Letter to the Editor

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Considerations on linear correlation analysis

Considerações sobre a análise de correlação linear

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The paper "Auditory processing screening: contributions of the combined use of questionnaire and auditory tasks", recently published in the 23rd volume of this journal[1], brings significant contribution on the search of valid and reliable auditory processing screening procedures, a recurrent topic in international consensus on the matter[2,3]. Nevertheless, the paper has two important mistakes regarding linear correlation analysis that might lead to incorrect interpretation of research's results and related statistical concepts.

In the paper's "Results" section, table 3 presents 78 correlation analyses between the score of *Scale of Auditory Behaviors* questionnaire and the hit percentage of tests that make up the Auditory Processing Simplified Assessment.

The first mistake consists in the fact that correlation coefficient (r), obtained through Pearson's correlation test, is inappropriately represented in the form of percentage.

The equation that determines r limits its value to real numbers contained between 1 and -1. Positive and negative signs indicate, respectively, directly or inversely proportional correlations, while absolute value indicates correlation's strength, with higher values denoting stronger correlations[4].

The representation of r by means of percentage might lead the reader to incorrect interpretations of the results, the most common being the idea that percentage represents variance proportion of one variable that can be explained by other variable[5]. This interpretation, however, is possible only if one squares r, obtaining coefficient of determination (r^2)[6].

Thus, it is recommended that r values must be reported in real numbers contained between -1 and 1, limiting its interpretation to correlation power, and the use of percentage must be reserved to r^2 representation[7].

The second mistake refers to the lack of correction for multiple comparisons of p values corresponding to each r.

It is known that, the more hypotheses tested simultaneously, the higher the probability of incurring into type I error (rejecting null hypothesis when it is true). This means that performing multiple correlation analyses increases the risk of finding statistically significant correlations by chance. Thus, interpretation of the results of a study and its conclusion can be altered if the effects of multiple comparisons are ignored[8].

Many methods of correction for multiple comparisons can be used, like Bonferroni's method, which consists in dividing the originally proposed p value by the number of comparisons to be made[9]. In this study, the application of this method would lead to consider statistical significance only for p values $\leq 0,00064$, consequently changing the interpretation of the results presented.

Statistics is a science based on concepts that are sometimes abstract and, for this reason, can be easily mistaken by readers and researchers alike. Yet, given the importance of this science for the construction of new knowledge and clinical decision, elucidation of misconceptions is necessary so that scientific knowledge can progress on solid bases.

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