

Mapping the universe of Registered Reports

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Abstract

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11 Registered Reports present a substantial departure from traditional publishing models with
12 the goal of enhancing the transparency and credibility of the scientific literature. We map
13 the evolving universe of Registered Reports to assess their growth, implementation, and
14 shortcomings at journals across scientific disciplines.

15 *Keywords:* Registered Reports, pre-registration, meta-research, open science, journal
16 policy

Mapping the universe of Registered Reports

Introduction

Most scientists publish research findings within an incentive structure that preferentially values aesthetics over authenticity. Responding to incentives for “novel”, “positive”, and “clean” results, researchers may exploit degrees of freedom in the analysis process (knowingly or unknowingly) and opaquely generate or re-calibrate hypotheses post-hoc. “Incremental”, “negative”, or “messy” findings that cannot be beautified through these questionable (or overtly detrimental) research practices, may only be competitive for publication in lower prestige journals, or may not be submitted for publication at all. These selection pressures exerted through the traditional academic publication system may infuse bias into the research process, compromising the credibility of the scientific literature (see Supplementary References 1-5).

One concept intended to tackle the issues above is “pre-registration”, the formal archiving of a study protocol (ideally including rationale, hypotheses, methods, and proposed analyses) in a public registry prior to commencement of a study [1,2]. The rationale is that research is more likely to be comprehensively and transparently reported when researchers can be held accountable to a pre-registered protocol. Questionable research practices such as “cherry picking” (selectively reporting favourable outcomes), “p-hacking” (making design and analysis decisions contingent on whether p-values are significant), and opaque “HARKing” (hypothesising after the results are known), can in theory be identified by comparing published research reports to their pre-registered protocols [1]. More broadly, effective pre-registrations may demarcate pre-planned (confirmatory) and post-hoc (exploratory) aspects of research, enabling research consumers to make more informed judgments about the validity of scientific results and the credibility of associated claims [3].

Adoption of pre-registration has accelerated recently in several fields with many researchers voluntarily archiving protocols on the Open Science Framework (OSF)[1]. Registration of clinical trials (via ClinicalTrials.gov and other registries) has a longer

precedent, with mandatory registration for US researchers introduced in 2005 [2]. All these schemes share the goal of increasing transparency, although advocates of pre-registration in the basic and pre-clinical sciences place greater emphasis on detailed specification of analysis plans [1,3]. Meta-scientific investigations have indicated some potentially beneficial consequences of pre-registration in the context of clinical trials. For example, one study observed that mandatory registration of primary outcomes on ClinicalTrials.gov was associated with a sharp decline in the number of NHLBI trials reporting statistically significant results, possibly due to a reduction in selective outcome and analysis reporting [4]. However, other studies have highlighted serious problems, including missing registrations, retrospective registrations, inadequate protocol specification, failure to report results, and perpetuation of selective reporting despite registration [2,5] (also see <http://compare-trials.org/>).

Recently there has been optimism surrounding a publication format called “Registered Reports” which builds upon the initiatives outlined above by embedding the pre-registration process directly within the publication pipeline [6,7]. A Registered Report involves submitting a study protocol directly to a journal, where it is peer-reviewed and potentially granted in-principle acceptance (IPA) for publication, before the study has even been conducted (see Figure 1). Publication decisions are therefore based primarily on the quality of the research question and methods, as outlined in the protocol. After study commencement, adherence to the initially accepted protocol (from herein “IPA protocol”) and appropriate calibration of conclusions to findings in the research article (from herein “Final Report”), is assessed in a second round of peer review. Crucially, this process emphatically does not involve consideration of the aesthetic qualities of the research findings, a substantial departure from traditional publication models.

Registered Reports have three unique features that differentiate them from other pre-registration schemes and in theory maximise their intended benefits. Firstly, study protocols are peer-reviewed before commencement, potentially improving research quality

through early expert feedback. For example, if reviewers spot a methodological flaw at this stage, the waste of running a poorly designed study can be avoided. Secondly, studies are granted IPA based solely on the merits of the research question and design, rather than the aesthetic characteristics of the findings, potentially mitigating publication bias. For example, studies granted IPA that observe “negative” or “messy” outcomes, will still be published, helping to reduce bias towards positive findings in the broader literature. Finally, adherence to the protocol and transparent reporting of protocol deviations is under the close scrutiny of journal editors and reviewers, potentially mitigating selective outcome reporting, cherry picking, or opaque HARKing. During the second round of peer review, reviewers are who are actively engaged in comparison of the IPA protocol and Final Report will be more likely to spot these deviations.

Interestingly, in 1997 the Lancet introduced a publication pathway for clinical trials that was similar to Registered Reports. However, the publication guarantee for new protocols was removed in 2008, and the entire pathway was curtailed in 2015 (see Supplementary References 6-7). During its application, it was noted that some trials had deviated substantially from their pre-specified outcomes and analyses, and full protocols were not always publicly available [8]. The current instantiation of Registered Reports was first introduced at the cognitive-neuroscience journal *Cortex* in March, 2013, but it is unclear if it drew inspiration from the Lancet precedent. Nevertheless, the abandonment of the Lancet scheme highlights that the in-principle benefits of Registered Reports cannot be taken for granted. Indeed, it is unlikely that any new policy or innovation designed to improve the validity of scientific findings will be perfect the first time around. Iterative evaluation and adjustment may be necessary to ensure that new initiatives are maximally effective and minimally detrimental.

Below we report the findings of an investigation to map the evolving universe of Registered Reports. Specifically, we sought to record the growth and expansion of this review and publication format across multiple journals and scientific disciplines, the number

of Registered Reports in existence and their status in the publication pipeline, the public availability of information about Registered Reports (especially access to IPA protocols), methods of protocol registration, the discoverability of Final Reports, how long it takes for Registered Reports to be published and whether they eventually do reach publication. We had no *a priori* hypotheses about how current Registered Reports would perform on these dimensions, but simply aimed to explore and describe key aspects of this innovative format and lay the groundwork for future meta-scientific enquiries.

Growth of Registered Reports

As of February 22, 2018, the Registered Report format is still in its nascent stages but has been adopted at a total of 91 journals and begun to expand rapidly across several scientific disciplines (see Figure 2 Panels A & B and Supplementary Figure B1). Overall, most Registered Reports were published in psychology and most were laboratory-based replication studies (see Supplementary Results). A total of 91 Final Reports had been published as of February 22, 2018, appearing in 16 different journals. Most journals offering Registered Reports have yet to publish any Final Reports.

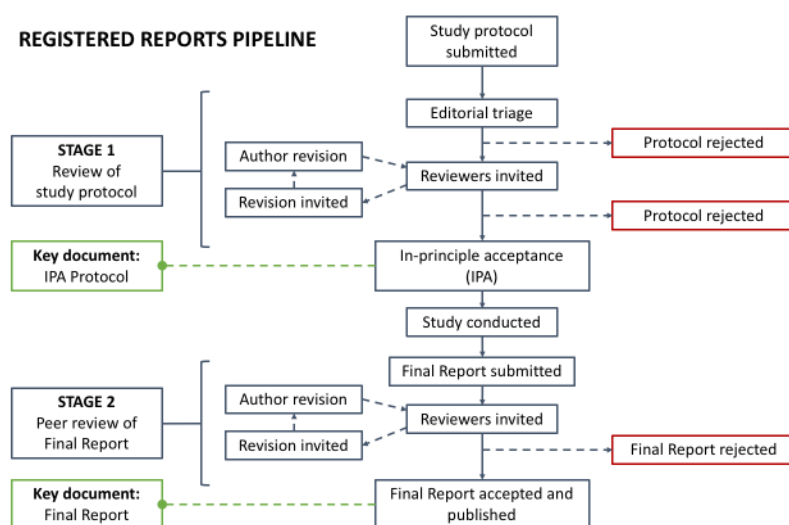


Figure 1. An idealized publication pipeline for Registered Reports. Image adapted from <https://cos.io/rr/>

Implementation of Registered Reports

Our initial efforts to identify all existing Registered Reports ran into problems because of a lack of transparency. It was not straightforward to establish the existence of individual Registered Reports because many IPA protocols are not publicly available, protocols are not formally registered, and Final Reports are not clearly identified as having been prior Registered Reports. Ultimately, we were only able to create a partial snapshot of the extant publication pipeline (see Supplementary Figure 1). We opted to investigate these issues systematically, extracting data from published Final Reports where possible, and augmenting this information with responses from a survey of Registered Reports editors (see Supplementary Methods). Below we document these findings in detail.

We found that many journals have opted to keep IPA protocols “in-house” and consequently a large number of IPA protocols are not publicly available (see Figure 2 Panels C and D). For Registered Reports that had not yet been published, all IPA protocols that were publicly available were part of The Reproducibility Project in Cancer Biology - published as a special issue in *eLife*. Some IPA protocols, from *Cortex* and *Royal Society Open Science*, were shared with us, but only privately. Both journals indicated that they were planning to change their policy to make protocols publicly available in the future. IPA protocols should be made publicly available to enable verification by the scientific community. When IPA protocols are public, both researchers and journals can be held accountable for their commitment to publish Final Reports regardless of outcomes. Protocol availability has been promoted for clinical trials in the last several years, allowing assessment of the high frequency of changes in the outcomes and analysis specifications between initial protocols, modified protocols, and published papers [5] (<http://compare-trials.org/>).

Even when IPA protocols were publicly available we often had problems locating and verifying them. We encountered a few cases where protocols were duplicated or missing, and found that over half of published Final Reports did not clearly identify themselves as Registered Reports (see Supplementary Results). Journals and authors had also adopted

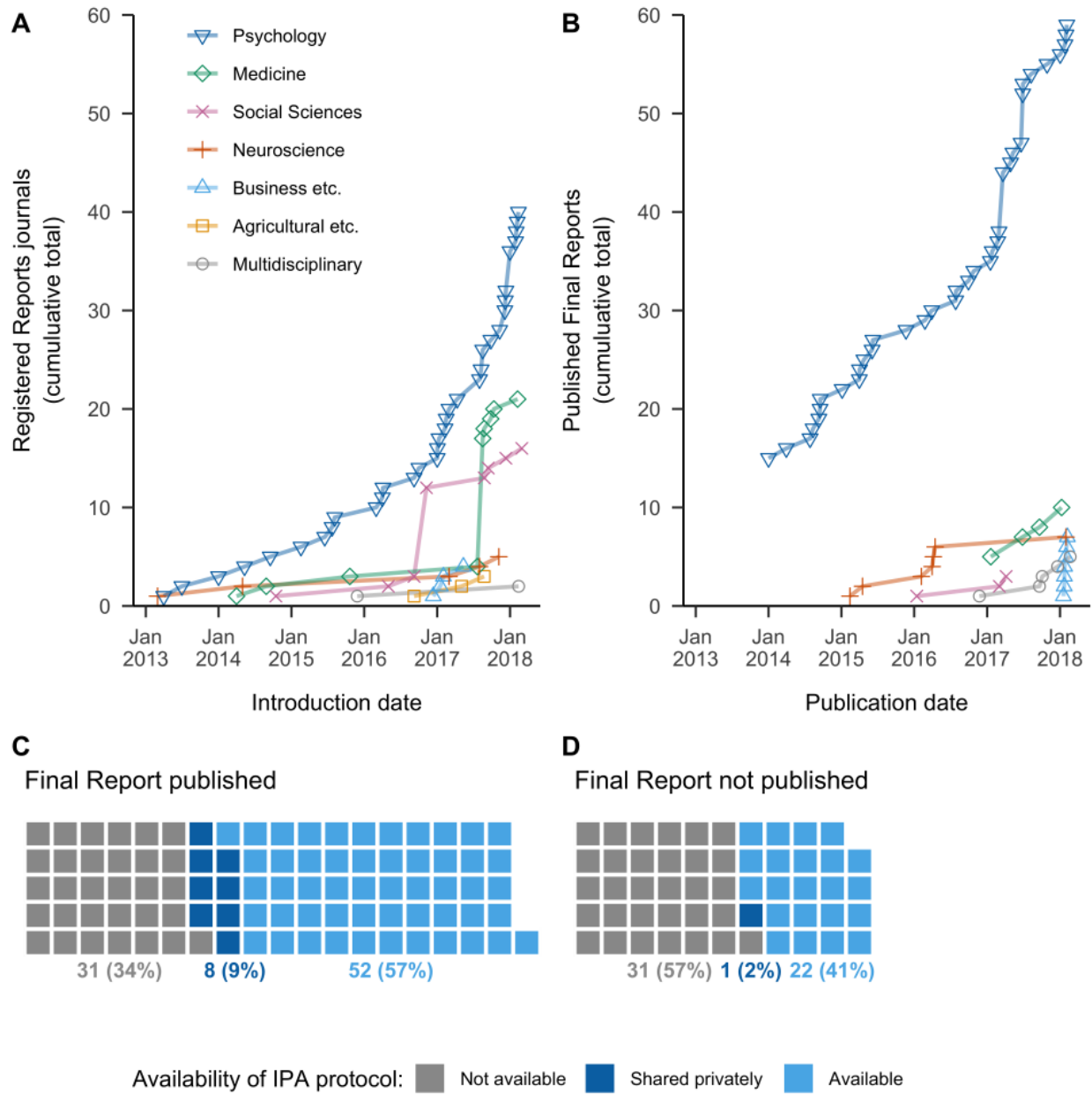


Figure 2. The rise of Registered Reports and access to in principle accepted (IPA) protocols. (A) Number of journals offering the Registered Reports format. (B) Number of Registered Reports that have published Final Reports. (C) Availability of IPA protocols when Final Report published. (D) Availability of IPA protocols when Final Report not yet published.

diverse, and apparently sub-optimal approaches to the registration of IPA protocols. Full registration involves archiving a read-only, time-stamped version of the IPA protocol in an

independent registry, such as the OSF. However, of the 74 publicly available IPA protocols, only 26 had been formally registered in this manner. Formal registration ensures that IPA content is persistent and verifiable; enhances discoverability (i.e., the protocol appears in searches for pre-registration meta-data); and ensures that protocol deletion results in a formal “withdrawal notice” so the prior existence of the protocol is publicly acknowledged (<https://bit.ly/2Ibropm>).

Future directions and recommendations

Our exploration of the Registered Reports universe has highlighted a number of important implementation issues that could undermine the intended benefits of this review and publication format. Given the rapid expansion of Registered Reports across journals and scientific disciplines, this is a critical time for developing standards that ensure optimal implementation. The Registered Reports Steering Committee (RR Committee) coordinated by the Center for Open Science (<https://cos.io/rr/>) currently provides detailed guidelines for journals implementing Registered Reports. In response to the issues we encountered, the RR Committee has updated its guidance (<https://osf.io/pukzy/>) to suggest that journals and authors formally and publicly register IPA protocols (C. Chambers, personal correspondence). However, no author or journal is obligated to conform to their recommendations.

Future expansion of the Registered Reports universe may benefit from the development of a central independent registry to promote standardisation. The example of centralized clinical trial registries may offer a useful paradigm in this regard. For example, ClinicalTrials.gov, currently contains over 269,900 records [2] with a standardized format for protocol and results reporting. Plans to develop such a central registry based on the Open Science Framework are currently underway (<https://osf.io/rr/>). The RR committee also plans to contact authors who have not yet published IPA protocols and encourage them to make them available in this registry. If authors are concerned about other researchers “scooping” their ideas, IPA protocols can be registered but then temporarily hidden

(“embargoed”) until the Final Report is published (a feature available on the OSF). However, early release of protocols might avoid unnecessary duplication of research effort. An alternative “partial embargo” system could involve early release of a project summary and embargoed release of the full protocol when the Final Report is published.

The success of a central registry for Registered Reports will be dependent on the endorsement and contributions of multiple stakeholders, including policy makers, funders, journals, reviewers, and authors. Contributions to ClinicalTrials.gov accelerated when registration was mandated by federal law and an influential consortium of medical journals [2]. However, as highlighted earlier, non-compliance issues remain common, undermining the intended benefits of pre-registration [2,5](also see <http://compare-trials.org/>). A likely contributing factor is that few reviewers appear to actually examine registered protocols [9]. Registered Reports may be able to overcome some of these difficulties because of the close oversight built into the unique two-stage peer review process. However, this cannot be taken for granted, and must be carefully monitored.

If the problems we have identified here are adequately addressed, future investigations should have access to sufficient information to examine whether Registered Reports are living up to expectations on a variety of indices. Such evaluation will be necessary to ensure that Registered Reports do not provide a false sense of security and their theoretical benefits are actually realised in practice. Future investigations could evaluate the extent to which registered protocols constrain degrees of freedom, how often protocol deviations occur, and whether IPA commitments continue to be honored by both authors and journals. It also remains to be seen how many Registered Reports will never get published as Final Reports and, if so, why they are abandoned. The time frame of the Registered Reports that we examined here is still too brief (maximum 5 years since IPA) to conclude that any of these studies have been totally abandoned. However, evidence from medical research suggests that abandonment because of futility or other reasons is common [10].

With these caveats in mind, Registered Reports seem to be a promising initiative that

may improve the transparency, validity, and credibility of registered studies. Continuous evaluation of their performance will be helpful to assess whether they meet their goals and how their adoption can be optimized.

Data availability statement

All data and materials related to this study are publicly available on The Open Science Framework (<https://osf.io/7dpwb/>).

Code availability statement

To facilitate reproducibility this manuscript was written by interleaving regular prose and analysis code using R Markdown. The relevant files are available on The Open Science Framework (<https://osf.io/uzfjp/>) and in a Code Ocean container (<https://doi.org/10.24433/CO.03fa2564-3910-4982-9882-4f2fcec50385.v3>) which re-creates the software environment in which the original analyses were performed.

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Competing interest statement

The authors declare no competing interests.

Author contributions:

TEH and JPAI designed the study. TEH conducted the data collection and performed the data analysis. TEH and JPAI and wrote the manuscript.

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Appendix A

Supplementary methods

All data exclusions and measures conducted during this study have been reported. Data collection was last updated for analysis on February 22, 2018, when there were 91 adopting journals and 91 published Final Reports. The respective numbers as of the date of submission of this paper (14 April, 2018) are 101 adopting journals and 120 published Final Reports.

Identification of Registered Reports journals and publications

Our initial goal was to identify all existing Registered Reports and relevant information associated with them (IPA protocols, timing information etc.). We relied on two information sources (see Figure A1) to identify all Registered Reports that have published Final Reports (<https://bit.ly/2pJRYz3>) and all journals that currently offer the Registered Reports format (<https://cos.io/rr/>). Both sources are maintained by COS, which also hosts the Registered Reports Steering Committee that develops and maintain standards for the Registered Reports format. Note that the COS list of journals offering Registered Reports also included “Cochrane Reviews” and “Campbell Reviews”. Both schemes are quite different from the others included in this list because they deal exclusively with systematic reviews, so we have not included them in our assessment.

References to specific Registered Reports in this article use an individual identification code in the form [journal abbreviation]_[individual identification number] (e.g., “RSOS_1” for a Registered Report at *Royal Society Open Science*). Where relevant, identification codes can be linked to available IPA protocols and/or published articles via the data files shared on the OSF (<https://osf.io/rv7eb/>).

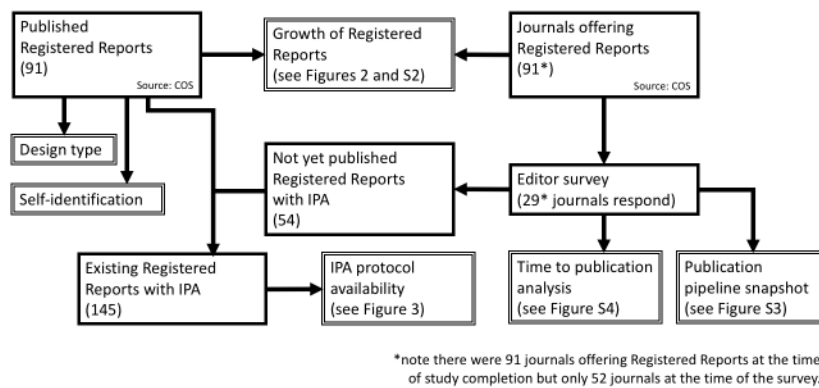


Figure A1. Flowchart illustrating the source of Registered Reports information for all data presented in this article.

Data extraction

Data extraction from published Final Reports was conducted manually by a single coder (TEH). We recorded whether each article identified as a ‘Registered Report’, a ‘pre-registration’, or neither. If the article did not identify as a Registered Report, we checked to see if it was identified as a Registered Report in an editorial as part of a special issue (see ‘Self-identification as a Registered Report’). We also recorded the number of individual studies/experiments reported in each article, the study design, whether the study was identified as a replication or not, and the publication date. Each article was searched for references to an IPA protocol. If the location of the IPA protocol was identified, we checked to see if it was actually a protocol (i.e., contained at least one of hypotheses, methods, or analysis plan), and recorded how it was registered (e.g., via formal registration on the OSF).

The research field for each journal was determined based on subject areas assigned by Scopus. When journals were not listed on Scopus, or when multiple subject areas were assigned to a single journal, we used our own judgment to select

the most pertinent. We identified the date that the Registered Reports format was introduced at each journal using public sources where possible. Often an editorial or news item announcing the introduction of the format was available ($n = 54$). It was typically necessary to assume that the date of publication for the editorial was the date that the format was introduced, even if this was not always made explicit. In some cases ($n = 37$), we could not identify a public source, and we obtained an estimated date of introduction from COS (D. Mellor, personal communication, February 23, 2018), who had liaised with the journals in question.

Survey of Registered Reports journals

To gather information that was not publicly available, we contacted the 52 journals offering the Registered Reports format on July 24, 2017 (according to the above COS list). We sent two reminder emails to non-respondents at approximately two-week intervals. The survey was completed by 29 (56%) of the journals we contacted.

Based on this survey, we were able to create a partial snapshot of the Registered Reports publication pipeline as of July 2017 (see Figure B2). Additionally, 7 journals provided detailed timing information about the publication pipeline (only 22 were in a position to do so as they had at least one Registered Report with IPA).

By comparing the survey data with the COS list of published Registered Reports when we last updated data collection on February 22, 2018, we identified 54 Registered Reports that had received IPA had not yet published Final Reports. However, it is also possible that the journals and/or COS have not been able to track some of the studies and they have been published elsewhere or informally withdrawn.

Appendix B

Supplementary results

Journals offering Registered Reports

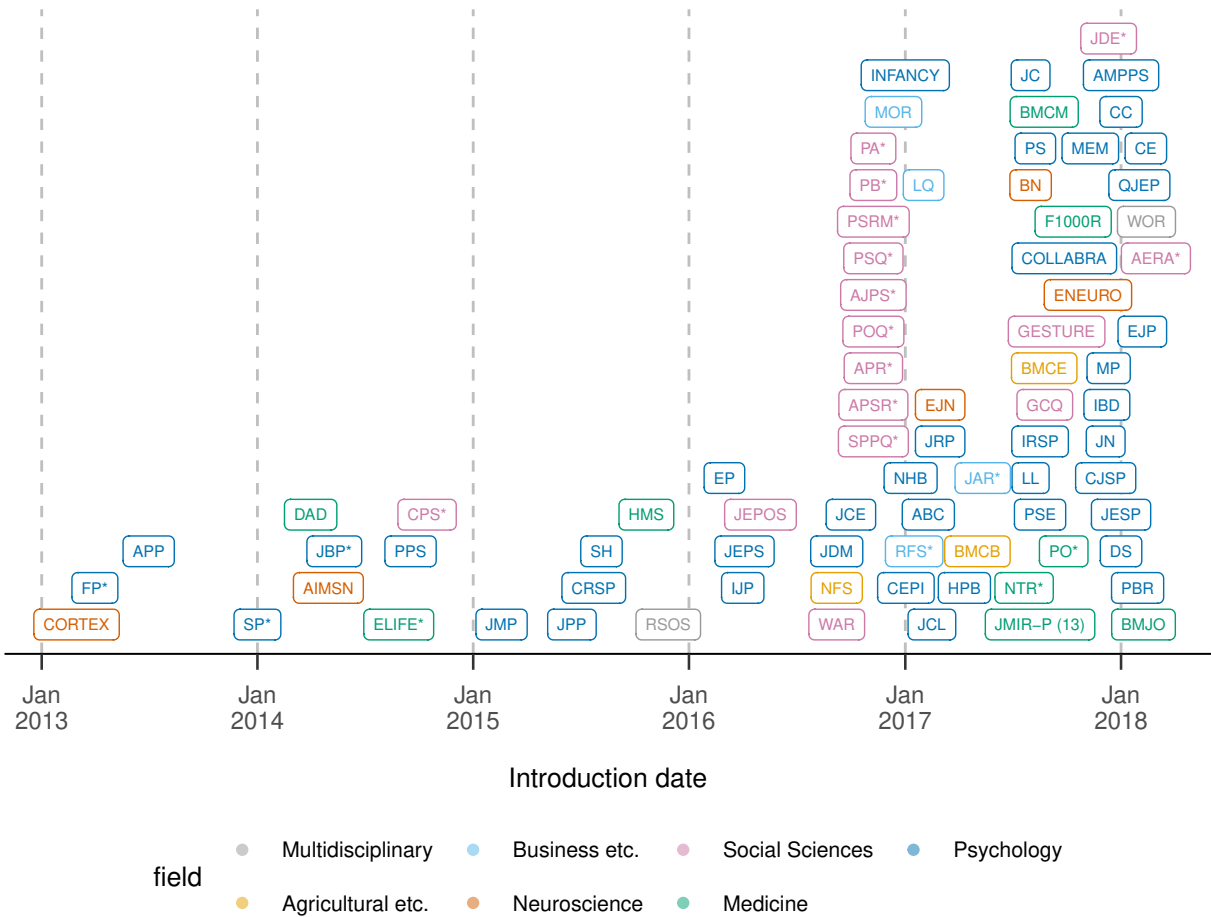


Figure B1. Timeline of Registered Reports introduction at 91 journals. Journal abbreviations are available in Supplementary Table S1. 13 journals using the Journal of Medical Internet Research Protocols platform are represented here by a single entry (JMIR-P). Special issues or pilot projects are starred*.

Snapshot of the Registered Reports’ publication pipeline

After realizing that many IPA protocols were not publicly available, we contacted editors of journals offering Registered Reports directly to request detailed

information about the number of Registered Reports currently in existence, and where they were situated in the publication pipeline (Figure 1). The survey was conducted in July 2017 and by that time 52 journals had adopted the Registered Reports format.

Overall, 29 out of 52 journals responded to our survey and the data are summarized in Figure B2. Note that because the identity of specific Registered Reports was not always explicitly revealed, it was not always possible to cross-reference these survey responses with publicly available data (e.g., see protocol availability above). Consequently, this snapshot is based solely on the survey data, which reflects the situation in July 2017.

334 protocols had been submitted to the responding journals at Stage One. However, note that of the 29 journals responding to our survey, 10 had not yet received any submissions at all. Additionally, one outlier journal (*The Review of Financial Studies*) had received 158 submissions, 148 of which were rejected. The median number of Stage One protocol submissions was only 1. 3 Registered Reports were withdrawn by the authors at Stage One (before IPA).

87 protocols were granted IPA, and for 50 of these studies the Final Report had been submitted for Stage Two peer review. The other 37 studies were presumably being conducted or written up, but there does not appear to be a formal tracking mechanism in place to verify this. 9 journals had received Stage Two Final Report submissions (median = 3).

Of the 50 Final Reports submitted, 32 were published or in press. 8 journals had published Final Reports (median = 2.50) and all others were in review or revision. No Registered Reports had been rejected by a journal or formally withdrawn by authors during Stage Two.

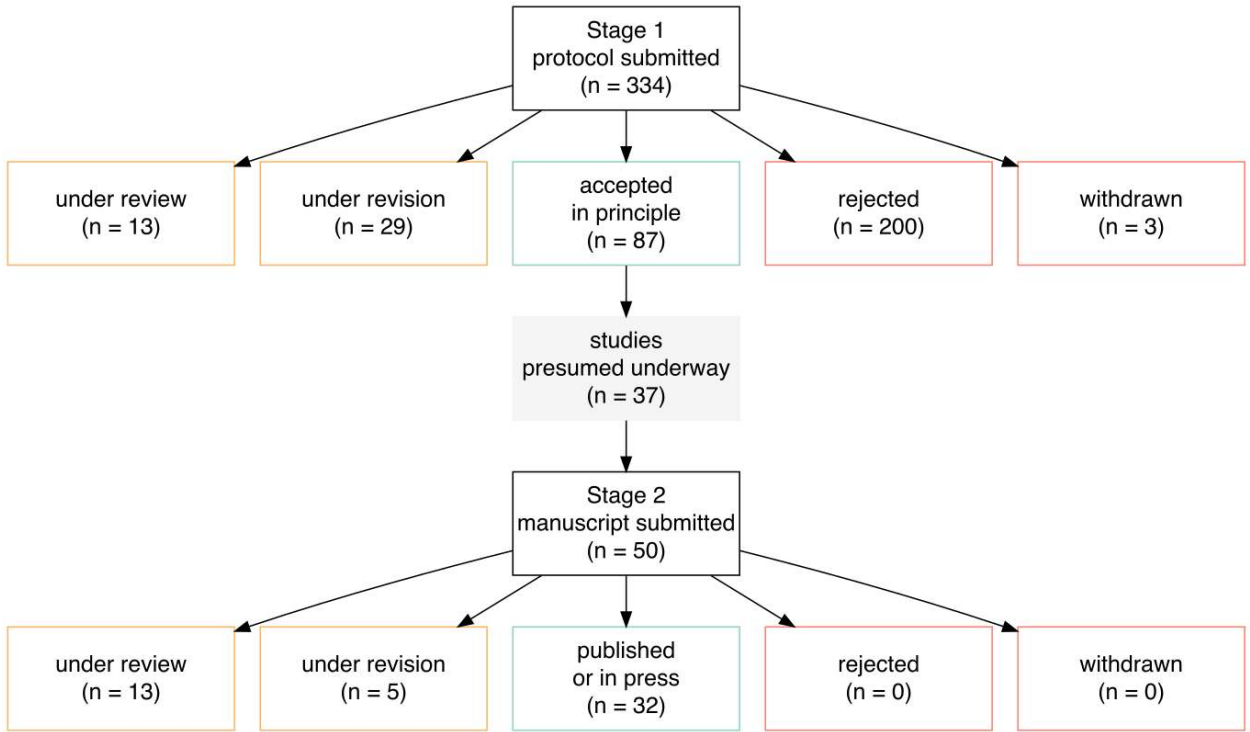


Figure B2. Snapshot of the publication pipeline of Registered Reports in July 2017 based only on survey responses from 29 journals. Of the 32 papers that were published or in press in July 2017, 25 have been fully published and assigned to journal issues as of February 22, 2018. Another 8 papers from the 29 responding journals were published between July 2017 and February 22, 2018. Note that additional pipeline data for two ‘submitted’ Registered Report protocols was not provided.

Time-to-publication

We estimated median time-to-publication since IPA by plotting Kaplan-Meier curves using data on 24 Registered Reports provided by 7 journals in our July 2017 survey. If relevant, we updated the relevant publication dates for the 59 Final Reports that had been published by February 22, 2018. The Kaplan-Meier analysis indicated that 50% of Final Reports would be published within 761 days (interquartile range [IQR]: 473-1122 days; see Figure B3 Panel A) of IPA, suggesting that there can be a considerable lag between IPA and publication. However, as few

journals contributed timing information, the representativeness of our estimate has substantial uncertainty. Time-to-publication is also likely to vary for different types of studies that require different amounts of effort and/or follow-up to complete. Figure B3 (Panel B) shows Kaplan-Meier curves for the three journals with five or more publication events. The longest estimate is for the *eLife* special issue reporting The Reproducibility Project in Cancer Biology, which has encountered unavoidable delays ($n = 29$, publications = 9, 1122 days, IQR = 693-1122). Other journals that contributed data had shorter time-to-publication estimates: *Cortex* ($n = 15$, publications = 7, 473 days, IQR = 441-958), and *Royal Society Open Science* ($n = 7$, publications = 5, 194 days, IQR = 190-296). For the 21 published Final Reports for which we obtained the date of submission for stage 2 review, the median time from stage 2 submission to publication was 187 (IQR = 102 to 272) days.

Replications and study designs

Of the 91 published Final Reports, 57 self-identified as replication studies. The median number of registered studies/experiments included per report was 1 (range: 1-13). Study designs included laboratory independent group designs ($n = 51$), laboratory crossover designs ($n = 25$), observational designs ($n = 6$), field independent group designs ($n = 5$), and survey designs ($n = 4$).

Self-identification as a Registered Report

When extracting data from the 91 articles included in the Center for Open Science (COS) list of published Registered Reports, we found that only 46 actually self-identified as a ‘Registered Report’ (i.e., included ‘Registered Report’ or similar phrasing somewhere in the article). For the other articles, 37 mentioned that they had been pre-registered, and 8 did not appear to mention anything about either Registered Reports or pre-registration. This was initially puzzling until we discovered that the articles were part of special issues. Editorials introducing the

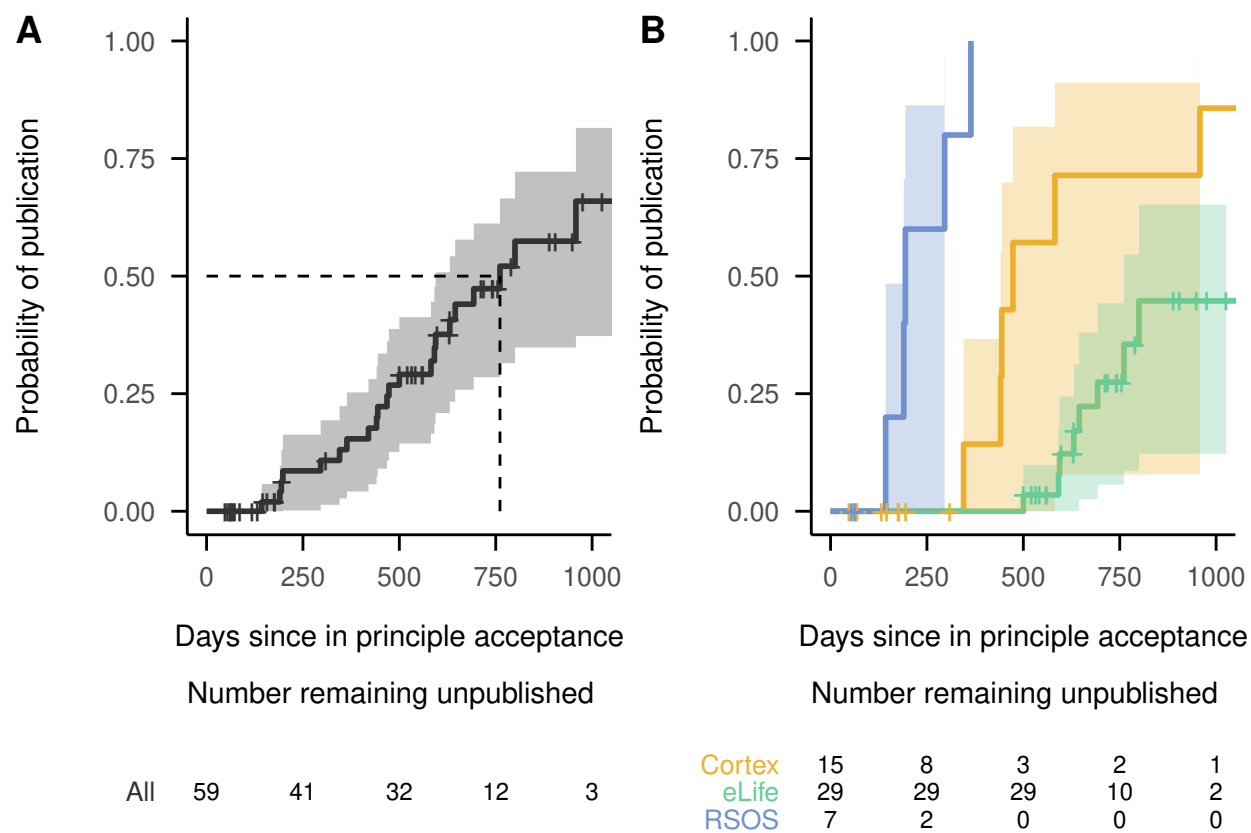


Figure B3. Kaplan-Meier curves indicating time-to-publication for Registered Reports. (A) All journals. (B) The three journals with five or more publication events. Cross marks indicate censored values. Confidence bands indicate 95% confidence intervals. The dashed line indicates the median time-to-publication. The x-axis is truncated at 1000 days as there were fewer than five remaining unpublished after this point.

special issues confirmed that these studies were definitely Registered Reports. However, this would not be obvious to a reader just reading the articles in isolation. We have also been made aware of cases where regular articles have erroneously self-identified as Registered Reports (C. Chambers, personal correspondence, 07 April, 2018; for example <https://doi.org/10.1016/j.ijpsycho.2017.09.010>). The relevant journal is looking into this issue.

Duplicate and/or missing protocols

In 2 cases we encountered duplicate IPA protocols. In one case (PS_1), a published Registered Report offered three routes to the IPA protocol. Firstly, a statement says that “The design and analysis plans were preregistered at the Open Science Framework” and provides a link. Following the link takes the user to an OSF project containing multiple files (data, materials etc) and it is not obvious which document is the IPA protocol. Secondly, an Open Practices Disclosure document is provided alongside the article, and this contains a second OSF link. This takes the user directly to a document that looks like an IPA protocol, but it was not formally registered, and also looks incomplete (e.g., it contains highlighting and what seem to be author notes). Finally, another document referring to pre-registration appears in the list of supplementary files shared alongside the article. This document, hosted by the journal, appears similar to the IPA protocol hosted on the OSF, but there are at least superficial differences (we did not conduct an in-depth comparison of the substantive content). There is a note at the top of this document explicitly acknowledging that there was a misunderstanding about the need to formally register the IPA protocol, but after conversations with the editor it was agreed that the OSF timestamps can be relied upon as an indicator of informal registration. Nevertheless, it remains unclear which of the documents is the final IPA protocol.

In the second case (RSOS_1), a journal editor responding to our survey sent us an IPA protocol for an article. However, the article itself linked to a different document hosted on the OSF. We eventually discovered that after receiving IPA from the journal, the authors had entered their protocol into the Pre-Registration Challenge, an incentive scheme maintained by COS to encourage adoption of pre-registration. Because this scheme requires entrants to complete a specific template, the authors had to modify their IPA protocol to fit with the template. A brief assessment suggests that the two protocols are similar in substantive content,

however they are not the same.

In a third case (SP_14), an article stated that a pre-registered design was available and linked to an OSF component (folder) that had been formally registered. However, there was no IPA protocol at the link, only survey instruments and a data file. Furthermore, the registration date was the same as the date that the paper was accepted for publication at the journal, and therefore not a pre-registration. Using OSF's version control feature, we noticed that a protocol file had been deleted from the component prior to registration, and then added back to the project after registration. The reasons for this are unclear, but this is one of the first Registered Reports to be published and the authors, reviewers, and/or editors, may just have been unfamiliar with the process.

Registration of protocols

Of the 74 publicly available IPA protocols, 26 had been formally registered (i.e., archiving a read-only, time-stamped version of the IPA protocol in an independent registry, such as the OSF). 30 (29 from a single journal, *eLife*) IPA protocols were published as articles, rather than registered. This may emulate formal registration, but mechanisms for handling IPA protocol deletion/withdrawal or modification are unclear. Another 11 IPA protocols had been uploaded as regular files to the OSF but had not been formally registered. Because file changes can be tracked by checking activity logs, this might approximate formal registration. However, unregistered files can still be deleted without leaving a digital trace (i.e., withdrawal notice) and more effort is required to manually locate and extract pertinent information. Finally, *The Journal of Accounting Research* published 7 IPA protocols as supplementary materials on its website with no time-stamps, no relevant meta-data, no clear guarantees that the IPA protocols are read-only, and no stated withdrawal mechanism.

Appendix C

Supplementary notes

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Journal abbreviations

Table C1

abbreviation	journal name
AMPPS	Advances in Methods and Practices in Psychological Science
AIMSN	AIMS Neuroscience
AJPS	American Journal of Political Science
APSR	American Political Science Review
APR	American Politics Research
ABC	Animal Behavior and Cognition
APP	Attention, Perception, and Psychophysics
BN	Behavioral Neuroscience
BMCB	BMC Biology
CE	Cognition and Emotion
CEPI	Cognitive Research: Principles and Implications
CPS	Comparative Political Studies
CRSP	Comprehensive Results in Social Psychology
CORTEX	Cortex
DAD	Drug and Alcohol Dependence
ELIFE	eLife
EJN	European Journal of Neuroscience
EP	Experimental Psychology
FP	Frontiers in Psychology
HPB	Health Psychology Bulletin
HMS	Human Movement Science

INFANCY	Infancy
IJP	International Journal of Psychophysiology
JAR	Journal of Accounting Research
JBP	Journal of Business and Psychology
JC	Journal of Cognition
JCE	Journal of Cognitive Enhancement
JEPS	Journal of European Psychology Students
JEPOS	Journal of Experimental Political Science
JMP	Journal of Media Psychology
JPP	Journal of Personnel Psychology
JRP	Journal of Research in Personality
JDM	Judgment and Decision Making
LQ	Leadership Quarterly
MOR	Management and Organization Review
MEM	Memory
NHB	Nature Human Behaviour
NFS	NFS Journal
NTR	Nicotine & Tobacco Research
PPS	Perspectives on Psychological Science
PA	Political Analysis
PB	Political Behavior
PSQ	Political Science Quarterly
PSRM	Political Science Research and Methods
POQ	Public Opinion Quarterly
RFS	Review of Financial Studies
RSOS	Royal Society Open Science
SP	Social Psychology

SPPQ	State Politics and Policy Quarterly
SH	Stress and Health
WAR	Work, Aging, and Retirement
AERA	AERA Open
BMCE	BMC Ecology
BMCM	BMC Medicine
BMJO	BMJ Open Science
CJSP	Canadian Journal of School Psychology
COLLABRA	Collabra
CC	Consciousness and Cognition
DS	Developmental Science
ENEURO	eNeuro
EJP	European Journal of Personality
F1000R	F1000Research
GESTURE	Gesture
GCQ	Gifted Child Quarterly
IBD	Infant Behavior and Development
IJMR	Interactive Journal of Medical Research
IRSP	International Review of Social Psychology
JMIRBE	JMIR Biomedical Engineering
JMIRC	JMIR Cancer
JMIRD	JMIR Diabetes
JMIRHF	JMIR Human Factors
JMIR	Journal of Medical Internet Research
JMIRME	JMIR Medical Education
JMIRMI	JMIR Medical Informatics
JMIRMH	JMIR Mental Health

JMIRMU	JMIR mHealth and uHealth
JMIRPHS	JMIR Public Health and Surveillance
JMIRRAT	JMIR Rehabilitation and Assistive Technologies
JMIRSG	JMIR Serious Games
JCL	Journal of Child Language
JDE	Journal of Development Economics
JESP	Journal of Experimental Social Psychology
JN	Journal of Neuropsychology
LL	Language Learning
MP	Meta-Psychology
PO	PLoS ONE
PS	Psychological Science
PSE	Psychology of Sport and Exercise
PBR	Psychonomic Bulletin & Review
QJEP	Quarterly Journal for Experimental Psychology
WOR	Wellcome Open Research

Appendix D

Supplementary references

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