Editorial

Doing More With Null Age Effects: Introduction to the Special Section

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When I became editor of the Psychological Sciences section of the Journal of Gerontology, one of my first goals was to encourage awareness of equivalence tests for null effects to researchers studying psychological aging. A number of techniques were out there for evaluating the potential meaningfulness of null effects—termed “equivalence tests”—but aging researchers were by and large not using them. This was especially problematic for our field because we are in the business of investigating differences between (age) groups, and there is at least a lot of anecdotal evidence of studies that did not find significant (age) group differences also not being publishable in top aging journals. The typical reason for manuscripts with null age effects to be rejected is the inherent ambiguity of null results; however, equivalence tests can make them somewhat less ambiguous. If potentially meaningful null age effects are systematically missing from the literature, this would lead to overestimates of the magnitude of actual age differences in the published record. Publishing only papers with significant age differences could mean that we are not working with null effects; the point is instead that these approaches may not have been available to the authors, but using the equivalence tests may lead to different and/or stronger conclusions, at least in some cases. Sometimes, equivalence tests will provide evidence for actual age similarity; other times, the equivalence tests will only tell us that we still do not know whether the age groups are similar or not. In these latter cases, we are left with the traditional ambiguity of null effects. So, equivalence tests help us distinguish between potentially meaningful and likely ambiguous null effects, but do not render all null effects meaningful.

One especially important feature of the article by Lakens and colleagues is that the example studies from the journal are not included to target their omission of the equivalence tests; the point is instead that these approaches may not have been available to the authors, but using the equivalence tests may lead to different and/or stronger conclusions, at least in some cases. Sometimes, equivalence tests will provide evidence for actual age similarity; other times, the equivalence tests will only tell us that we still do not know whether the age groups are similar or not. In these latter cases, we are left with the traditional ambiguity of null effects. So, equivalence tests help us distinguish between potentially meaningful and likely ambiguous null effects, but do not render all null effects meaningful.

This point is reinforced by the important work presented in the article by Brydges and Bielak (this issue). In reviewing published studies in aging journals, they find that Bayes factors in particular have been used rarely so far—a point that is perhaps not too surprising. More importantly though, they do calculate Bayes factors for those studies...
that report null age effects but had not already presented Bayes factors, and find that the vast majority are inconclusive. This is an important reminder that equivalence tests are not a panacea; many—perhaps most—null age effects will remain inconclusive. Large sample sizes may be more likely to generate meaningful null effects, and researchers will need to design their studies with a consideration of what attributes might be likely to render any null age effects that are more likely to be meaningful.

Although some studies focus on whether a particular psychological process varies by age or not, another typical question in studies of psychological aging involves whether some factor predicts variability in a particular psychological process within persons and whether the direction or magnitude of these associations vary by age group. Neupert and Hannig (2019) propose a compromise between frequentist and Bayesian approaches, termed generalized fiducial inference (GFI), and compare the results of the three analysis types for emotional reactivity data from daily diaries. GFI provides an important alternative to Bayesian analysis especially when there is not a strong reason to choose a theoretically grounded prior based on previous research. In some cases, all three methods agree about null age effects in the daily diary data, providing quite a strong test of age similarity. The authors also consider cases in which the models diverge and provide recommendations for how to use these different approaches for daily diary data in the future. This work is also an important reminder that null effects testing should not be reserved only for cross-sectional age comparisons, but also for within-person longitudinal assessments as well.

Finally, the special section includes several articles providing empirical examples of the use of equivalence tests to try to discern potentially meaningful null age effects. Emery, Sorrell, and Miles (this issue) investigate different types of rumination and find a dissociation between negative and positive rumination. The use of equivalence tests allows for a stronger interpretation here than “there are significant age differences in negative but not positive rumination.” Whereas negative rumination is significantly lower in older adults, Bayesian analyses suggest an actual age similarity in positive rumination.

Löckenhoff and Samanez-Larkin (this issue) consider intertemporal choice tasks, which have produced mixed findings in past studies of age differences (including one of the few published null effects including Bayes factors I am aware of at this journal prior to this special section: Löckenhoff, Rutt, Samanez-Larkin, O’Donoghue, & Reyna, 2019). Using equivalence testing, they are able to demonstrate that particular changes to the nature of the task do not change the basic finding of age similarity in temporal discounting. Moreover, the Bayesian analysis suggests a dissociation in age effects for gains versus losses, with evidence for an age effect for gains but evidence suggesting similarity in losses. Again, equivalence testing allows for stronger conclusions regarding distinctions between processes that show age differences and those that show age similarity.

Tessoulin, Galharret, Gilet, and Colombel (2019; this issue) apply equivalence tests to false memory and are able to show that the magnitude of the misinformation effect is similar in both younger and older adults. In contrast to the relatively weaker interpretation of “no significant difference between the 2 groups,” instead they can make the stronger claim that the effect is similar across age groups.

The authors of these articles are brave for trying to illustrate the use of these tests (see also Castro & Isaacowitz, 2019; Livingstone & Isaacowitz, 2019—two recent articles from my lab which also included Bayesian analyses, as well as Löckenhoff et al. (2016)—another article on aging featuring Bayes factors), and I appreciate them for taking the lead in trying the techniques out, especially in such a public forum. I am optimistic that these techniques will become more widespread in aging journal articles and thus will no longer warrant special issues. Editors and reviewers are quite reasonably starting to ask for the use of equivalence tests when authors attempt to interpret null effects in their manuscripts. Moving forward, authors will need to decide to either appropriately tone down language about possible age similarity in the absence of equivalence tests or (preferably) include equivalence tests and then use them to guide interpretation of potentially meaningful age similarity.

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**References**


Lakens, D., McLatchie, N., Isager, P., Scheil, A., & Dienes, Z. Improving inferences about null effects with bayes factors and equivalence


