Guest Editorial

Moving nursing beyond $p < .05$

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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Matthew J. Hayat*,[1,2]
Department of Population Health Sciences, School of Public Health, Baydine F. Lewis College of Nursing & Health Professions (Joint), Georgia State University, Atlanta, GA, USA

Vincent S. Staggs[3,4]
Department of Pediatrics, University of Missouri-Kansas City, Biostatistics & Epidemiology Core, Children's Mercy Kansas City, Kansas City, MO, USA

Todd A. Schwartz[5]
*Department of Biostatistics, Gillings School of Global Public Health,
School of Nursing,
University of North Carolina,
Chapel Hill, NC, USA*

Melinda Higgins[6]
*School of Nursing, Emory University,
Atlanta, GA, USA*

Andres Azuero
*School of Nursing, The University of Alabama at Birmingham,
Birmingham, AL, USA*

Chakra Budhathoki
*School of Nursing, Johns Hopkins University,
Baltimore, MD, USA*

Rameela Chandrasekhar
*Department of Biostatistics, Vanderbilt University School of Medicine,
School of Nursing, Vanderbilt University,
Nashville, TN, USA*

Paul Cook
*College of Nursing, University of Colorado,
Aurora, CO, USA*

Emily Cramer
*School of Nursing, University of Kansas Medical Center,
Kansas City, KS, USA*

Mary S. Dietrich
*School of Medicine (Biostatistics, VICC, Psychiatry),
School of Nursing,
Vanderbilt University,
Nashville, TN, USA*

Mauricio Garnier-Villarreal
*College of Nursing, Marquette University,
Milwaukee, WI, USA*

Alexandra Hanlon
*Center for Biostatistics and Health Data Science,
Department of Statistics,
Virginia Polytechnic Institute and State University,
Blacksburg, VA, USA*

Jinghua He
Jinxiang Hu
*Department of Biostatistics and Data Science,
University of Kansas Medical Center,
Kansas City, KS, USA*

MyoungJin Kim
*Office of Nursing Research, Scholarship, and Innovation,
Mennonite College of Nursing, Illinois State University,
Normal, IL, USA*

Martina Mueller
*College of Nursing and Department of Public Health Sciences (Joint),
Medical University of South Carolina,
Charleston, SC, USA*

Joseph R. Nolan
*Department of Statistics, Northern Kentucky University,
Highland Heights, KY, USA*

Yelena Perkhounkova
*Office for Nursing Research and Scholarship,
College of Nursing, University of Iowa,
Iowa City, IA, USA*

Janet Rothers
*College of Nursing, University of Arizona,
Tucson, AZ, USA*

Glenna Schluck
*College of Nursing, Florida State University,
Tallahassee, FL, USA*

Xiaogang Su
*Department of Mathematical Sciences, University of Texas at El Paso,
El Paso, TX, USA*

Thomas N. Templin
*College of Nursing, Wayne State University,
Detroit, MI, USA*

Michael T. Weaver
*College of Nursing, University of Florida,
Gainesville, FL, USA*

Qing Yang
*School of Nursing, Duke University,
Durham, NC, USA*

Sangbeak Ye
*School of Nursing and Health Studies, University of
Missouri-Kansas City,
Kansas City, MO, USA*

[1]Primary author.
[2]Joint first author.
[3]Primary author.
[4]Joint first author.
[5]Primary author.
[6]Primary author.

* Corresponding author.
E-mail address: mhayat@gsu.edu (M. Hayat).