LETTERS

Core Temperature—The Intraoperative Difference Between Esophageal Versus Nasopharyngeal Temperatures and the Impact of Prewarming, Age, and Weight

To the editor: We would like to respectfully bring your attention to potential errors in the manuscript entitled "Core Temperature—The Intraoperative Difference Between Esophageal Versus Nasopharyngeal Temperatures and the Impact of Prewarming, Age, and Weight: A Randomized Clinical Trial" by Erdling and Johansson, *AANA Journal*, April 2015[1]. We believe an inappropriate notation for the Spearman's rank correlation was used (r^2) whereas r_s is the appropriate abbreviation[2]. In the Results section (page 102, right column, paragraph 4) the authors used r^2 in referring to the correlation and alleged that this would result in a negative value, which is mathematically impossible. Additionally, r^2 is a different statistic that indicates the proportion of variance in the dependent variable determined by the independent variable[3]. The authors evaluated the normality of the data distribution using the Kolmogorov–Smirnov test (p. 102, paragraph 2) but the results of the data distribution were not disclosed, yet the authors proceeded to use parametric and non-parametric statistical tests without explaining their different choices. The authors used a paired, two-tailed, *t*-test to compare two groups described as parallel groups (page 102, paragraph 2, under "Data Analysis") at identical time points, whereas we believe an independent *t*-test would be more appropriate for this between-group comparison of two different populations denoted Group A (pre- and intraoperative warmed) and Group B (intraoperative warmed). Thus, an independent *t*-test should have been used[4]. We thank the authors for studying such an important issue in anesthesia care. We would like to request that the authors address these methodological issues in a further effort to understand and clarify their work.

REFERENCES

1. Erdling A, Johansson A. Core temperature—the intraoperative difference between esophageal versus nasopharyngeal temperatures and the impact of prewarming, age, and weight: a randomized clinical trial. *AANA J.* 2015; 83(2):99-105.
2. Polit DF, Beck CT. Nursing Research. 10th ed. Philadelphia: Wolters Kluwer; 2017: 393.
3. Shavelson RJ. *Statistical Reasoning for the Behavioral Sciences.* Boston: Allyn & Bacon Inc.; 1981: 203.
4. Polit DF, Beck CT. *Nursing Research.* 10th ed. Philadelphia: Wolters Kluwer; 2017: 385- 386.

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First and foremost, I would like to thank my co-author for the opportunity to contribute regarding the data analysis process. In the mentioned letter, it was argued that Spearman's rank correlation may have been used in an inappropriate manner in our article. To study how variables are related, correlation and regression are usually used. These two are the most common and most important methods for mapping relationships between variables. With correlation, you can study how strong a relationship is. Regression is a more powerful tool, with regression you can study how strong the connection is, and you can study more than two variables simultaneously and you can use the results to predict.

A correlation includes two variables (X & Y). Both variables are treated equally, so far that none of the variables are considered as predictors or outcomes (outcome). The correlation between X and Y indicates the relationship between the variables and the correlation ranges from -1 to +1 and this value is called the correlation coefficient (*r*). Pearson's correlation coefficient is based on the assumption that X and Y are normalized and the relationship between X and Y is linear and Pearson's method is thus parametric. If the variables do not meet parametric assumption, there are non-parametric methods, and the most commonly used method is the Spearman rank correlation coefficient. By this method, the ranking is compared between X and Y. Using the rankings, the calculation becomes more robust if the relationship is not linear. The ranking also attenuates the significance of any outliers.

Regression also investigates the connection between two variables. However, in the regression analysis, one variable is dependent and the other variable is independent. In order to follow the tradition, the dependent variable will be Y, which means that you will use X to predict Y. To estimate the strength of the relationship between Y and Y, you can use the coefficient of determination, also called R^2. This value is from 0 to 1. So, your observation is perfectly correct. Our presented

correlation value is a correlation value (and correct) and nothing else – so the variable named r^2 is a mistake. Notably, this is in line with our intention in the statistic section, which we only intended to perform a correlation analysis and not a regression analysis.

Furthermore, normal distribution according to our variables was evaluated with the Kolmogorov-Smirnov test, but the letter argued that the results of the data distribution were not reported. We hope and believe that the majority of the readers of this article could predict that the authors use parametric and non-parametric tests when appropriate. If the editor of the journal and/or involved reviewers wanted us to present these values continuously, we would, of course, have done this.

Regarding the next statement, that we used a paired *t*-test to compare two groups described as parallel groups at identical times are misinterpreted: here we admit that what should be compared could more clearly be described under the heading "data analysis." However, the described comparison aims to be within the same groups; to describe the temperature difference between the 0-point and 210 minutes. So, we believe that we used an adequate *t*-test.

Finally, we also want to remind readers that clinical benefit from results is sometimes more important than an individual *P* value. Too many times, statistical differences are presented without much mention of the clinic benefit from the statistical result. Regarding the appropriate comments on our manuscript, we agree that different parts in the data analysis could be clarified in more detail but still, we believe that our results are of clinical relevance.

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