



**With Many Looking to Us for Better Answers, We Must Answer Carefully: A Call for
Methodological Reform in Research on Effects of Communication Technology**

Dr. James D. Ivory

Associate Professor

Department of Communication

Virginia Tech University

Correspondence:

540-231-6507

jivory@vt.edu

Original manuscript accepted for publication in

Journal of Communication Technology

Published by the Communication Technology Division of the Association for Education

in Journalism and Mass Communication

DOI: 10.51548/joctec-2018-002

With Many Looking to Us for Better Answers, We Must Answer Carefully: A Call for Methodological Reform in Research on Effects of Communication Technology

Abstract

Among the range of approaches and topic areas encompassed by the broad and interdisciplinary field of communication, research on the effects of communication technology is prominent and long-standing. Given the attention that research on the effects of communication technology receives from the scholars, the public, and policymakers, it is imperative that the accuracy, validity, replicability, and reproducibility of that research is a priority. This essay suggests five points, informed by research related to open science, that the community of researchers studying effects of communication technology might bear in mind to protect and promote the most accurate body of knowledge possible.

Keywords

Media Effects; Communication Technology; Replication; Open Science

In the view of pioneering communication scholar Wilbur Schramm (1963), communication research spans its various subfields as a unified endeavor: “There is only communication research. All parts of it are related to all other parts, and the landscape is marked off only by the fact that some scholars are centrally interested in one part, some in another” (p. 5).

Without challenging that wisdom, it can also be noted that the various nebulously defined approaches and topic areas within the field of communication have involved unique

contributions to knowledge. Prominent among these areas is the subfield encompassing research on the effects of communication and media technology. Scholarship dealing with new media technologies has long been a key corner of the communication discipline. Academic interest in the advent of the mass media as a social force was one catalyst for the emergence of communication as an academic field of study, and since the early 20th century the arrival of a given new media technology has been demonstrably tailed by a spate of research investigating that new media technology's social effects (Cantril & Allport, 1935; Wartella & Reeves, 1985).

That pattern holds today, with the potential effects of technologies such as video games and mobile devices drawing interest from scholars, clinicians, parents, policymakers, and the courts (American Psychological Association, 2015; Council on Communications and Media, 2016; Ferguson, 2013; Ivory & Holz Ivory, 2016). With so many sets of eyes on the outcomes of research dealing with the effects of communication technology, the stakes are high. It is imperative that research examining the social effects of new communication technology is based in methodological practices that ensure accurate and valid findings.

Across the universe of social and behavioral research, such accuracy and validity cannot be taken for granted. Perhaps most notably in the fields of psychology and medicine, a “replication crisis” (see Lindsay, 2015; Maxwell, Lau, & Howard, 2015) has mounted in recent years around growing concerns that key findings—and even entire bodies of literature and theoretical frameworks—may be based on research documenting phenomena that cannot be consistently observed (Ioannidis, 2005; Open Science Collaboration, 2015). Several systemic problems in the process of social research are cited as culprits for a body of published knowledge that too often cannot be replicated or reproduced. These problems range from “questionable research practices” that inflate the likelihood of significant findings (Fanelli, 2009; John, Loewenstein, & Prelec, 2012; Martinson, Anderson, & de Vries, 2005) in individual studies

to the “file drawer problem” wherein studies producing null findings tend to be less likely to be published, or even submitted for publication (Rosenberg, 2005; Rosenthal, 1979).

While issues with replicability and reproducibility are, at present, less frequently discussed in communication circles, there is ample evidence that communication research also suffers from systemic inflation of significant findings in its published literature (Matthes et al., 2015; Seaman & Weber, 2015; Vermeulen et al., 2015). Concerns also extend to specific research topics dealing with communication technology, such as the possible effects of video games (Bushman, Gollwitzer, & Cruz, 2015; Elson, Breuer, Scharrow, & Quandt, 2014; Ferguson, 2007; Ivory et al., 2015). Such problems with the validity of research findings in the literature are not, for the most part, the results of intentional fraud or overtly malevolent intent by researchers. As Simmons, Nelson, and Simonsohn (2011) describe motivations behind practices that inflate significance of findings thusly: “This is not driven by a willingness to deceive but by the self-serving interpretation of ambiguity, which enables us to convince ourselves that whichever decisions produced the most publishable outcome must have also been the most appropriate” (p. 1365). Therefore, the “pressure to do whatever is justifiable to compile a set of studies that we can publish” (Simmons et al., 2011, p. 1365) is a symptom of a research practice culture that needs to have some of its norms adjusted rather than of sporadic bad acts in the community.

Given the importance of research on effects of communication technology to the field and to a broader audience and given that systemic issues in the production of social research are a legitimate threat to the validity of that research, this article offers a call for some minor methodological reforms to protect and promote the accuracy and validity of research dealing with effects of communication technology. This call takes the form of five simple points addressed to researchers, reviewers, editors, and others in the scholarly community studying

effects of communication technology regarding ways that our research culture can be as conducive as possible to production of accurate, valid, replicable, and reproducible knowledge.

Five Suggestions for Future Research on Communication Technology Effects

1. Nothing is Something: Null Findings Teach Us About Communication Technology Effects, Too

The “media effects” approach to communication has been a dominant perspective in both communication technology research and the broader communication field (Eveland, 2003), but the approach may, down to its very name, also be inadvertently plagued by a bias toward research finding such effects. Given that the “file drawer” problem is prominent across social research (Rosenberg, 2005; Rosenthal, 1979), scholars interested in effects of communication technology must be especially mindful of avoiding publication bias—a broad preference for significant findings at all levels of the research process that cumulatively produces an inflated appearance of media effects in the literature.

Sometimes, media technologies have a noteworthy effect on outcomes in our lives. Sometimes, they do not. To ensure that the entire spectrum of communication technology effects—including null effects—is included in the record of knowledge, we must be mindful of the need to avoid privileging significant findings when we conduct our own research and when we evaluate the research of others. The latter is particularly important, as authors who might otherwise be comfortable with reporting and submitting null findings may be less so when discouraged by reviewers and editors. Feedback along the lines of “This was a great study idea; it’s a pity the results weren’t significant” must become a thing of a past if we are to be sure that our research is focused on the quality of the questions we ask about communication technology and the methods we devise to answer them rather than on the answers we get.

2. Context is Everything: Baseline Comparisons Inform Findings about Communication

Technology Effects

While learning to embrace null findings may be one ongoing challenge for scholars, a similar challenge deals less with the presence of effects than with the magnitude of them. Reporting statistical effect sizes is an increasingly common practice in communication research, even a prerequisite for publication. Such statistics provide information about the strength of association between variables, which is useful context. In the specific research area of effects of communication technology, another useful indicator of magnitude is information about how effects of the specific technology of interest compare to effects of alternative technologies or activities. Indeed, a communication technology may have a measurable effect on an outcome, but the societal importance of that effect may be in its magnitude relative to the technology's alternatives. Providing such comparisons, both in formal research reports and in popular media outreach such as press releases, would do much to discourage misinterpretation of an observed effect's novel impact on individuals and society.

An outstanding example of the value of such comparisons can be found in a recent study by Przybylski and Weinstein (2017), who report some associations between high amounts of weekday digital screen time and problems with mental well-being among a large sample of British adolescents. They carefully qualify the urgency of their findings, though, by noting that the strength of association between screen time and well-being in their study was much smaller in magnitude than associations between well-being and breakfast or sleep habits. Such comparisons provide an excellent opportunity to contextualize the impact of communication technology on our lives rather than promote all observed effects as substantially detrimental or beneficial to the lives of users.

3. Show Our Work: Reducing Methodological Flexibility Will Ensure Valid Findings about

Communication Technology Effects

The importance of encouraging reportage and publication of null effects (as well as contextualizing the magnitude of observed effects) has already been discussed here. However, the incentive to produce research showing effects of communication technology is not eliminated by merely increasing publication of null findings. Researchers may be predisposed to findings that support an existing theoretical framework, a previous program of research, or simply an exciting finding. Without ill intent, a researcher may increase the likelihood of significant findings by incorporating “researcher degrees of freedom” (Simmons et al., 2011) in a study design, providing more opportunities to produce a desired outcome. Choosing which cases to remove, how to compute an outcome measure, which variables to include in a statistical model, which measures to report, and a host of other decisions all introduce a “garden of forking paths” in which a study can inadvertently provide scores of potential outcomes to compare in search of a preferred finding (Gelman & Loken, 2014). Even without deliberately “p-hacking” to produce a desired significant result, a researcher motivated to expect a certain effect might consequently report significant patterns picked from noise in a data set. This selectivity is perhaps a particular concern with measures that are designed to allow flexible use (see Elson et al., 2014).

A remedy for such inflation of significant effects is transparency and *a priori* decision-making throughout the research process. Providing open access to data sets via freely available services (including notably the Open Science Framework; <http://osf.io>) allows specific analyses to be reproduced but also allows alternate analyses to be conducted to be sure a finding is not the product of a delicate combination of analysis decisions rather than a robust effect of the technology under study. Further, an array of tools (one of many examples is As Predicted; <http://aspredicted.org>) allow pre-registration of study designs and analysis plans to ensure careful consideration of a conceptually appropriate methodological strategy in advance rather than *post hoc* decisions made from among a smorgasbord of reportable findings (Nosek &

Lakens, 2014). With a broad audience interested in what researchers learn about communication technology effects, sharing access to how that knowledge was produced adds substantially to its credibility. Authors can use these tools to increase the credibility of their findings, while reviewers and editors can encourage such open practices to increase their confidence in the studies they evaluate.

4. Demolition Allows Development: Letting Go of Findings that Do Not Replicate Ensures Accurate Knowledge about Communication Technology Effects

If we achieve a research environment where a broader range of results are reported and published, and where studies have less flexibility in analyses to produce outcomes that may be preferable, then that environment is one where our research findings are more accurate. Unfortunately, though, such an environment can also be one where popular findings and theories from the previous, more flexible, and more effects-friendly research climate are not well-supported. In behavioral science, replication initiatives commonly fail to support some previously celebrated findings (Open Science Collaboration, 2015). Previous findings may have been inflated by biases in the research process, or they may be flukes of chance rather than consistently observable phenomena (Ioannidis, 2005).

In any case, there will be instances where authors, reviewers, and editors encounter results that challenge popular scholarly beliefs about effects of technology. Such challenges must be welcomed by authors as well as by editors and reviewers. Lewin's (1952) maxim, "There is nothing more practical than a good theory" (p. 169) may ring true, but a theory loses its practicality when evidence no longer consistently supports it as presented. Articles published in major communication journals display an increased proliferation of proposed theories (Anderson, 2016); culling them based on evidence will allow the strongest frameworks to flourish. As we conduct and evaluate research, we must maintain a healthy receptiveness toward falsification of our assumed knowledge.

5. If Being Wrong is Wrong, I Do Not Want to Be Right: Acknowledging and Embracing Errors and Limitations in Our Past Research is a Noble Contribution to Knowledge

Finally, if we will find sometimes that previous research has been wrong, then we may find sometimes that *our own* previous research has been wrong. This realization will not likely be pleasant. A researcher may have invested considerable effort into a program of research, and it may be difficult to countenance a lack of support from new data. Further, a researcher may have produced findings using accepted strategies at the time but later realize in a changed research environment that those strategies inflated the significance of findings and are now discouraged. In both situations, there may be feared impacts on reputation, and even careers.

Here, it is crucial that we are responsible with the uncomfortable outcomes of new research culture. If we are indeed able to produce a climate in research on communication technology effects where we see more common publication of null findings, more clarity about the comparative context of effects, more transparency and less flexibility in analyses, and more falsification of prior research, then we need to consider implications for the people involved—ourselves and others—carefully. While some practices, such as demonstrable fraud, should have negative consequences for researchers, findings that are simply falsified by improvements in research practice should not be viewed as a source of shame so much as proverbial “products of their time.”

An author acknowledging that a prior finding is no longer one that can be interpreted confidently is not only candid; that author is voluntarily accelerating correction of the scientific record. Thus, we need to take an “amnesty” approach when hindsight allows a researcher to see limitations in a study and congratulate the nobility of righting past errors. A crucial part of improving the norms of research practice, then, is for the community of researchers interested in communication technology effects to welcome—and even applaud—self-inspection and self-correction of the research record.

Conclusions and a Final Call

I expect to enjoy observing a future of innovative programs of research conducted by brilliant, hard-working, and well-intended researchers. This article aims to suggest how we can all help each other ensure that the future is also one where we can be more confident in the knowledge we produce. While one touted hallmark of science is that it is self-correcting, it is folly to assume that a research field will self-correct without eradication of systemic biases against self-correction (Ioannidis, 2012). Researchers studying effects of communication technology are trusted by many for guidance about the new devices, media content, and interactions that continue to flood into their lives. We must honor that trust by ensuring that our research community's norms and standards ensure the most accurate body of knowledge possible.

References

- American Psychological Association. (2015). *Resolution on violent video games*. Retrieved from <http://www.apa.org/about/policy/violent-video-games.aspx>
- Anderson, J. A. (2016). Communication descending. *International Communication Gazette*. (Online First Publication). doi:10.1177/1748048516655708
- Bushman, B. J., Gollwitzer, M., & Cruz, C. (2015). There is broad consensus: Media researchers agree that violent media increase aggression in children, and pediatricians and parents concur. *Psychology of Popular Media Culture*, 4, 200–214. doi:10.1037/ppm0000046
- Cantril, H., & Allport, G. W. (1935). *The psychology of radio*. New York: Harper.
- Council on Communications and Media. (2016). Media and young minds. *Pediatrics*, 138, e20162591. doi:10.1542/peds.2016-2591
- Elson, M., Mohseni, M. R., Breuer, J., Scharrow, M., & Quandt, T. (2014). Press CRTT to measure aggressive behavior: The unstandardized use of the competitive reaction time

task in aggression research. *Psychological Assessment*, 26, 419–432.

doi:10.1037/a0035569

Eveland, W. P., Jr. (2003). A “mix of attributes” approach to the study of media effects and new communication technologies. *Journal of Communication*, 53, 395–410.

doi:10.1111/j.1460-2466.2003.tb02598.x

Fanelli, D. (2009). How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. *PLoS One*, 4(5), e5738.

doi:10.1371/journal.pone.0005738

Ferguson, C. J. (2007). Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behavior*, 12, 470–482.

doi:10.1016/j.avb.2007.01.001

Ferguson, C. J. (2013). Violent video games and the Supreme Court: Lessons for the scientific community in the wake of *Brown v. Entertainment Merchants Association*. *American Psychologist*, 68, 57–74. doi:10.1037/a0030597

Gelman, A., & Loken, E. (2014). The statistical crisis in science. *American Scientist*, 102, 460–465.

Ioannidis, J. P. A. (2005). Why most published research findings are false. *PLoS Medicine*, 2(8), e24. doi:10.1371/journal.pmed.0020124

Ioannidis, J. P. A. (2012). Why science is not necessarily self-correcting. *Perspectives on Psychological Science*, 7, 645–654. doi:10.1177/1745691612464056

Ivory, J. D., & Holz Ivory, A. (2016). Playing around with causes of violent crime: Violent video games as a diversion from the policy challenges involved in understanding and reducing violent crime. In S. Conway & J. DeWinter (Eds.), *Video game policy: Production, distribution, and consumption* (pp. 146–160). New York: Routledge.

- Ivory, J. D., Markey, P. M., Elson, M., Colwell, J., Ferguson, C. J., Griffiths, M. D., . . . Williams, K. D. (2015). Manufacturing consensus in a diverse field of scholarly opinions: A comment on Bushman, Gollwitzer, and Cruz (2015). *Psychology of Popular Media Culture, 4*, 222–229. doi:10.1037/ppm0000056
- John, L. K., Loewenstein, G., & Prelec, D. (2012). Measuring the prevalence of questionable research practices with incentives for truth telling. *Psychological Science, 23*, 524–532. doi:10.1177/0956797611430953
- Lewin, K. (1952). *Field theory in social science: Selected theoretical papers by Kurt Lewin*. London: Tavistock.
- Lindsay, D. S. (2015). Replication in psychological science. *Psychological Science, 26*, 1827–1832. doi:10.1177/0956797615616374
- Martinson, B. C., Anderson, M. S., & de Vries, R. (2005). Scientists behaving badly. *Nature, 435*, 737–738. doi:10.1038/435737a
- Matthes, J., Marquart, F., Naderer, B., Arendt, F., Schmuck, D., & Adam, K. (2015). Questionable research practices in experimental communication research: A systematic analysis from 1980 to 2013. *Communication Methods and Measures, 9*, 193–207. doi:10.1080/19312458.2015.1096334
- Maxwell, S. E., Lau, M. Y., & Howard, G. S. (2015). Is psychology suffering from a replication crisis? What does “failure to replicate” really mean? *American Psychologist, 70*, 487–498. doi:10.1037/a0039400
- Nosek, B. A., & Lakens, D. (2014). Registered reports: A method to increase the credibility of published results. *Social Psychology, 45*, 137–141. doi:10.1027/1864-9335/a000192
- Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science, 349*(6251), aac4716. doi:10.1126/science.aac4716

- Przybylski, A., & Weinstein, N. (2015). A large-scale test of the Goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science*. (Online First Publication).
doi:10.1177/0956797616678438
- Rosenberg, M. S. (2005). The file-drawer problem revisited: A general weighted method for calculating fail-safe numbers in meta-analysis. *Evolution*, 59, 464–468. doi:10.1554/04-602
- Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin*, 86, 638–641. doi:10.1037/0033-2909.86.3.638
- Seaman, C. S., & Weber, R. (2015). Undisclosed flexibility in computing and reporting structural equation models in communication science. *Communication Methods and Measures*, 9, 208–232. doi:10.1080/19312458.2015.1096329
- Schramm, W. (1963). Communication research in the United States. In W. Schramm (Ed.), *The science of human communication* (pp. 1–16). New York: Basic Books.
- Simmons, J. P., Nelson, L. D., Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, 22, 1359–1366. doi:10.1177/0956797611417632
- Vermeulen, I., Beukeboom, C. J., Batenburg, A., Avramiea, A., Stoyanov, D., van de Velde, B., & Oegema, D. (2015). Blinded by the light: How a focus on statistical “significance” may cause *p*-value misreporting and an excess of *p*-values just below .05 in communication science. *Communication Methods and Measures*, 9, 253–279.
10.1080/19312458.2015.1096333
- Wartella, E., & Reeves, B. (1985). Historical trends in research on children and the media: 1900–1960. *Journal of Communication*, 35, 118–133. doi:10.1111/j.1460-2466.1985.tb02238.x

