing to the cost of the RAAB, and provides valuable information for planners.