

Response to von Eye and Wiedermann's commentary "Strengthening arguments based on scale levels?"

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In a thought provoking commentary, von Eye and Wiedermann (2018) discussed the choice of statistical method in relation to scale level and then gave as an example the study of longitudinal stability of aggression based on a cross-tabulation of aggression at age 10 against aggression at age 13. Aggression was measured by seven-graded scales (1-7) and a 7 x 7 table was presented. The table was taken from my article in the *Journal for Person-Oriented Research* (Bergman, 2017). There a Pearson correlation of $r = 0.43$ was reported, indicating a moderate stability of aggression. The main statement I made was that this correlation carries information about the stability at a *group* level but that it does not inform about *individual* stability. Von Eye and Wiedermann seem to agree with the second part of this statement but point out that the interpretation of r is not straightforward – among other things it depends on the assumptions you make about the scale level of the measures of aggression. Analyzing the relationship with methods assuming nominal scale level and ordinal scale level they find that the method for ordinal analysis they used indicated no stability in aggression - in contrast to the findings obtained using methods assuming nominal or interval scale level. They also made the important point that, within an ordinal scale level framework, there exist methods for examining person-oriented statements in a more formal way than the simple counts presented in my article and that the toolbox of configural frequency analysis (von Eye, 2002) could be used for that purpose.

Von Eye's and Wiedermann's main admonition is well taken: It is imperative that when choosing a statistical method for a studying a relationship the researcher must consider the purpose of the analysis, the scale level of the variables, and the modeling assumptions. They gave in their commentary an example where the inferences drawn from the analysis varied strongly depending on the assumptions made about the scale level and the choice of statistical method used for studying the relationship.

Like me, I think many readers were surprised by the divergent finding that emerged for the data example when applying an analysis assuming an ordinal scale; a finding that should be a reminder to carefully consider the authors' admonition when planning the statistical analyses. However, in this specific case the finding might not be so unexpected, if the construction of the aggression scales is considered in more detail. Unfortunately, these details were not presented in my article and, hence, were unknown to von Eye and Wiedermann. The teacher that rated the pupils in his/her school class was instructed to first find the pupils at the two extremes of aggression (anchored by descriptions of extremely low or high aggression), to expect that normally they would be few, and then work towards the midrange (3-5) of the scale where normally the majority of the pupils would be (Magnusson, Dunér, & Zetterblom, 1975). Of course, the ratings produced could be regarded as just an ordinal scale with ties. However, the larger frequency of ties in the midrange might be considered as conveying information beyond what "normally" is the case for ordinal scales with ties. Could it be regarded as suggesting that, in spite of being just a seven-graded scale, it has to some extent interval scale properties, as well as a rough fit to the normal distribution, and that this information is lost in an ordinal analysis, causing the divergent findings?

References

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