Social epidemiology, intra-neighbourhood correlation, and generalised estimating equations

The recent editorial by Merlo1 offers an interesting critique of the generalised estimating equations (GEE) analysis of a paper published in the same issue of the journal. In the editorial, the author notes that the paper’s GEE analysis treats “the intra-neighbourhood correlation as a nuisance” that needs to be adjusted in the analysis but not explicitly investigated (page 550).

The editorial then becomes a call for an alternative, more innovative approach in social epidemiology: “Estimation of the extent to which individuals within a given neighbourhood are correlated with one another in relation to health (that is, the concept of intra-neighbourhood correlation) has value in the context of ideas about the efficacy of focusing intervention on places instead of people” (page 551). The finale is a logical conclusion that studies of intra-neighbourhood correlation may “...present a step in the right direction for research on contextual influences and health.”

Author’s reply

I have read with great interest the comments made by Petronis and Anthony on my editorial.1 I have also read their forthcoming article,2 and I believe they apply an analytical approach that seems to be, in my opinion, a step in the right direction for research on contextual influences and health that focuses on investigation of clustering. I will be very pleased to write a more extensive comment and send it for consideration and possible publication in the journal.

Measuring clustering with the aim of obtaining substantive scientific information is so far an uncommon approach in social epidemiology and most multilevel analyses have in fact been plain “contextual analysis”3 focused on measures of association. This seems to be true not only for studies using GEE techniques but also for studies using multilevel hierarchical regression. However, the original standpoint of multilevel hierarchical regression analyses is the investigation of complex patterns of variation4 rather than dealing with residual correlation.

Regarding the use of “GEE2” and measurement of clustering, the comment of Petronis and Anthony is certainly right. From an epidemiological point of view the most interesting question is the conceptual rather than the mathematical approach used. I agree with Petronis and Anthony in their conceptual approach and I believe that they put context back in epidemiology using “GEE2” techniques. The pairwise odds ratio and other techniques for measuring neighbourhood heterogeneity and clustering like the median odds ratio and the interval odds ratio5 deserve more development and spreading.

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References