

Sorting the File Drawer: A Typology for Describing Unpublished Studies

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Abstract

A typology of unpublished studies is presented to describe various types of unpublished studies and the reasons for their nonpublication. Reasons for nonpublication are classified by whether they stem from an awareness of the study results (result-dependent reasons) or not (result-independent reasons) and whether the reasons affect the publication decisions of individual researchers or reviewers/editors. I argue that result-independent reasons for nonpublication are less likely to introduce motivated reasoning into the publication decision process than are result-dependent reasons. I also argue that some reasons for nonpublication would produce beneficial as opposed to problematic publication bias. The typology of unpublished studies provides a descriptive scheme that can facilitate understanding of the population of study results across the field of psychology, within subdisciplines of psychology, or within specific psychology research domains. The typology also offers insight into different publication biases and research-dissemination practices and can guide individual researchers in organizing their own file drawers of unpublished studies.

Keywords

file drawer, publication bias, unpublished studies, meta-analysis, methodology

In a seminal article, Rosenthal (1979) introduced the concept of the file drawer, a term coined to describe unpublished studies. The concept of the file drawer was developed to assist in framing discussions of earlier concerns that published studies may be unrepresentative of the total population of studies conducted by scientists (McNemar, 1960; Smart, 1964; Sterling, 1959). A strong version of this concern is that a disproportionate number of statistically significant results in published studies are due to Type I errors. Rosenthal called this the file-drawer problem, and the greater its extent, the less confident psychologists can be in their theoretical understanding of phenomena when that understanding is derived from the results of published studies.

Over the past 40 years since the term file drawer was coined, contributors to psychological science have expanded their repertoire of ways to frame study results. In addition to null-hypothesis statistical testing (NHST), study results are now widely reported in terms of individual study effect sizes and confidence intervals, as well as aggregated study effects computed via meta-analysis (Cumming, 2014). As approaches to summarizing study results have broadened, so too has the conceptualization of the file-drawer problem. The more contemporary

conceptualization of the file-drawer problem, also referred to as publication bias, considers it a more general problem of bias in published effect sizes because of the disproportionate representation of more extreme results in the published literature (Borenstein et al., 2009; McDaniel et al., 2006; Paterson et al., 2016). This bias is typically considered directional such that effect sizes of published studies are thought to be larger than effect sizes of unpublished studies (Banks et al., 2014; Bradley & Gupta, 1997; Dalton et al., 2012; Franco et al., 2014), although there are cases in which larger effect sizes of unpublished studies have been suggested (Murad et al., 2018). Regardless of the direction of publication bias or whether a more nuanced elaboration of publication bias is considered, the major implication of the file-drawer problem remains essentially unchanged. The greater its extent, the less credible are theoretical conclusions derived from the results of published studies.

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The Extent of the Problem Depends on the Population of Studies

It is important to note that the file-drawer problem exists only to the extent that published studies are unrepresentative of the population of studies in a systematic manner that lessens confidence in scientific results. For instance, if published studies are unrepresentative of the population of studies in that they are of disproportionately higher methodological quality, then one should have greater confidence in theoretical conclusions based on published results. If upward bias in the results of published studies relative to the results of unpublished studies is due in part to higher methodological quality, then the degree of upward bias that is problematic may actually be quite low. To identify the extent of problematic bias, one would have to disentangle sources of beneficial bias from sources of problematic bias by comparing results of published studies to only the subset of unpublished studies that are of equivalent methodological quality. Another possibility given recent concerns raised by some about the dependability of results of published psychology studies (Funder et al., 2014; Kepes & McDaniel, 2013; McBee & Matthews, 2014; Motyl et al., 2017) is that published studies are of lower methodological quality than unpublished studies because of a higher reliance on questionable research practices (see John et al., 2012). In this instance, the upward bias in published effect sizes would indicate that the file-drawer problem is grave indeed. Finally, even if published and unpublished studies of a given phenomenon are matched in terms of methodological quality, there may be other factors that distinguish between published and unpublished studies that are responsible for discrepancies in results that may be of theoretical value to identify.

To draw firm conclusions regarding the extent of the file-drawer problem, one must ultimately have a clear understanding of the population of studies, which includes studies that are published and studies that are unpublished. On the basis of this understanding, one may then identify potential characteristics of published and unpublished studies that are similar or different to better evaluate the extent to which problematic bias in published studies may exist. Knowledge of published studies is readily obtainable by perusing the empirical literature. Unfortunately, knowledge of unpublished studies is either more difficult to obtain (e.g., studies reported in dissertations, theses, or professional conferences) or unavailable (e.g., unanalyzed study data or unreported studies).

The goal of this article is to facilitate a systematic understanding of unpublished studies by presenting a working typology for classifying different subsets of unpublished studies and the reasons for their nonpublication status. This typology can then be used as a

descriptive framework to (a) summarize and organize one's own unpublished studies, (b) inform understanding of different publication biases and research-dissemination practices, (c) build theoretical models of psychological and behavioral processes that explain publication decision-making, and (d) guide an accumulation of knowledge pertaining to the structure and nature of the population of studies across and within psychology subdisciplines and research domains.

Reasons for Nonpublication

What prevents scientific studies from being published? A number of possibilities exist, reflecting several factors.

Result-independent versus result-dependent reasons

One factor relevant to understanding why a study is published or not and which is of particular relevance to the file-drawer problem is whether circumstances or decisions for publishing are based on factors external to the final pattern of study results (i.e., circumstances or decisions are independent of study results) or whether the pattern of study results is used as the basis for publication or attempted publication (i.e., circumstances and decisions are dependent on study results). Considering result-independent reasons versus result-dependent reasons for publication is important because problematic bias is more likely introduced in the published literature if empirical outcomes of studies unrelated to conceptual or methodological quality are used as the basis for publication. For instance, assuming all other factors for publication are held constant, if researchers decide to submit for publication only high-quality studies that produce relatively large effect sizes, but not high-quality studies that produce relatively small effect sizes, then published findings will tend to have an upward bias. In contrast, assuming all other factors for publication are held constant, if researchers decide to submit for publication high-quality studies regardless of effect-size magnitude or statistical insignificance, then upward bias in published effect sizes would be less likely.

The publication decision maker

A second factor relevant to understanding why a study is published is who makes the publication decision. Is the decision made by the researcher who conducted the study or by reviewers of the presentation or report in which the study is included? If published studies are unrepresentative of unpublished studies, then it is worthwhile to know where in the publication process bias or unrepresentativeness is introduced. Is it produced by the

Table 1. Publication Status of Studies, Relative Degree of Accessibility, and Relative Severity of Evaluation

Publication status	Degree of accessibility	Severity of evaluation
Never entered or analyzed	Low	Low
Analyzed but no formal presentation	Low to moderate	Low
Formal but no professional presentation	Low to moderate	Low to moderate
Professional presentation but no attempted publication	Low to moderate	Low to moderate
Attempted but unsuccessful publication	Low to moderate	High
Published	High	High

Note: *Degree of accessibility* refers to the typical ease of obtaining studies within a publication-status category relative to studies within other publication-status categories. *Severity of evaluation* refers to the typical stringency of evaluation by researchers and reviewers of studies within a publication-status category relative to studies within other publication-status categories.

decisions of researchers, reviewers, and editors or by a combination thereof? How are the reasons for deciding against publication by researchers, reviewers, and editors similar or different?

Accessibility of unpublished studies and severity of evaluation

In addition to considering result-independent and result-dependent reasons for publication and who makes the publication decision, it also is important to note that unpublished studies are not homogeneous in terms of their accessibility to individuals other than the researcher. Some studies, although unpublished, may still have been reviewed for publication at one time, professionally presented (e.g., as conference presentations or talks), or documented in some formal manner (e.g., in research reports, dissertations, or theses). Even studies lacking formal presentation or review may have moderate accessibility if submitted to searchable online research repositories or archives. Consequently, some files in the drawer have been shared and exist in a form more readily available to others. In contrast, some files, consisting of data that have not been formally presented, or perhaps even analyzed, are not readily available to others and are known only to the researchers who acquired them.

The accessibility of unpublished studies is important to consider because the reasons for their degree of accessibility may provide insight into subsets of unpublished studies that are more or less representative of published studies. For instance, studies that are of higher conceptual and methodological quality may also have a higher degree of accessibility in terms of having been presented at professional conferences or documented in a dissertation or thesis than studies that possess major conceptual or methodological flaws. Indeed, the process of professional review is predicated

on the idea that studies should be screened to “weed out” those of lower conceptual and methodological quality. The goal is to make accessible the study results most worthy for use in advancing science by ensuring a high severity of evaluation. Of course, a higher severity of evaluation would be expected to promote quality only if the evaluation is done in an objective manner and is grounded in sound conceptual and methodological reasoning. Otherwise, a higher severity of evaluation may have little bearing on the quality of professionally presented or published studies and perhaps might even promote the presentation or publication of conceptually and methodologically inferior studies. Table 1 provides a scheme for conceptualizing various categories of unpublished studies, the relative degree of accessibility of results within those categories, and the relative severity of evaluation to which the results within those categories are subjected.

A Working Typology of Unpublished Studies

Table 2 presents definitions and examples of 12 reasons for unpublished studies and whether the reasons are specific to researchers, reviewers,¹ or common to both. This list was derived in the following manner. First, reasons for nonpublication were identified and developed intuitively on the basis of personal experience, conversations with colleagues, and casual reading of the psychology literature pertaining to the file-drawer effect and publication bias. Next, a more focused search for and examination of empirical studies and commentaries concerning factors related to the nonpublication of studies was undertaken by considering work in psychology and psychology-related fields (Cooper et al., 1997; S. Kerr et al., 1977; Reyson, 2006; Rotton et al., 1995). However, work in medical and related fields was also considered to acquire a broader sampling of

Table 2. Reasons for the Nonpublication of Studies

Reason	Description
1. Statistical concerns	Concerns with statistical properties or analyses thought to undermine the scientific value of study results <i>Examples:</i> statistical insignificance; estimate imprecision; ambiguous or equivocal data analytic outcomes
2. Unanticipated results	Study results that are contrary to theoretical or personal expectations, hypotheses, predictions, or assumptions <i>Examples:</i> failure to find evidence of a favored hypothesis; finding evidence of a nonfavored hypothesis
3. Unimportant results	Study results thought to provide little theoretical or empirical clarity, advancement, or direction for the field <i>Examples:</i> similarity of results to already published results; a theoretical question under investigation that has already been addressed
4. Conceptual concerns	Concerns with correct identification or sampling of theoretical constructs thought to undermine the scientific value of study results <i>Examples:</i> poor operationalization of focal constructs; poor or ambiguous theoretical inference from measures to focal constructs; theoretical inference that does not cohere with mainstream theoretical accounts or established empirical findings; poor formulation of theoretical explanation for study results
5. Methodological concerns	Concerns with procedural elements of a study that are thought to undermine the scientific value of study results <i>Examples:</i> instrumentation/technology errors; problems in study design features; participant recruitment problems; unexpected ethical problems; inadequacy of specific research paradigm
6. Sequence incompleteness	Studies are considered part of a larger study sequence that must be completed before analysis, presentation, or publication of study results <i>Examples:</i> additional direct replication studies are required; follow-up studies must be conducted
7. Field contention	Competition, disagreement, or conflict within a field or domain of investigation that discourages or deters professional presentation or publication of studies <i>Examples:</i> Not submitting a manuscript to avoid hostile reviews; more critical evaluation or obstruction of studies when reviewing work of competitors or scientists with opposing theoretical viewpoints
8. Collaborator opposition (researcher only)	Resistance to presentation or publication of studies by collaborators or research sponsors <i>Examples:</i> interpersonal or ethical conflict among collaborators; sponsor prohibition of publication
9. Loss of interest (researcher only)	Lack/loss of interest or timidity in professional presentation or publication of studies by the researcher or collaborators <i>Examples:</i> change in research focus; career change; fear of the review process
10. Resource limitations (researcher only)	Lack of resources to adequately pursue data analysis, presentation, or publication of studies <i>Examples:</i> insufficient funds, time, or personnel
11. Alternative focus (researcher only)	Focus of research directed at outcomes other than professional presentation or publication of studies <i>Examples:</i> pilot studies; educational/training opportunities; organizational assessment/evaluation; sponsor prohibition of publication; personal curiosity
12. Manuscript concerns (reviewer only)	Characteristics of proposals or manuscripts under review that undermine professional presentation or publication of studies <i>Examples:</i> poor writing; manuscript length; author or institutional prestige; author demographics/background; journal incompatibility; lack of grant funding

possible factors related to the nonpublication of studies (Bailar & Patterson, 1985; Chalmers et al., 1990; Hartling et al., 2004; Okike et al., 2012; Scherer et al., 2015; Ter Riet et al., 2012; Timmer et al., 2002; Toews et al., 2016).

Much of this work involved surveys of researchers regarding reasons for the nonpublication of their studies. The focused examination of the literature resulted in the identification of many reasons and specific

Table 3. Researcher and Reviewer Result-Dependent and Result-Independent Reasons for Nonpublication by Publication Status

Reason for nonpublication	Publication status				
	Never entered or analyzed	Analyzed but no formal presentation	Formal but no professional presentation	Professional presentation but no attempted publication	Attempted but unsuccessful publication
Researcher					
Statistical concerns		D	D	D	D
Unanticipated results		D	D	D	D
Unimportant results		D	D	D	D
Conceptual concerns		D	D	D	D
Methodological concerns	I	D/I	D/I	D/I	D/I
Sequence incompleteness	I	D/I	D/I	D/I	D/I
Field contention			I	I	I
Collaborator opposition	I	D/I	D/I	D/I	D/I
Loss of interest	I	D/I	D/I	D/I	D/I
Alternative focus	I	I	I	I	I
Resource limitations	I	I	I	I	I
Reviewer					
Statistical concerns			D		D
Unanticipated results			D		D
Unimportant results			D/I		D/I
Conceptual concerns			D/I		D/I
Methodological concerns			D/I		D/I
Sequence incompleteness			D/I		D/I
Field contention			I		I
Manuscript concerns			I		I

Note: The severity of evaluation (i.e., the typical stringency of evaluation by researchers and reviewers of studies within a publication-status category relative to studies within other publication-status categories) of each reason is assumed to increase from left to right along the publication-status continuum. D = result-dependent; I = result-independent; D/I = result-dependent/result-independent.

examples of those reasons that overlapped with the initial intuitive list of reasons and so were conceptually integrated together. Two additional reasons identified in the more expansive literature review that were not easily assimilated into reasons identified intuitively were also added to the list (collaborator opposition, loss of interest).

Table 3 lists the reasons for unpublished studies as a function of the following characteristics: (a) whether the reason may be attributable to researchers or reviewers, (b) in what publication status category the reason may block advancement toward the presentation or publication of studies, and (c) whether the reason is dependent or independent of the result (or both). The potential reasons for nonpublication are cumulative in that the number of potential reasons for nonpublication and their evaluative severity generally increase as one moves from studies that tend to be inaccessible (i.e., results never entered or analyzed) to results with high accessibility (i.e., published results). The 12 general

reasons for nonpublication are described in more detail below.

Statistical concerns

The failure of results to achieve statistical significance may lead researchers to avoid seeking publication of their results. This is the classic explanatory reason for the file-drawer problem in psychology (Cooper et al., 1997; S. Kerr et al., 1977; Reyson, 2006; Rosenthal, 1979; Rotton et al., 1995). Reviewers may find statistically insignificant results unconvincing, increasing the likelihood of manuscript rejection even if a researcher attempts to publish the results. Why does bias against statistically insignificant results exist? First, in the context of NHST, rejection of the null hypothesis is typically linked to the confirmation of a theoretical hypothesis, whereas failure to reject the null hypothesis is linked to the disconfirmation of the theoretical hypothesis. Given that the error rate for rejection of the null

hypothesis is usually set very low (typically $p < .05$), rejection of the null hypothesis is often interpreted as highly convincing evidence of support for a theoretical hypothesis. In contrast, given the insufficient statistical power of many psychology studies (Maxwell, 2004; Sedlmeier & Gigerenzer, 1989), failure to reject the null hypothesis with correspondingly high likelihood of Type II error is often interpreted as unconvincing evidence that a theoretical hypothesis has been disconfirmed. Second, Greenwald (1975) identified a number of “cultural truisms” regarding the null hypothesis that lead psychologists to (sometimes erroneously) perceive a failure to reject the null hypothesis as a less convincing statistical outcome than a rejection of the null hypothesis. Consequently, rightly or wrongly, statistical insignificance is often perceived as an equivocal study outcome by both researchers and reviewers.

Even if one adopts an estimation approach to the interpretation of empirical results, the conditions that prove problematic for NHST can also prove problematic for the generation of confidence intervals and estimation of effect sizes. Studies without relatively large sample sizes may produce imprecise estimates of effect size and wide confidence intervals. Indeed, interpreting confidence intervals that include mean-difference or effect-size values distributed near zero can be particularly challenging to interpret because one must entertain the possibility that a population parameter has a value that is zero, positive, or negative. Although the inclusion of such results may prove beneficial in the context of a meta-analysis, researchers may find it difficult to persuade reviewers that one’s results justify publication as a single study.

Unanticipated results

When researchers have a priori hypotheses or expectations about the outcome of a study, unanticipated results may deter publication. Unanticipated results may conflict with researchers’ own previous findings or the well-accepted results of others. They may be inconsistent with well-supported and accepted theory. In such instances researchers and reviewers may be inclined to assume the presence of some unrecognized methodological flaw is responsible or that the results are atypical or extreme as a result of random error. Moreover, unanticipated results may not conform to the hypothetical-deductive ideal when post hoc explanations are necessary for drawing plausible conclusions from results. Given psychologists’ strong adherence to this ideal (N. L. Kerr, 1998), researchers and reviewers may conclude that the findings should not be published. One special case of unanticipated results is when

results that are inconsistent with or disconfirm researchers’ favored theoretical model are strategically filed away to maintain the credibility of the favored model. Result suppression of this nature involves a motivated attempt to hide clearly unfavorable results as opposed to resisting publication because of confusion, lack of clarity, or doubt.

Unimportant results

It is assumed that before observing study results researchers always believe that their studies have the potential to provide important insight into some phenomenon or answers to important questions. However, after observing study results, researchers or reviewers may conclude that the results are theoretically equivocal and raise more questions than they answer. The results may suggest implications that are less impressive or provide less theoretical clarity than anticipated when considering the merits of the study design or the rationale for conducting the study. Even if researchers believe their study is important regardless of the results, reviewers may be less convinced. They may conclude that regardless of the results, the phenomena under investigation or the questions to which the researchers are seeking answers have already been addressed or provide little theoretical clarity and so preclude professional publication or presentation.

Conceptualization concerns

The nonpublication of studies may result from authors or reviewers having identified one or more conceptual problems or flaws with the study generating the results. A conceptual flaw may involve incorrect matching between a construct of interest and the measure used by the researcher to operationalize that construct. It is assumed that before observing study results researchers always believe that they have correctly or reasonably linked their operationalizations to their constructs of interest, which is why they selected them for use in the first place. However, researchers may change their mind after observing the study results. They may conclude that the measure of a construct of interest is a poor operationalization on the basis of its empirical characteristics (e.g., its statistical reliability or factor structure) or its empirical association with measures of other constructs with which the construct of interest should converge or diverge. Reviewers may also conclude that there are conceptual flaws in a study after observing the study results, but, unlike individual researchers, they may also identify conceptual problems for reasons independent of the study results (e.g., a belief that the measure is an invalid operationalization of the construct in general).

Methodological concerns

Studies may go unpublished if they suffer from one or more methodological flaws or problems. Methodological flaws can range in degree from relatively minor to fatal, and they may be identified by either individual researchers or reviewers. All studies likely possess one or more methodological flaws, but the more serious they are the more the validity of the results are called into question. For example, identifiable unsystematic mistakes in acquiring measurements from a few participants may not seriously undermine the validity of the final study results, but a systematic mistake in acquiring measurements from all study participants may completely invalidate the final study results. Methodological flaws may be either result-independent or result-dependent. A researcher may identify a methodological flaw before conducting analyses, such as when research personnel identify an error in the random assignment of participants to experimental conditions or a key dependent measure is erroneously excluded from study materials. Alternatively, a methodological flaw may be identified as a result of conducting analyses, such as when a primary dependent measure exhibits a floor or ceiling effect or an experimental manipulation is found to have little influence on a valid manipulation-check measure. The higher the number and severity of methodological flaws and the sooner in the dissemination process they are identified, the lower the likely accessibility of the results because researchers and reviewers will tend to be more resistant to allowing access to results the greater their perceived invalidity.

Sequence incompleteness

Many published reports of studies are built around a sequence of studies that as a set form the basis from which conclusions of the report are drawn. Thus, one reason studies may go unpublished is that they are conceived as one in a sequence of studies, of which not all studies in the sequence have been completed. Once all studies in the sequence are complete, researchers will attempt to publish the entire sequence of studies in a single research report. Researchers may plan for a sequence of studies in advance of conducting the studies or decide after knowing the results of initial studies that more studies need to be added to the sequence to address limitations or questions raised by the initial studies. Moreover, whether reviewers know the results of the studies or not, they may require authors to expand a sequence of studies as a condition for publication, which can then delay publication of earlier studies in the sequence. Regardless of the specific rationale for the sequence of studies, any study in

the sequence may remain unpublished until all studies in the sequence are complete.

Field contention

Researchers may avoid seeking the professional presentation or publication of studies if the results concern a phenomenon in an area of investigation in which debates are highly contentious and uncivil. Likewise, although they may conduct research on the phenomenon to satisfy their own curiosity or for objectives other than publication (see alternative focus below), researchers may opt to forgo seeking publication to avoid exposure to hostile or belittling reviews of their research or to avoid feeling beholden to meet publication demands of partisan reviewers. Reviewers may evaluate more critically submissions of work by researchers with opposing theoretical viewpoints or researchers they dislike for personal reasons (assuming reviewers can determine researchers' identities). Reviewers may seek to undermine the publication of results by competitors engaged in research similar to their own to facilitate the "scooping" of findings. Field contention is notable because it is one reason for nonpublication that is assumed to be independent of study results.

Collaborator opposition

After the completion of data collection, studies may go unanalyzed, may never be presented formally, or may never be submitted for publication, because of conflict or disagreement among collaborators about what to do with study results. Alternatively, sponsors who supported the research may prohibit the presentation or publication of results. Collaborator opposition may be either a result-dependent or result-independent reason for nonpublication that is contingent on whether the source of opposition is due to the pattern of study results. Moreover, it is one reason for nonpublication that is solely attributable to researchers and not reviewers.

Loss of interest

The nonpublication of studies sometimes (maybe even often) occurs because researchers or their collaborators lose interest in the study or the phenomenon examined in the study. Loss of interest may be due to burgeoning interest in another area of investigation or to a career change that transitions researchers' focus to activities other than scholarship. Anxiety and apprehension about subjecting one's work to critical review may also foster loss of interest, especially in seeking publication given its high severity of evaluation. Like collaborator

opposition, loss of interest is solely attributable to researchers but may stem from a consideration of study results (e.g., given the outcome of the study the phenomenon no longer seems appealing to investigate) or not (e.g., a shift in emphasis from research to teaching or administration for an individual in an academic institution).

Resource limitations

The nonpublication of studies may result from insufficient availability of resources in terms of time, financial support, access to participants, research personnel, or any other tangible resource necessary for researchers to adequately analyze, present, or publish study results. For example, academic researchers with higher time commitments to nonresearch activities (e.g., teaching, administration, service) may be less likely to publish their results than those with lower time commitments to such activities. Perhaps researchers with fewer or less experienced research personnel may find it more difficult to formally publish the final results of a study that would permit accessibility to study results. Limited resources is one potential reason for nonpublication that is specific to individual researchers and, like collaborator opposition, is solely independent of results.

Alternative focus

Research is not always conducted with the ultimate goal of publishing or disseminating one's results to the scientific community. Goals of the research may instead be directed toward other important outcomes not necessarily tied to publication. Examples of these types of goals include generating educational research experiences, training, or culminating projects for students (e.g., theses, dissertations); assessing programs, processes, or products of one's institution or organization; or evaluating clinical or public-health interventions. Goals with an alternative focus may also be more personal in nature, such as satisfying one's curiosity. Once these goals of the research are met, the professional presentation or publication of results may be perceived as unimportant or unnecessary. In some cases the dissemination of results outside of internal formal presentations may even be forbidden depending on the institution supporting the researcher. In other cases, formally presenting the results may be deemed unnecessary (e.g., creating research experiences, satisfying one's curiosity). Focusing on alternative goals of research is another reason for nonpublication that is specific to individual researchers and not reviewers. Moreover, this reason for nonpublication is considered result-independent in that the focus on alternative goals may be met regardless of the pattern of results discovered.

Manuscript concerns

Reviewers may undermine the publication of results because the manuscript reporting the results is unappealing in some manner independent of the results. The manuscript may be poorly written, boring, or structured in a nontraditional format that reviewers find problematic. Perhaps the manuscript fails to provide a "good story" for readers and so is judged an inadequate contribution to the journal. Moreover, the manuscript may lack certain heuristic cues that reviewers perceive as indicative of strong results or superior scholarship, such as manuscripts with notable authors or authors from prestigious institutions or manuscripts that indicate the research was supported by grant funding. It is also possible that certain perceived demographic characteristics of authors (sex or gender, country of origin) may trigger biases in reviewers who possess negative stereotypes or prejudices toward authors possessing those characteristics.

Assumptions of the Typology

Before considering specific features and implications of the typology of unpublished studies it is important to acknowledge it as a working typology. Although it may provide useful insights, implications, and applications, it may also require reduction, expansion, or revision on the basis of an empirical evaluation of its assumptions or features. With this in mind, what follows is a closer examination of the typology's current assumptions and features.

The status of unpublished studies varies in accessibility

First, although cast as a tool for understanding why a study may fail to achieve publication, the typology considers other forms of study dissemination in addition to publication that vary in their degree of formality and exposure to professional review. It can also be used to understand why studies may not be presented professionally or even formally presented to anyone. The various reasons for nonpublication are arranged along an ordered publication continuum that reflects how generally accessible studies are to individuals other than the researchers who generate them. Although the continuum is ordered in this manner, it is not assumed that studies necessarily pass through each subsequent status category along the continuum. It may be that after analyzing data a researcher formally presents the study in a manuscript that is immediately submitted for publication without the results ever being formally presented in another format. Likewise, studies may be submitted for professional presentation without ever having been

formally presented in a nonprofessional context (e.g., as a dissertation or formal colloquium presentation).

Reasons for nonpublication are cumulative

A second assumption of the typology is that the number of potential reasons for nonpublication accumulate with increasing movement along the publication-status continuum toward publication. As shown in Table 3, the number of potential reasons typically increases as one moves from the *never entered or analyzed* category to the *attempted but unsuccessful publication* category. The increase in number is due to both the actual number of potential reasons and how many individuals may generate those reasons. For example, there are six result-independent reasons attributed to the researcher for why study data may never be entered or analyzed (methodological concerns, sequence incompleteness, collaborator opposition, loss of interest, alternative focus, and resource limitations). In contrast, all 12 reasons are possible explanations for attempted but unsuccessful publication of results in a peer-reviewed journal, some of which may be attributed to multiple individuals (researchers, editors, multiple reviewers) and based on both result-independent and result-dependent considerations.

Reasons for nonpublication increase in severity

Like the number of reasons for nonpublication, the severity of evaluation by individual researchers or reviewers to overcome certain reasons for nonpublication (e.g., statistical, conceptual, or methodological concerns) is assumed to increase with movement toward publication. For example, concerns over minor methodological or conceptual flaws may be less problematic for reviewers considering whether to permit the professional presentation of studies, but those same flaws could be major obstacles to journal reviewers granting publication recommendations for the same studies. Likewise, statistical concerns such as statistical insignificance or imprecision may be considered less problematic for reviewers of professional presentations than for journal reviewers.

Reasons for nonpublication may be causally related and interactive

A fourth assumption of the typology is that reasons for nonpublication are distinct, yet they can be causally related or affect nonpublication in interactive ways. For example, sometimes resource limitations may cause

sequence incompleteness. Subsequent studies in a sequence may be impossible given limited time, money, or availability of research personnel. Unanticipated results or statistical concerns may lead researchers or reviewers to decide that the results are ultimately unimportant. The extent to which unanticipated results or statistical concerns influence reviewer or editor evaluations of unimportance may depend on manuscript concerns (e.g., a researcher's reputation, the prestige of a researcher's institution).

Reasons for nonpublication may stem from researchers or reviewers

A fifth assumption of the typology is that the decision to present professionally is a critical threshold. As soon as one decides to seek professional dissemination of a study one exposes it to professional review, which means that decisions to publish or present the study are no longer solely imposed by the researcher. Reviewers now influence the process and, like individual researchers, may choose to limit publication or presentation for a variety of reasons.

Potential Limitations of the Typology

In addition to considering what the typology of unpublished studies provides in terms of a descriptive framework, it also is important to consider several potential limitations of the typology.

Reasons for nonpublication are redundant

One possible limitation of the typology is that some reasons for nonpublication are redundant or represent special cases of other reasons. For instance, certain statistical concerns may be conceptualized as methodological concerns because they arise from similar study features, such as sample size, which can affect the quality of participant sampling, quality of random assignment, and imprecise estimation of descriptive statistics. However, these two concerns are kept distinct because statistical concerns can also arise for reasons unrelated to study characteristics or features (e.g., use of incorrect data analyses). As noted earlier, certain reasons for nonpublication may seem redundant because they produce causal effects on other reasons, such as when resource limitations produce sequence incompleteness or statistical imprecision produces unanticipated but equivocal results. Indeed, one could argue that unimportant results is a reason for nonpublication that stems from a combination of many of the other

reasons for nonpublication, including the perception of conceptual flaws, methodological flaws, and statistical concerns. Yet many times results are considered unimportant despite having high conceptual, methodological, and statistical quality. Alternatively, there are times when studies are considered important yet lack high quality in one or more of these characteristics.

Reasons for nonpublication are nonexhaustive

Another but opposite potential limitation is that the list of reasons for nonpublication is incomplete. Reason categories were selected to make them general enough to capture a wide range of potential reasons for nonpublication that cohere around common themes. For instance, there is no reason dedicated to author or institutional prestige, which (at least anecdotally) seem like factors with the potential to bias nonblinded reviewers in the manuscript review process. However, these two factors seem to cohere with other factors pertinent to the written presentation of studies (e.g., author demographics, journal incompatibility), which may influence the likelihood of their publication. Thus, when determining whether a reason for nonpublication is missing from the typology a key question to consider is whether the reason represents a more concrete example of any of the general categories of reasons identified in Table 2.

The typology lacks strong theoretical or empirical grounding

Perhaps the most significant potential limitation of the typology is that its formulation is not based on a specific set of theoretical principles. Or perhaps the typology does not offer an unequivocal set of empirical criteria for establishing a consistent classification of unpublished results on which all would agree. For instance, although the typology hints at certain motivational factors that may underlie some reasons why researchers and reviewers decide against publication of a study, the typology offers no deep systematic account of the motivational or reasoning processes that drive publication decision-making within or across individuals. Moreover, when evaluating the reasons for nonpublication of the same study, it is possible that different judges might arrive at different conclusions regarding these reasons. Researchers may emphasize or perceive different reasons for their own unpublished studies than judges not personally involved in conducting the studies. Consequently, as is the case with any self-report measure, one would need to be cautious of method biases if using the typology to develop self-report measures of nonpublication reasons (see Podsakoff et al., 2003).

Although these potential theoretical and empirical limitations may seem problematic to some readers, it is important to emphasize that the typology was not designed to provide a comprehensive theoretical explanation of publication decision-making or behavior. Rather, the typology was designed to offer a rich and comprehensive descriptive framework for classifying unpublished studies, a framework that could then be used to explore and develop useful questions that might guide the formation of such explanations. Examples of such questions include the following: What are the motivational and reasoning processes that guide publication decision-making by researchers and reviewers? Are they more focused on result-independent or result-dependent concerns of the study? How are these motivational and reasoning processes similar or different in individuals when evaluating their own work versus the work of others in determining whether to pursue or permit publication? When seeking to determine whether a study should be sent to reviewers, do editors focus more on result-independent concerns, result-dependent concerns, or both? When preparing a manuscript, what are different ethical or unethical strategies researchers may adopt to overcome various anticipated reviewer reasons for nonpublication? What are the factors that minimize manuscript concerns in reviewers? What are the factors that affect the perceived importance of studies? When evaluating the same study, for which reasons is there more or less consistency in perceptions between researchers and reviewers and among reviewers? As I argue in the next section, such questions not only can guide theoretical explanations or models of publication decision-making but also can illuminate strengths and limitations of peer-review practices and approaches to the dissemination of study results.

Applications of the Typology

The typology of unpublished studies is a descriptive framework that offers a number of useful potential applications. It provides a conceptual scheme that may be useful in a number of ways. First, the scheme can offer more concrete direction into the investigation of the structure and nature of the population of studies across the field of psychology, within psychology sub-disciplines, or by phenomena of study. Second, it can further a more nuanced understanding of different publication biases. Third, the scheme can facilitate building theoretical models that describe and predict researcher and reviewer publication decision-making and behavior. Fourth, it can provide insight into practices that enhance or deter the dissemination of rigorous or nonrigorous studies. Fifth, the typology can guide the organization of one's own file drawer of unpublished studies.

Mapping the population of studies

Discussions of the file-drawer problem have historically lacked a nuanced descriptive account of the population of studies. The population is usually understood by relying on a coarse division of results into those that are published and those that are unpublished. Unfortunately, this traditional descriptive scheme offers little insight into the potential diversity of the unpublished side of this division. This state of affairs in turn proves problematic for a confident evaluation of the file-drawer problem because one cannot evaluate whether published studies are unrepresentative of the population of studies if characteristics of a large portion of that population are unknown.

A major benefit of the typology of unpublished studies is that it provides a means for understanding how characteristics of unpublished studies and published studies may be similar or different. Are published studies acquired using more methodologically and conceptually rigorous research designs? Do published studies differ from unpublished studies in terms of their statistical precision or level of statistical significance? Are published studies more likely to reflect less controversial or contentious findings? Do published studies reflect their inclusion in manuscripts that are more attractive or appealing to reviewers than unpublished studies? Is the status of studies along the publication-status continuum primarily a result of decisions made by authors or reviewers? Depending on who makes those decisions, are those decisions primarily made for result-independent or result-dependent reasons? Depending on whether the decisions are based on result-independent or result-dependent reasons, what are the implications for understanding and addressing publication bias? These and other questions regarding the similarities and differences between published and unpublished studies, and their implications, can be formulated using the typology. In other words, the typology of unpublished findings permits an exploration and mapping of what the population of studies actually looks like.

Conceptualizing publication bias

By offering a more fine-grained descriptive scheme for classifying studies, the typology of unpublished studies in turn permits a more nuanced understanding of publication bias and the potential file-drawer problem. As noted earlier, publication bias is traditionally considered problematic for empirical integrity and scientific advancement because it introduces unrepresentative study results into the published literature (see Ferguson & Brannick, 2012). The primary culprit of publication bias is assumed to be reliance on a specific type of

result-dependent interpretation of studies as the basis for publication: failing to attempt publication or rejection from publication of statistically insignificant study results or study results indicating small effect sizes, regardless of their methodological or conceptual rigor. The unrepresentative nature of this basis for publication proves problematic when relying on published study effects to draw conclusions about the existence of associations among constructs or the magnitudes of those associations. For this reason, the more concrete term *magnitude bias* is used to describe what is meant by this traditional notion of publication bias.

However, one interesting implication of the typology of unpublished studies is that consideration of the various reasons for nonpublication suggests a more expansive and nuanced view of publication bias that includes at least two other variations of publication bias in addition to magnitude bias. Consider rejection from the publication of results because of legitimate conceptual concerns or methodological concerns. It is possible that nonpublication of studies for these reasons may lead to unrepresentative published effect sizes if the magnitude of published effect sizes of a phenomenon are systematically linked to the degree of methodological or conceptual rigor of the studies that generate them. For example, studies of a phenomenon with poor methodological or conceptual designs may tend to produce lower (or higher) effect sizes than well-designed studies of the phenomenon, but well-designed studies may have a higher likelihood of publication. In such cases, publication bias is best conceptualized as a *rigor bias*, which is beneficial for science because high accessibility of rigorous results leads to higher-quality theories and higher-quality tests of theories. Indeed, perpetuating rigor bias is (or should be) a major aspirational goal of a peer-review system in science. A legitimate rigor bias creates a file-drawer benefit, not a file-drawer problem.²

In addition to magnitude and rigor bias, the typology suggests at least one more form of publication bias. Consider researchers employed outside of academia who work for private or public organizations. Such researchers may conduct higher numbers of field studies relative to laboratory studies than researchers employed in academia. However, researchers outside of academia may be less likely to publish their studies than academic researchers because their research is directed toward outcomes other than professional publication (alternative-focus reasons). If the field studies and laboratory studies of a phenomenon possess methodological characteristics that generate study effects that vary systematically as a function of some moderating variable, then the absence of the field studies from the published literature blinds scientists to a body of

empirical work from which to construct and evaluate theory. A similar issue may arise with regard to cross-cultural research if nonpublication reasons entail manuscript concerns regarding the writing style or quality of nonnative-speaking authors or if researchers are intimidated by navigating the review process of journals published in a country other than their own (a form of loss of interest). The consequence is an unrepresentative sampling of published studies that offer only limited insight into the impact of cultural variation on psychological processes and behavior.

The previous two examples of potential publication bias are best conceptualized as instances of methodological *context bias* (for other examples, see Coburn & Vevea, 2015). Context bias entails the publication of studies that are systematically unrepresentative of the full range of possible study characteristics (e.g., study populations, settings, and operational variables) that could be used to investigate a specific phenomenon. Context bias may occur for either result-independent reasons (as in the two previous examples) or result-dependent reasons (e.g., nonpublication of unanticipated results that differ from previously published results because of novel nuances of the methodological context sampled). Context bias is problematic because it creates an impoverished sampling of results from diverse methodologies from which to build or evaluate theories.

Note that unlike magnitude bias, which is considered to stem solely from result-dependent reasons pertaining to statistical concerns, both rigor bias and context bias may stem from either result-dependent or result-independent reasons pertaining to methodological, conceptual, or statistical concerns. Whereas rigor bias is beneficial, context bias, like magnitude bias, is problematic. However, context bias can be problematic in ways that would not be expected of magnitude bias. Like magnitude bias, context bias can introduce unrepresentative study effect sizes into the literature that are atypically low or high, which undermines accurate assessment of the strength of associations among constructs and the influence on associations of moderating variables. However, context bias proves problematic for theoretical construction and evaluation even if nonpublished study effects are of equivalent magnitude to those that are published because it does not permit scientists to see the full extent of theoretical generalization that a broader awareness of different methodological contexts may permit.

The differentiation of publication bias into magnitude, context, and rigor bias is likely only one possible expansion of the concept of publication bias suggested by the typology of unpublished studies. Other reasonable expansions may be evident to some readers, but

it is anticipated that alternative publication-bias schemes would expand to include both result-dependent and result-independent sources of potential bias and the possibility for beneficial and problematic influences on the body of published study results. Moreover, regardless of the scheme championed, it would be important to empirically evaluate whether the forms of publication bias identified by the scheme do indeed account for actual systematic differences between published and unpublished studies.

Implications for meta-analyses

The typology of unpublished studies calls to attention reasons for nonpublication that can result in both problematic and beneficial publication biases. These biases are important to consider when evaluating the primary outcomes of meta-analyses and the interpretation of quantitative techniques often used to detect or investigate potential publication bias. Examples of techniques used to detect the potential for publication bias include funnel plots, cumulative meta-analysis, and *p*-curve analysis; examples of techniques that may be used to investigate the nature of suspected publication bias include subgroup comparison and model-selection analysis (e.g., Borenstein et al., 2009; Coburn & Vevea, 2015; Jin et al., 2014; Lipsey & Wilson, 1993; McKay & McDaniel, 2006; Simonsohn et al., 2014; Vevea & Woods, 2005).

Methods for detecting publication bias seek to determine whether the results of published studies conform to a pattern that is suggestive of a potential empirical discrepancy between published studies and unpublished studies. When methods for detecting publication bias do suggest a potential discrepancy, magnitude bias is typically the inferred culprit (see Carter et al., 2019). However, it may be important to consider the potential influence of rigor bias and context bias, as well as the extent to which existing methods for detecting publication bias are sensitive to these different types of publication biases. For example, when considering a funnel plot of published studies in which study effect sizes are plotted as a function of study precision (i.e., sample size or standard error), magnitude bias may be suspected if the frequency of low-precision studies with large effect sizes is higher than the frequency of low-precision studies with small effect sizes. Yet it may be for some phenomena that studies with higher conceptual and methodological quality produce larger effect sizes (e.g., rigorous studies involve more effective experimental manipulations with higher construct validity) even if the precision is low (e.g., small sample size). It is also possible that some types of theoretically meaningful study characteristics may produce larger effect sizes but necessitate lower precision because of the

cost or difficulty of implementing them (e.g., some types of field-study interventions). If only low-precision studies that meet severe conceptual and methodological standards are published, or if the use of certain types of procedural characteristics entail low precision, then funnel-plot asymmetry may instead reflect a combination of magnitude bias, rigor bias, and context bias. Differentiating among these biases may be possible with moderator or subgroup comparison analyses provided that they are guided by a consideration of these different forms of publication bias.

More perplexing is when results of published studies conform to a pattern that is suggestive of no empirical discrepancy between published studies and unpublished studies. Although the lack of discrepancy makes it seem reasonable to rule out magnitude bias or a combination of magnitude bias and rigor bias, methodological context bias remains a source of publication bias worth considering. The reason for this is that context bias may create an unrepresentative sampling of study characteristics among published studies that undermines theoretical understanding in terms of the generalizability of a phenomenon. Thus, given the wide range of result-dependent and result-independent reasons for nonpublication identified by the typology of unpublished studies and the different forms of publication bias they might propagate, it would be prudent in any meta-analysis to undertake a qualitative examination of published studies and any obtainable unpublished studies of a phenomenon if possible. And this would be prudent even if publication-bias detection methods suggest no systematic discrepancy in the results of published and unpublished studies to ascertain the possibility of context bias.

Result-dependent reasons and motivated reasoning

One important distinction in determining whether a reason for nonpublication is likely to introduce problematic bias is whether the reason involves result-independent or result-dependent decisions by authors and reviewers. Result-dependent reasons for nonpublication can introduce publication bias that is more problematic because they are more likely to involve decision-making by authors or reviewers that is influenced by motivated reasoning (see Kunda, 1990). Decision-making driven by an awareness of study results may also increase adherence to publication norms that promote selective publication of certain patterns of results that are unrelated to the methodological or conceptual quality of the study that generates the results (see Maner, 2014; McBee & Matthews, 2014). For instance, authors or reviewers may become more severe in their evaluations of a study's conceptual quality, methodological quality,

or importance when the study results violate their expectations or seem inconsistent with a favored theory. They may then justify a decision not to publish on the basis of this more severe standard. Study results that are statistically insignificant, equivocal, imperfect, or complex despite high conceptual, methodological, or statistical quality may lead authors or reviewers to decide against publication of the study results because they do not make for a "nice story" or make it difficult to devise an empirical article that would be attractive to journal readers.

Further complicating issues is the possibility that result-dependent reasons for nonpublication can lead to decision-making that is objective and devoid of motivated reasoning. Sometimes patterns of results illuminate legitimate conceptual or methodological concerns that would be unidentifiable in the absence of knowing the results (e.g., questions concerning the construct validity of primary dependent measures or effectiveness of experimental manipulations). The point is not that result-dependent reasons for nonpublication are necessarily problematic or necessarily worse than result-independent reasons for nonpublication. The point is only that result-dependent reasons for nonpublication are more likely than result-independent reasons to have involved decision-making that serves the ulterior goals of authors or reviewers other than the accurate identification of studies for publication that meet reasonable standards of scientific importance and quality.

Building theoretical models of publication decision-making and identifying factors that contribute to reasons for nonpublication

The typology of unpublished studies offers a rich descriptive scheme from which to build theoretical models of researcher and reviewer decision-making regarding the dissemination and publication of study results. One could investigate which nonpublication reasons are most predictive of individual decisions to disseminate or publish studies among researchers or reviewers. Those reasons most predictive of nonpublication decisions would then be used as theoretical predictors in an additive model. For example, if research suggested that methodological concerns, resource limitations, and statistical concerns were most predictive of nonpublication decisions, then these reasons may offer a relatively parsimonious theoretical model for explaining nonpublication decisions. The conceptual predictors in these models may be relatively general, relatively concrete, or a mix of both. In the previous example, perhaps the amount of time available to write manuscripts and the degree of estimate imprecision are

identified as the specific resource limitation and specific statistical concern that drive nonpublication decisions.

Given that certain reasons likely relate to other reasons in a causal manner, theoretical models in which reasons are causally or interactively arranged may better explain nonpublication decisions. Perhaps nonpublication decisions of editors are ultimately determined by an evaluation of the perceived unimportance of results (general), which is in turn determined by the extent of methodological concerns (general) identified by reviewers and the prestige of the manuscript authors (a specific manuscript concern). Maybe similar methodological concerns influence evaluations of perceived unimportance to a lesser extent when authors have higher rather than lower prestige.

Instead of seeking to predict nonpublication decisions, empirical and theoretical work could focus on understanding factors or conditions that contribute to specific reasons for nonpublication. What factors lead to losing interest in the publication of studies? What factors determine whether studies are considered unimportant? What conditions contribute to field contention in some domains of research but not others? What factors or conditions promote evaluations of conceptual, methodological, or statistical concerns that are least influenced by motivated reasoning of authors or reviewers? These and many other interesting theoretical questions can be derived and investigated using the typology of unpublished studies by creative and inquisitive scientists.

Evaluating research dissemination and peer-review practices

Identifying reasons for the nonpublication of studies offers potential insight into how different types of publication and peer-review practices may systematically promote or deter the dissemination of research results and may thus promote or deter beneficial and problematic publication biases. Two contemporary practices are worth considering. The first is the increased use of online academic and scholarly repositories by individuals and institutions that permit the dissemination of study results as open-access raw data or preprint manuscripts that bypass or supplement traditional journal peer review (see Martone et al., 2018; Mellor et al., 2019). As may be apparent from the typology of unpublished studies, online data and manuscript repositories can increase the accessibility of unpublished studies. This potential is reflected in the “moderate” accessibility classification of several of the publication categories listed in Table 1.

Given that data and manuscript repositories offer access to a potentially broader subset of unpublished studies for those conducting systematic reviews and

meta-analyses, the inclusion of such studies would be expected to affect the influence of publication bias on conclusions drawn from them. On the one hand, this may be beneficial for a review or meta-analysis because problematic magnitude bias introduced into the published literature by reviewers may be reduced by the inclusion of unpublished studies found in repositories. On the other hand, beneficial rigor bias may also be reduced because researchers may set a less severe threshold for evaluating studies that they opt to submit to data and manuscript repositories but do not publish. Certain researcher reasons for nonpublication such as loss of interest, resource limitations (e.g., time), and alternative focus may also not be addressed by the high availability of data and manuscript repositories because these reasons would be expected to undermine any form of dissemination of study results by researchers. For instance, a researcher with limited time to prepare and submit manuscripts for publication may also have limited time to prepare and submit data and manuscripts to repositories. Moreover, to the extent that these types of reviewer reasons for nonpublication are also linked to the systematic use of different types of methodological procedures and measures, data and manuscript repositories may not protect against the influence of context bias on the conclusions of systematic reviews and meta-analyses either.

A second contemporary practice worth considering is the preregistration of study hypotheses and research protocols before data collection (Nosek et al., 2018; Wagenmakers et al., 2012). The primary benefit espoused by proponents of preregistration is an increased transparency to reviewers (and possibly researchers themselves) regarding the formulation of a priori hypotheses and research plans, which should in turn help deter the use of questionable research practices and exploiting researcher degrees of freedom when analyzing and reporting study results (see John et al., 2012; Simmons et al., 2011). However, a second proposed virtue of preregistration is reduced publication bias if preregistration is combined with peer review as a part of the journal submission process (van ‘t Veer & Ginger-Solla, 2016; Wagenmakers et al., 2012). Specifically, before collecting data, researchers submit a proposal manuscript that articulates the study purpose and a priori hypotheses and describes the study materials, procedural protocol, and data-analysis plan that will be used to evaluate the hypotheses. Reviewers then make preliminary result-independent acceptance decisions relying only on this information. After data collection, a final acceptance decision is based on the extent to which researchers adequately follow the procedural and data-analytic plan presented in the initial proposal. Given that acceptance decisions rest mostly on result-independent evaluations of the conceptual

and methodological quality of the research, rejections of studies based on result-dependent outcomes of studies (e.g., statistical insignificance) should be less likely.

The typology of unpublished studies suggests that preregistered peer review should generally reduce the nonpublication of studies for result-dependent reasons and thus help mitigate publication bias in the form of magnitude bias. For example, Scheel et al. (2020) found that authors reported finding full or partial evidence of their stated a priori hypotheses at much higher rates in studies published using traditional peer review (96.05%; 146/152) than did authors of studies published using preregistered peer review (43.66%; 31/71). Given that support for a priori hypotheses is typically cast in terms of finding directional study effects of appreciable magnitude or that achieve statistical significance, these results may indicate a reduction in magnitude bias in the preregistered peer-review sample. However, this interpretation is speculative because the authors did not examine study effect-size magnitude.

What is not clear is how preregistered peer review would affect rigor bias and context bias. Rigor bias may be increased because research is reviewed twice (Yamada, 2018), and the initial evaluation of the research would focus more on potential result-independent conceptual and methodological weaknesses of studies. At least initially, result-dependent reasons for nonpublication, which are more likely to involve motivated reasoning and decision-making, would be eliminated. But rigor bias may be reduced in other ways. Legitimate result-dependent weaknesses identified at the final stage of peer review may be disregarded or deemphasized because reviewers may be resistant to rejecting a manuscript they provisionally approved before data collection. Moreover, it is unclear whether preregistered peer review would address context bias. Indeed, there may be systematic differences in the types of methodological contexts implemented by researchers who have more or better resources to successfully navigate the preregistered peer-review process than researchers who do not, which may increase context bias. Finally, it is worth considering how preregistered peer review would affect other reasons for nonpublication even if it does not increase or decrease different forms of publication bias. For instance, resource-limitation reasons for nonpublication may be increased if researchers find preregistered peer review more taxing or burdensome than conventional peer review. Other reasons for nonpublication, such as alternative focus, collaborator opposition, loss of interest, and manuscript concerns may also be unaffected by an increased implementation of preregistered peer review.

The descriptive framework that makes up the typology of unpublished studies offers one means for understanding the myriad and complex reasons for nonpublication

and thus may prove informative in evaluating the impact of different publication and peer-review practices on the nonpublication of studies and publication bias. The reverse also is worth considering. Examining the reasons why studies or manuscripts in repositories are not published or why manuscripts submitted for preregistered review are rejected either initially or after reporting results can inform understanding of the classification scheme proposed in the typology. Tracking whether studies or manuscripts in repositories are submitted for publication can offer insight into result-independent reasons and result-dependent reasons that are most prevalent or most important in researcher decisions to submit for publication. Tracking the publication outcomes of manuscripts submitted for preregistered peer review can offer insight into reasons for nonpublication that are most prevalent or most important in reviewer publication decisions. Also informative is the possibility of more clearly distinguishing between reviewer result-independent reasons and result-dependent reasons for nonpublication by examining reviewer publication decisions at the initial proposal review and reviewer decisions at the postdata collection review, respectively.

Organizing the file drawer

A final valuable application of the typology of unpublished studies would be to provide a scheme for researchers to label and organize files in their own file drawer of unpublished studies. As is the case with self-report measures of reasons for nonpublication, caution would be warranted when interpreting researcher-imposed organization of their file drawers. Nonetheless, researchers willing to consider the reasons for their unpublished work would likely gain meaningful insight into their scholarly research activities, the functions and goals these activities serve, and the reasons why these activities lead to successful publication or not. Researchers could use the typology to develop research portfolios. Perhaps these portfolios could be included along with traditional evidence of publication as evidence in job performance, renewal, tenure, or promotion evaluations. Documenting reasons for nonpublication would be highly beneficial information for meta-analysts requesting unpublished studies and may facilitate more openness to sharing data when such requests are encountered. In addition, if researchers regularly documented the reasons for the nonpublication of their studies, then this information could be collected to yield better descriptive understanding of the population of study results in various domains of psychology research. As noted earlier, better descriptive understanding of the population would assist in identifying which publication biases to consider when evaluating meta-analytic findings. Finally, organizing file drawers using a common descriptive scheme generates

a potential database for those interested in systematically investigating the psychological and behavioral processes involved in various research-dissemination practices in psychological science.

Conclusion

Despite long-standing concerns regarding the file-drawer problem and the representativeness of published studies, what makes up the population of studies remains largely unknown. The dearth of understanding stems in large part from a lack of knowledge about the unpublished portion of the population. This portion of the population remains mysterious because no clear descriptive scheme for organizing different types of unpublished studies exists. The working typology of unpublished studies presented here seeks to remedy that problem. By considering unpublished studies as falling along a publication-status continuum, and the nonpublication reasons for the location of studies along that continuum, the typology provides a more nuanced descriptive scheme for classifying the unpublished portion of the population of studies. Moreover, the typology offers insight into different publication biases that may prove problematic, and in some cases even beneficial, for drawing conclusions from the more accessible body of published studies. Thus, the typology may prove useful in mapping the population of studies within the various research domains of psychology, guiding and informing analyses of publication bias, and assisting researchers in better organizing their own individual file drawers of studies to the benefit of themselves and the field.

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Notes

1. The term “reviewer” is used to encompass both reviewers and editors from this point forward to simplify discussion. Potential reasons for nonpublication should usually apply consistently to reviewers and editors, although sometimes this may not be true. For example, unlike editors, reviewers usually are blinded to author identity. In this instance, editor publication decisions may be influenced by a wider range of manuscript concerns than the publication decisions of reviewers (e.g., author or institutional prestige; see Table 2).

2. Others have acknowledged previously the possibility that studies of low methodological quality may lead to nonpublication (see Ferguson & Brannick, 2012; see also Rothstein & Bushman, 2012); however, some doubt this is an important factor (see Borenstein et al., 2009). The claim advanced here is that the methodological quality of studies constitutes one of many potential reasons for the unrepresentative publication of studies and thus should be considered a potential source of publication bias in its own right. The concept of rigor bias advanced here encompasses both methodological and conceptual reasons for excluding studies from publication.

References

- Bailar, J. C., & Patterson, K. (1985). Journal peer review: The need for a research agenda. *The New England Journal of Medicine*, *312*, 654–657. <https://doi.org/10.1056/nejm198503073121023>
- Banks, G. C., Kepes, S., & McDaniel, M. A. (2014). Publication bias: Understanding the myths concerning threats to the advancement of science. In C. E. Lane & R. J. Vandenberg (Eds.), *More statistical and methodological urban legends* (pp. 36–64). Routledge. <https://doi.org/10.4324/9780203775851>
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Wiley. <https://doi.org/10.1002/9780470743386>
- Bradley, M. T., & Gupta, R. D. (1997). Estimating the effect of the file drawer problem in meta-analysis. *Perceptual and Motor Skills*, *85*, 719–722. <https://doi.org/10.2466/pms.1997.85.2.719>
- Carter, E. C., Schönbrodt, F. D., Gervais, W. M., & Hilgard, J. (2019). Correcting for bias in psychology: A comparison of meta-analytic methods. *Advances in Methods and Practices in Psychological Science*, *2*, 115–144. <https://doi.org/10.1177/2515245919847196>
- Chalmers, T. C., Frank, C. S., & Reitman, D. (1990). Minimizing the three stages of publication bias. *JAMA*, *263*, 1392–1395.
- Coburn, K. M., & Vevea, J. L. (2015). Publication bias as a function of study characteristics. *Psychological Methods*, *20*, 310–330. <https://doi.org/10.1037/met0000046>
- Cooper, H., DeNeve, K., & Charlton, K. (1997). Find the missing science: The fate of studies submitted for review by a human subjects committee. *Psychological Methods*, *2*, 447–452. <https://doi.org/10.1037/1082-989x.2.4.447>
- Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, *25*, 7–29. <https://doi.org/10.1177/0956797613504966>

- Dalton, D. R., Aguinis, H., Dalton, C. M., Bosco, F. A., & Pierce, C. A. (2012). Revisiting the file drawer problem in meta-analysis: An assessment of published and non-published correlation matrices. *Personnel Psychology, 65*, 221–249. <https://doi.org/10.5465/ambpp.2011.65869140>
- Ferguson, C. J., & Brannick, M. T. (2012). Publication bias in psychological science: Prevalence, methods for identifying and controlling, and implications for the use of meta-analyses. *Psychological Methods, 17*, 120–128. <https://doi.org/10.1037/a0024445>
- Franco, A., Malhotra, N., & Simonovits, G. (2014). Publication bias in the social sciences: Unlocking the file drawer. *Science, 345*, 1502–1505. <https://doi.org/10.1126/science.1255484>
- Funder, D. C., Levine, J. M., Mackie, D. M., Morf, C. C., Vazire, S., & West, S. G. (2014). Improving the dependability of research in personality and social psychology: Recommendations for research and educational practice. *Personality and Social Psychology Review, 18*, 3–12. <https://doi.org/10.1177/1088868313507536>
- Greenwald, A. G. (1975). Consequences of prejudice against the null hypothesis. *Psychological Bulletin, 82*, 1–20. <https://doi.org/10.1037/h0076157>
- Hartling, L., Craig, W. R., Russell, K., Stevens, K., & Klassen, T. P. (2004). Factors influencing the publication of randomized controlled trials in child health research. *Archives of Pediatric Adolescent Medicine, 158*, 983–987. <https://doi.org/10.1001/archpedi.158.10.983>
- Jin, Z.-C., Zhou, X.-H., & He, J. (2014). Statistical methods for dealing with publication bias in meta-analysis. *Statistics in Medicine, 34*, 343–360. <https://doi.org/10.1002/sim.6342>
- John, L. K., Lowenstein, G., & Prelec, D. (2012). Measuring the prevalence of questionable research practices with incentives for truth telling. *Psychological Science, 23*, 524–532. <https://doi.org/10.1177/0956797611430953>
- Kepes, S., & McDaniel, M. A. (2013). How trustworthy is the scientific literature in industrial and organizational psychology? *Industrial and Organizational Psychology, 6*, 252–268. <https://doi.org/10.1111/iops.12045>
- Kerr, N. L. (1998). HARKing: Hypothesizing after the results are known. *Personality and Social Psychology Review, 2*, 196–217. https://doi.org/10.1207/s15327957pspr0203_4
- Kerr, S., Tolliver, J., & Petree, D. (1977). Manuscript characteristics which influence acceptance for management and social science journals. *Academy of Management Journal, 20*, 132–141. <https://doi.org/10.2307/255467>
- Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin, 108*, 480–498. <https://doi.org/10.1037/0033-2909.108.3.480>
- Lipsey, M. W., & Wilson, D. B. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist, 48*, 1181–1209. <https://doi.org/10.1037/0003-066x.48.12.1181>
- Maner, J. K. (2014). Let's put our money where our mouth is: If authors are to change their ways, reviewers (and editors) must change with them. *Perspectives on Psychological Science, 9*, 343–351. <https://doi.org/10.1177/1745691614528215>
- Martone, M. E., Garcia-Castro, A., & VandenBos, G. R. (2018). Data sharing in psychology. *American Psychologist, 73*, 111–125. <https://doi.org/10.1037/amp0000242>
- Maxwell, S. E. (2004). The persistence of underpowered studies in psychological research: Cases, consequences, and remedies. *Psychological Methods, 9*, 147–163. <https://doi.org/10.1037/1082-989x.9.2.147>
- McBee, M. T., & Matthews, M. S. (2014). Change starts with journal editors: In response to Makel (2014). *Psychology of Aesthetics, Creativity, and the Arts, 8*, 8–10. <https://doi.org/10.1037/a0035801>
- McDaniel, M. A., Rothstein, H. R., & Whetzel, D. L. (2006). Publication bias: A case study of four test vendors. *Personnel Psychology, 59*, 927–953. <https://doi.org/10.1111/j.1744-6570.2006.00059.x>
- McKay, P. F., & McDaniel, M. A. (2006). A reexamination of black-white mean differences in work performance: More data, more moderators. *Journal of Applied Psychology, 91*, 538–554. <https://doi.org/10.1037/0021-9010.91.3.538>
- McNemar, Q. (1960). At random: Sense and nonsense. *American Psychologist, 15*, 295–300. <https://doi.org/10.1037/h0049193>
- Mellor, D., Vazire, S., & Lindsay, S. D. (2019). Transparent science: A more credible, reproducible, and publishable way to do science. In R. J. Sternberg (Ed.), *Guide to publishing in psychology journals* (2nd ed., pp. 219–237). Cambridge University Press. <https://doi.org/10.1017/9781108304443>
- Motyl, M., Demos, A. P., Carsel, T. S., Hanson, B. E., Melton, Z. J., Mueller, A. B., Prims, J. P., Sun, J., Washburn, A. N., Wong, K. M., Yantis, C., & Skitka, L. J. (2017). The state of social and personality science: Rotten to the core, not so bad, getting better, or getting worse? *Journal of Personality and Social Psychology, 113*, 34–58. <https://doi.org/10.1037/pspa0000084>
- Murad, M. H., Chu, H., Lin, L., & Wang, Z. (2018). The effect of publication bias magnitude and direction on the certainty in evidence. *BMJ Evidence-Based Medicine, 23*, 84–86. <https://doi.org/10.1136/bmjebm-2018-110891>
- Nosek, B. A., Ebersole, C. R., DeHaven, A. C., & Mellor, D. T. (2018). The preregistration revolution. *Proceedings of the National Academy of Sciences, USA, 115*, 2600–2606. <https://doi.org/10.1073/pnas.1708274114>
- Okike, K., Kocher, M. S., Nwachukwu, B. U., Mehlman, C. T., Heckman, J. D., & Bhandari, M. (2012). The fate of manuscripts rejected by *The Journal of Bone and Joint Surgery* (American volume). *The Journal of Bone and Joint Surgery, 94*(17), Article e130. <https://doi.org/10.2106/jbjs.l.00078>
- Paterson, T. A., Harms, P. D., Steel, P., & Credé, M. (2016). An assessment of the magnitude of effect sizes: Evidence from 30 years of meta-analysis in management. *Journal of Leadership & Organizational Studies, 23*, 66–81. <https://doi.org/10.1177/1548051815614321>
- Podsakoff, P. M., Mackenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>

- Reyson, S. (2006). Publication of nonsignificant results: A survey of psychologists' opinions. *Psychological Reports*, 98, 169–175. <https://doi.org/10.2466/pr0.98.1.169-175>
- Rosenthal, R. (1979). The “file drawer problem” and tolerance for null results. *Psychological Bulletin*, 86, 638–641. <https://doi.org/10.1037/0033-2909.86.3.638>
- Rothstein, H. R., & Bushman, B. J. (2012). Publication bias in psychological science: Comment on Ferguson and Brannick (2012). *Psychological Methods*, 17, 129–136. <https://doi.org/10.1037/a0027128>
- Rotton, J., Foos, P. W., Van Meek, L., & Levitt, M. (1995). Publication practices and the file drawer problem. *Journal of Social Behavior and Personality*, 10, 1–13.
- Scheel, A. M., Schijen, M., & Lakens, D. (2020). *An excess of positive results: Comparing the standard psychology literature with registered reports*. PsyArXiv. <https://psyarxiv.com/p6e9c>
- Scherer, R. W., Ugarte-Gil, C., Schmucker, C., & Meerpohl, J. J. (2015). Authors report lack of time as main reason for unpublished research presented at biomedical conferences: A systematic review. *Journal of Clinical Epidemiology*, 68, 803–810. <https://doi.org/10.1016/j.jclinepi.2015.01.027>
- Sedlmeier, P., & Gigerenzer, G. (1989). Do studies of statistical power have an effect on the power of studies? *Psychological Bulletin*, 105, 309–316. <https://doi.org/10.1037/0033-2909.105.2.309>
- 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. <https://doi.org/10.1177/0956797611412632>
- Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: A key to the file-drawer problem. *Journal of Experimental Psychology: General*, 143, 534–547. <https://doi.org/10.1037/a0033242>
- Smart, R. G. (1964). The importance of negative results in psychological research. *The Canadian Psychologist*, 5, 225–232. <https://doi.org/10.1037/h0083036>
- Sterling, T. D. (1959). Publication decisions and their possible effects on inferences drawn from tests of significance—or vice versa. *Journal of the American Statistical Association*, 54, 30–34. <https://doi.org/10.2307/2282137>
- Ter Riet, G., Korevaar, D. A., Leenaars, M., Sterk, P. J., Van Noorden, C. J. F., Bouter, L. M., Lutter, R., Oude Elferink, R. P., & Hooft, L. (2012). Publication bias in laboratory animal research: A survey on magnitude, drivers, consequences and potential solutions. *PLOS ONE*, 7(9), Article e43404. <https://doi.org/10.1371/journal.pone.0043404>
- Timmer, A., Hilsden, R., Cole, J., Hailey, D., & Sutherland, L. R. (2002). Publication bias in gastroenterological research—A retrospective cohort study based on abstracts submitted to a scientific meeting. *BMC Medical Research Methodology*, 2, Article 7. <https://doi.org/10.1186/1471-2288-2-7>
- Toews, I., Glenton, C., Lewin, S., Berg, R. C., Noyes, J., Booth, A., Marusic, A., Malicki, M., Munthe-Kaas, H. M., & Meerpohl, J. J. (2016). Extent, awareness and perception of dissemination bias in qualitative research: An explorative survey. *PLOS ONE*, 11(8), Article e0159290. <https://doi.org/10.1371/journal.pone.0159290>
- van 't Veer, A. E., & Giner-Sorolla, R. (2016). Pre-registration in social psychology—A discussion and suggested template. *Journal of Experimental Social Psychology*, 67, 2–12. <https://doi.org/10.1016/j.jesp.2016.03.004>
- Vevea, J. L., & Woods, C. M. (2005). Publication bias in research synthesis: Sensitivity analysis using a priori weighted functions. *Psychological Methods*, 10, 428–443. <https://doi.org/10.1037/1082-989x.10.4.428>
- Wagenmakers, E.-J., Wetzels, R., Borsboom, D., van der Maas, H. L. J., & Kievit, R. A. (2012). An agenda for purely confirmatory research. *Perspectives on Psychological Science*, 7, 632–638. <https://doi.org/10.1177/174569161246307>
- Yamada, Y. (2018). How to crack pre-registration: Toward transparent and open science. *Frontiers in Psychology*, 9, Article 1831. <https://doi.org/10.3389/fpsyg.2018.01831>