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Moving nursing beyond $p < .05$

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We write as a community of professional statisticians and quantitative methodologists with extensive collective experience in nursing research. Our group includes faculty in academic nursing programs, statistics reviewers for nursing research journals, statistics educators who teach nursing students, and statistics collaborators on nursing research studies. Members of our group have participated in expert panel discussions and presentations at international statistics conferences about the use of statistics in nursing research and education ([Hayat et al., 2013, 2014](#)). Our efforts are further described in the opening editorial for a special issue of *Nursing Research* devoted to statistics in nursing ([Hayat, 2012](#)). Since 2011 we have continued to maintain an email listserv for statisticians in nursing.

Over the years, members of our group have routinely encountered, and tried to address, misuses and misunderstandings of p -values and significance testing. Fortunately, the American Statistical Association (ASA) recently launched a large-scale effort aimed at “Moving to a World Beyond ‘ $p < 0.05$ ’” ([Wasserstein et al., 2019](#)), publishing a 19-page editorial with this title in the ASA-sponsored journal *The American Statistician*, along with 43 thought-provoking papers from prominent statisticians and other experts on the topic. [Wasserstein et al. \(2019\)](#) call for abandoning the phrase “statistically significant” and discontinuing the practice of categorizing p -values based on an arbitrary threshold such as .05, noting that, “Regardless of whether it was ever useful, a declaration of ‘statistical significance’ has today become meaningless.”

It is unfortunate that the term “significant” was ever attached to “ $p < .05$.” Webster’s dictionary defines the word “significance” as “importance.” Yet, statistical significance is not synonymous with importance. This misleading label has led to misinterpretations and poor decisions that have cost lives, money, and resources ([Ziliak and McCloskey, 2008](#)). Patients and healthcare providers have paid a heavy price for the science community’s reliance on statistical significance as a criterion for importance. Decisions should never be made based solely on a significance test or p -value. The deep issues with inappropriately using p -values as a measure of importance were addressed nearly a decade ago by [Hayat \(2010\)](#) in *Nursing Research*, but the reality is that p -values continue to be poorly understood and widely misused.

Our hope is that editorial boards of nursing journals will consider revising their author submission and publication guidelines to provide clear guidance more consistent with the promotion of rigorous, reproducible science. Specifically, in line with the recent effort by the ASA, we recommend the following manuscript submission requirements:

- 1) When a p -value is reported, state its value regardless of how small or large it may be.
- 2) Avoid using .05 or any other cutoff for a p -value as the basis for a decision about the meaningfulness/importance of an effect.
- 3) In reporting a p -value, a measure of the effect size should be included, along with a corresponding interval estimate (e.g., confidence interval).

The “ $p < 0.05$ ” standard and concomitant language of “statistical significance” are well-entrenched, despite the damage that has resulted from their use. This recent initiative among statisticians to move beyond “ $p < 0.05$ ” is an escalation of a longstanding agenda in the statistics discipline to shift science away from “statistical significance” and toward measures of clinical and practical importance. We

would like to see the nursing science community take this important step forward, abandoning the language of “statistical significance” in favor of meaningful statistics, which are essential for sound science and healthcare decision-making.

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