Commentary

Psychological Science
2017, Vol. 28(9) 1361–1363

DOI: 10.1177/0956797617718183
www.psychologicalscience.org/PS

Evidence That an Ebola Outbreak Influenced Voting Preferences, Even After Controlling (Mindfully) for Autocorrelation: Reply to Tiokhin and Hruschka (2017)

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Received 12/9/16; Revision accepted 6/6/17

"Did an Ebola outbreak influence the 2014 U.S. federal elections (and if so, how)?" We addressed this question in a previous article (Beall, Hofer, & Schaller, 2016), in which analyses on preelection polling data were reported. Results indicated that the outbreak was associated with increased intentions to vote for conservative candidates and also increased inclination to conform to local voting norms. A Commentary by Tiokhin and Hruschka (2017) reports new analyses of these data after first detrending key variables. On the basis of these new results, Tiokhin and Hruschka's Commentary concludes that there is "no evidence that an Ebola outbreak influenced voting preferences in the 2014 elections after controlling for time-series autocorrelation."

The conclusion that there is "no evidence" is questionable, for two reasons. First, it does not take into account results (reported by Beall et al.) that did control for autocorrelation and did produce evidence linking the Ebola outbreak to changes in voting preferences. Second, the new analyses reported in Tiokhin and Hruschka's Commentary have their own inferential shortcomings.

Beall et al. reported two complementary analytic strategies to examine whether the Ebola outbreak was associated with changes in a voter-intention index. The primary strategy focused on the ongoing outbreak itself—treating the outbreak as an "intervention"—and compared preoutbreak and postoutbreak voter-intention-index values. The second strategy did not focus directly on the outbreak but instead on Google searches for "Ebola"—treating an Ebola-search-volume index as an "assay" of the psychological salience of the outbreak—and examined correlations between the Ebola-search-volume index and the voter-intention index. (Americans searched for "Ebola" much more often during the month after the onset of the outbreak than they did before—which is why the Ebola-search-volume index may have some inferential utility as an indicator of the outbreak.)

Tiokhin and Hruschka's Commentary focuses only on the second strategy. This omission matters because it is the first strategy (preoutbreak vs. postoutbreak comparison) that most directly addresses the research question (because it focuses explicitly on the outbreak, not on Internet search behavior), and it is within the context of that more direct strategy that Beall et al. did—in Study 1—report analyses that corrected for autocorrelation.

Study 1 employed nationwide polling data to test whether the outbreak coincided with a change in Americans' voting intentions. The results (depicted graphically in Beall et al., Fig. 1, p. 599) revealed that it did. There was a change in the temporal trajectory of the voter-intention index (a pattern that, within the political-science literature, has been labeled a *wave effect*; Shaw, 1999): Compared with the preoutbreak trajectory, the postoutbreak trajectory was toward greater support for conservative candidates—which indicates a cumulative impact of the ongoing outbreak. Beall et al. reported analyses that separately estimated pre- and postoutbreak trends. Results—which addressed inferential issues associated with autocorrelation—showed that the

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trends were significantly different. *Segmented regression analysis* (Jebb, Tay, Wang, & Huang, 2015) provides a more statistically elegant means of controlling for autocorrelation and testing the difference between pre- and postoutbreak trends. These additional results—described in detail in the Supplemental Material available online—are inferentially identical to those reported by Beall et al.: The temporal trajectories of voters' intentions differed during the month following and the month preceding the outbreak ($p < .001$), and also differed during the week following and the week preceding the outbreak ($p = .002$), which indicates that the outbreak was associated with increasing support for conservative candidates.

We conducted an analogous segmented regression analysis on Canadian polling data (Study 3). Here, too, there was a statistically significant difference between pre- and postoutbreak trends in voters' intentions ($p = .037$; see the Supplemental Material for details)—which indicates, again, that the outbreak was associated with increasing support for conservative candidates.

Now consider the results for Studies 1 and 3 that *are* reported in Tiokhin and Hruschka's Commentary: correlations between two detrended variables (Ebola-search-volume index and voter-intention index). Although this detrending strategy is appropriate for many time-series data sets addressing many research questions, it is inferentially problematic when applied to these data and this research question. This is because the positive temporal trend that characterizes the Ebola-search-volume index was entirely a consequence of the outbreak (for evidentiary details, see the Supplemental Material). Detrending the Ebola-search-volume index does not merely control for autocorrelation; it statistically eliminates the Ebola-search-volume index's utility as an assay of the outbreak. Analyses involving the detrended Ebola-search-volume index are therefore statistically insensitive to the wave effect that was associated with the outbreak. This has implications for the conclusions that one can logically draw from the results reported in Tiokhin and Hruschka's Commentary. It may be appropriate to conclude that after controlling for autocorrelation—and thus also statistically controlling for the effect of the outbreak on the Ebola-search-volume index—there is no evidence linking Ebola search volume to voting intentions. But it is an incorrect inferential leap to also conclude that there is no evidence linking the outbreak itself to voting intentions.

Is there a way to analyze the relationship between the Ebola-search-volume index and the voter-intention index that addresses inferential issues associated with autocorrelation while also allowing detection of a wave effect (if there is one)? Perhaps. The Supplemental Material describes one such strategy that appears to be of inferential utility in this particular context. The results (for both Studies 1 and 3) mimic those of the segmented regression analyses. These complementary results suggest that the outbreak-related change in the polling data may be attributable to the persistent psychological salience of Ebola throughout the month that followed initial news of the outbreak.

What about the other effect reported by Beall et al.—the finding (from Study 2) that outbreak-related changes in state-specific voting intentions were moderated by state-specific voting norms? For reasons identified in Tiokhin and Hruschka's Commentary, that finding must be viewed skeptically; and because the results reported in Tiokhin and Hruschka's Commentary emerged from analyses involving a detrended Ebola-search-volume index, they must also be viewed skeptically. Therefore, we conducted new analyses on the nonrepresentative subset of state-specific elections for which there was minimally sufficient polling data to do so. These analyses (a) employed results of segmented regression analyses to estimate outbreak-related changes in the temporal trajectories of voters' intentions and (b) tested whether these changes were systematically moderated by state-specific voting norms. Results indicated no such effects (see the Supplemental Material for details). Thus, these sparse data do not show any outbreak-related increase in conformity to local voting norms.

So when all relevant results are considered, the conclusion that there is "no evidence" appears to be incorrect, and the conclusion stated by Beall et al. appears to be only partially correct. Instead, the most sensible answer to the research question—"Did an Ebola outbreak influence the 2014 U.S. federal elections (and if so, how)?"—is probably this: The results suggest that the Ebola outbreak may have led to increasing intentions to vote for politically conservative candidates.

A bigger-picture thought might be worth articulating too: Any statistical analysis may lead to inferential errors when employed in a manner that is not mindful of the research context. Gigerenzer (2004) wrote,

> We know but often forget that the problem of inductive inference has no single solution. There is no uniformly most powerful test, that is, no method that is best for every problem. Statistical theory has provided us with a toolbox with effective instruments, which require judgment about when it is right to use them. (p. 604)

How might those judgments best be made? Collectively. Scientists are merely human—cognitively constrained by analytic preferences and prejudices and prior expectations—and so scientific inference proceeds best as a communal enterprise. One service provided by Tiokhin and Hruschka's Commentary (and by this reply, too, we hope) is to remind researchers that in order to most

successfully overcome the inferential shortcomings associated with any particular statistical analysis, it helps to employ the efforts of multiple statistical analysts.

Action Editor

D. Stephen Lindsay served as action editor for this article.

Author Contributions

M. K. Hofer and M. Schaller performed the new statistical analyses reported here. M. Schaller drafted the manuscript using input from all three of the authors; M. K. Hofer and A. T. Beall made critical revisions. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Funding

This research was funded by an Insight Grant (435-2012-0519) from the Social Sciences and Humanities Research Council of Canada.

Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797617718183

References

Beall, A. T., Hofer, M. K., & Schaller, M. (2016). Infections and elections: Did an Ebola outbreak influence the 2014 U.S. federal elections (and if so, how)? *Psychological Science*, *27*, 595–605.

Gigerenzer, G. (2004). Mindless statistics. *The Journal of Socio-Economics*, *33*, 587–606.

Jebb, A. T., Tay, L., Wang, W., & Huang, Q. (2015). Time series analysis for psychological research: Examining and forecasting change. *Frontiers in Psychology*, *6*, Article 727. doi:10.3389/fpsyg.2015.00727

Shaw, D. R. (1999). A study of presidential campaign event effects from 1952 to 1992. *The Journal of Politics*, *61*, 387–422.

Tiokhin, L., & Hruschka, D. (2017). No evidence that an Ebola outbreak influenced voting preferences in the 2014 elections after controlling for time-series autocorrelation: A Commentary on Beall, Hofer, and Schaller (2016). *Psychological Science*, *28*, 1358–1360.