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Open Science at OBHDP

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There used to be a time when the expense of printing and distributing journals limited how much scientists could share with one another. That constraint is long gone. As digital distribution pushes the marginal cost of sharing to zero, it makes possible a greater openness than science has ever known. We can now post all our research materials, data, analysis code, and results online. These technological advances come at a time when the need for openness and full reporting has never been clearer.

That need was identified in a short paper by Simmons, Nelson, and Simonsohn (2011) that explained how undisclosed researcher flexibility inflates the risk of false positive results. This flexibility has included the freedom to determine sample size, selectively report experimental conditions and measures, and specify statistical tests. They showed how these sources of flexibility quickly raise the rate of false positives from 5% to 60% or beyond, especially in studies with small sample sizes.

The years since 2011 have seen momentous shifts in the way psychologists conduct and report their research. Sample sizes have grown rapidly. Researchers regularly share their materials and data. And web sites like osf.io and aspredicted.com are logging pre-registered research plans that specify research designs, sample sizes, measures, and key hypothesis tests. These changes are improving the quality and replicability of psychological research (Nosek, 2018; Wagenmakers *et al.*, 2012). But the fields of organizational behavior and management have been latecomers to the open science revolution. Tenney, Costa, Allard, and Vazire (2021) examine the use of open science practices in four management journals and find that while the vast majority of articles have not adopted them, they are increasing and that the field may be on the brink of an important change. A broader adoption of open science standards seems timely.

Why here?

We applaud Maryam Kouchaki's (2020) call for research published in *OBHDP* to include posted data, syntax, and materials. We believe the failure to answer this call risks undermining the credibility of our field, threatening the validity of the conclusions we can draw from papers, and hampering scientific progress. If the cumulative evidence published in *OBHDP* is more accurate and truthful, the journal will increase in impact and influence compared to journals that continue publishing results of more dubious veracity and replicability. It was this sentiment that motivated us to issue a call for papers that could help management research move faster into the vanguard of open science. Ultimately, ten papers made it through the review process. Each one contributes in a different way to our understanding of the challenges and potential solutions. (Their references below are designated [Special issue on Open Science].)

We recognize that the studies published in top journals for organizational behavior are often different from the studies published in experimental psychology journals. Some of the characteristics of management research make our work less vulnerable to undisclosed researcher flexibility. Research in organizational behavior is more likely to include field data that uses

surveys or rich archival measures. Such studies are perhaps less likely to include endogenous choices about sample size. If you haven't pre-specified your sample size for a lab experiment, you may be tempted to collect a little more data after looking at your results and seeing that they're trending in the right direction but not quite significant. This is often not possible in field studies or archival samples.

However, in other ways survey research may be more open to flexibility in data analysis. A rich assortment of variables in survey and archival studies can raise serious concerns about backward induction, selective reporting, dustbowl empiricism, and capitalizing on chance findings. Researchers will always have choices to make about which analyses to present and which measures best represent theoretical constructs. Naturally, there are some specifications and analyses that are more useful and insightful than others, and choices between them are facilitated when researchers understand their data. The problem is that selective reporting allows exploratory analysis to masquerade as confirmatory (Kerr, 1998). One simple solution to this problem is full reporting. Reporting all variables and materials allows readers and reviewers to make informed assessments of the degree of freedom the researchers have in choosing measures and statistical specifications (Yip & Schweitzer, forthcoming).

It is important to note that this is not about derogating exploratory analyses, since exploration and discovery are as central to the scientific enterprise as confirmation, and an emphasis on confirmation should not discourage researchers from making exploratory discoveries (Collins *et al.*, in press). Instead, the benefit of full disclosure is to make it clear when the reported results emerge from exploration or when they follow from a confirmatory pre-planned test. Schweinsberg *et al.* (2021) offer an inspiring solution to this problem. Their DataExplained software package allows researchers to track data analyses in R. This record allows researchers to report the degree to which they engaged in exploration ahead of settling on statistical specifications they chose to present in the paper. Moreover, Schweinsberg and colleagues demonstrate the profound value in understanding this path of discovery by documenting the radical dispersion in results when different researchers test the same hypothesis. Further, almost all published research results from some element of exploration but even exploration can follow a plan, and making these plans often has advantages that it motivates researchers to think more systematically about what they want to do and why. Yeomans (2021) provides an illustrative case. His analysis shows how the exploration of large corpora of text data to increase construct validity can follow open science standards.

What are best practices in full reporting?

Full reporting begins with preregistration of research plans ahead of data collection that specify the study's primary goals, hypotheses, and measures. Preregistration is relatively new in both social psychology and management. Logg and Dorison (2021) show that adoption of preregistration in *OBHDP* in the past five years has increased to 26.4% of all articles published but they also find generational differences in adoption. Its formats and details are still a matter of discussion. There are a number of useful resources on how to make a good preregistration including (but not limited to) the preregistration template from aspredicted.org, a suggested template for social psychology (van 't Veer & Giner-Sorolla, 2016), and a workshop on how to preregister (<https://osf.io/fkt8e/>). Logg and Dorison (2021) review these options and argue that preregistration can increase freedom and efficiency at low cost.

Simmons, Nelson, and Simonsohn (2012) suggest a 21-word disclosure: “We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.” This declaration then requires additional disclosures to fulfill it. Some of these may be simple. For instance, a perfectly acceptable explanation for sample size might be that it was chosen arbitrarily; important is that the sample size was specified ex-ante and did not depend on the results. Reporting all measures may require more explanation for a survey study, especially if the key measures are just a subset of the many questions on the survey.

It should then be standard practice for researchers to share their research materials and data ahead of publication (Aguinis *et al.*, 2020). For experimental research, this would mean sharing the experimental stimuli (such as Qualtrics survey exports) and the raw data files. For survey research, this would mean sharing the full surveys. For all research, full disclosure entails posting all the data employed by analyses presented in the paper.

Hofman *et al.* (2021) highlight other good reporting practices. Their paper describes their attempts to replicate the analyses in published papers using the authors’ own data. The fact that this effort does not always succeed should, by itself, be alarming to every researcher and every reader of the research literature. Hofman and colleagues’ experience leads them to recommend that researchers post the code they used to conduct the analyses that appear on their paper. Indeed, some have called on journals to hire statistics editors whose job it is to attempt to reproduce authors’ claims using their data and code (Gertler, Galiani, & Romero, 2018). This would reward authors who make it clear what analyses they have conducted, perhaps by providing well-commented code and code books that explain data files and the variables within them.

These disclosures need not clutter your papers. The article itself need only include a link to the online supplement which hosts your data, materials, syntax, and other relevant files. Thus, diligent reviewers interested in understanding the research in more detail can explore data, syntax, and additional materials. Other readers will be free to enjoy the published work the way they always have, unencumbered by supplements. The net result though, is a cumulative body of research that is more informative, accurate, and replicable. Likely, the field will also be able to learn better from the details of the research process that are shared.

Can there be exceptions?

There are, of course, circumstances under which data sharing is problematic. Sometimes authors are reluctant to share because they hope to conduct other analyses for additional papers. In this case, it is possible to post the data with some embargo period before which it will not be available. If the paper presents a selected subset of the data, then full disclosure would include an explanation of what was included, what was omitted, and why. Even for omitted data, in most cases it will be possible to explain precisely what was omitted—including variable names, the coding of the variable, and maybe even descriptive statistics. See Table 1.

Even when the data are proprietary, authors interested in addressing readers’ questions about the data still have options. They could, for instance, post a code book that lists all the variables in the data file, along with how each variable is coded and descriptive statistics. Conscientious researchers could also offer to share the results of novel analyses without sharing the data. One way to do this would be to offer that if a colleague sent functional statistical analysis code, the researcher would run the analysis on their data and send back the results.

Some researchers might fear being scooped with their own data. We suspect that this fear is exaggerated. If data posting is coincident with publication, it would be hard for even the speediest rival to sneak ahead of the original paper. Some may be reluctant to share for fear of increasing the chances that a critical colleague finds an error in their work. This very logic leads others to infer that researchers' failure to share signals a lack of confidence in their own results. It is worth noting, on the up side, that there are also real benefits to empowering others to test and replicate one's results. Not only does it draw attention (and citations) to one's work, but it enables a more cumulative science in which we learn collectively about replicability and generalizability (Tierney *et al.*, 2020).

Why now?

We acknowledge that the changes the Open Science movement proposes for our field represent real changes to the way that we have gotten used to conducting, analyzing, and reporting research. Do we really have to respond to these changes now? Why not wait and see what everyone does and allow reporting standards to change organically? One answer to this is that we should all prefer to be at the forefront of a positive change rather than the laggards. We should all be embarrassed to be the last journal allowing authors to hide their data and materials, especially if we suspect that it increases the risk that we are publishing results that will not replicate.

Another answer is that these changes represent meaningful responses to the recent realization of how much common research practices inflate the risk of false positives. We should all be concerned that the research literatures that we read and on which we rely to build our theories, include results that do not replicate (Camerer *et al.*, 2016; Ebersole *et al.*, 2016; Klein *et al.*, 2014; Open Science Collaboration, 2015; Tierney *et al.*, 2021). We should all worry about the risk to our field and its long-term credibility when the cumulative body of evidence is contaminated with results that will not replicate. As such, it is in our collective interest to agree to a system that constrains all of us a bit by compelling full disclosure of research methods and data. And it is never too early to implement such a change and raise the standards to which we hold each other.

Kraft-Todd and Rand (2021) point the way toward progress spreading open science practices by applying two conceptual frameworks. The first highlights the ways in which the adoption of open science practices represents a social dilemma. The field is collectively stronger when everyone shares openly. However, these practices may sometimes be costly to individual researchers. The second framework, credibility-enhancing displays, seeks to establish greater rewards for cooperation with open science practices by changing the incentives and making good practice more visible. *OBHDP* is well positioned to offer precisely this solution.

Open access

Finally, we would be remiss if we did not comment on what may be the greatest boon of online distribution: We can make our research papers universally available instantly and costlessly. Archaic systems that slow down publication in inexplicable publication queues and then hide research results behind paywalls restrict dissemination of our work. These systems are antithetical to the scientific value of openness and broad dissemination (Nosek & Bar-Anan, 2012). They reduce the impact of our research.

Journals rely on the volunteer labor of researchers, reviewers, and editors. For-profit publishers thank us for our efforts by claiming copyright over our work, restricting its dissemination, and charging our own libraries for access to it. Our universities then find themselves in the ironic position of having to pay to get access to the research results they paid to produce in the first place. This system is antiquated, unfair, and inefficient.

There will come a day when all research is posted online and is universally available. We are eager to move to this bright future. Online sharing sites such as PsyArXiv, osf.io, and SSRN are facilitating an explosion of available content. To sift through all this material, quality assessment becomes even more important in this digital world. Rather than fading away, it is easy to see that scholarly journals represent essential certifiers of quality. We intend to secure this journal's role in that digital future by taking full advantage of all the benefits offered by technological advancement. The future is bright. Let us have the courage to move forward to meet it.

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Table 1. Full disclosure for different types of data.

Type of data	What to post online	Are there exceptions?	Notes
Experiments	• Complete data • Syntax reproduces all results reported in paper • Complete study materials • Pre-registration, if available	No	All measures taken need to be reported in study materials; redact identifying details on participants
Survey data	• Complete data • Syntax reproduces all results reported in paper • Complete study materials • Pre-registration, if available	Data can be embargoed for usage by other researchers	All measures taken need to be reported in study materials; redact identifying details on participants
Archival data	• Complete data • Syntax reproduces all results reported in paper • Pre-registration, if available	Under some circumstances, reposting may be prohibited	Provide link to original data set if reposting not allowed. Link codebook with complete study materials, if available Syntax needs to execute the data extractions from original source data
Field notes	• Complete notes • Document explaining how data was coded. • Pre-registration, if available	No	Redact confidential information