Review of: "When to Adjust Alpha During Multiple Testing"

Sander Greenland[1]

1 University of California, Los Angeles

Potential competing interests: The author(s) declared that no potential competing interests exist.

I agree with Rubin, whose position has long been held by a large portion of the epidemiologic methods community. Greenland (2021, see below) goes into technical detail about how inappropriate application of MC procedures can severely undermine valid research goals.

My 4 instead of 5 stars for Rubin's post reflects only that I did not see where the post or his cited work discussed alternatives to the extremes of conventional multiple-comparisons (MC) adjustment and no MC adjustment. As has been written about for over 50 years, hierarchical (multilevel) methods such as empirical-Bayes and semi-Bayes modeling can dramatically improve accuracy in multivariate settings (including those in which the MC debate arises). Today these methods are easily applied with common software. For gentle introductions see

Greenland, S. (2000). Principles of multilevel modelling. International Journal of Epidemiology, 29, 158-167. https://academic.oup.com/ije/article/29/1/158/666823

Greenland, S. (2000). When should epidemiologic regressions use random coefficients? Biometrics, 56, 915-921. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.0006-341X.2000.00915.x

Greenland, S. (2008). Introduction to Regression Modeling. Ch. 21 of Rothman et al. (eds.), Modern Epidemiology, 3rd ed. p. 435-439.

and sec. 5.6 of Greenland (2021, below).

For discussions of misconceptions of MC problems common among statisticians as well as scientists see

Greenland, S. (2008). Multiple testing and association selection in general epidemiology. International Journal of Epidemiology, 37, 430-434.

Greenland, S., and Hofman, A. (2019). Multiple comparisons controversies are about context and costs, not frequentism vs. Bayesianism. European Journal of Epidemiology, 34(9), 801-808, DOI 10.1007/s10654-019-00552-z, open access at https://link.springer.com/content/pdf/10.1007%2Fs10654-019-00552-z.pdf

Greenland, S. (2021). Analysis goals, error-cost sensitivity, and analysis hacking: essential considerations in hypothesis testing and multiple comparisons. Pediatric and Perinatal Epidemiology, 35, 8-23. https://doi.org/10.1111/ppe.12711