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1-1-2018

Registered Reports: introducing a new article format in Developmental Science

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Citation of this paper:

Ansari, D. and Gervain, J. (2018), Registered Reports: introducing a new article format in *Developmental Science*. Dev Sci, 21: e12650. <https://doi.org/10.1111/desc.12650>

Registered Reports: introducing a new article format in *Developmental Science*

Developmental Science is proud to announce the launch of a new article type: *Registered Reports*. Registered Reports can be submitted for consideration by *Developmental Science* effective January 1st 2018. With this exciting new format, *Developmental Science* seeks to meet researchers' increasing desire to communicate their findings and advance our knowledge in novel ways that focus on theory and method rather than on results, acknowledging the real contribution of "null results" and unexpected findings, hitherto all too often discarded or unreported. In what follows, we detail what Registered Reports are, what the rationale for this new article format is and what the advantages of the Registered Report submission format and review process are for developmental scientists. The introduction of Registered Reports does not replace any of the existing article types at *Developmental Science*. Rather, it provides a new addition to the already existing options for developmental scientists to publish their work in *Developmental Science*.

WHAT ARE REGISTERED REPORTS?

Registered Reports are a new way of reporting the results of empirical investigations in scientific journals. The format of Registered Reports is now offered in over 80 journals spanning a diversity of scientific fields. Contrary to the conventional publication formats, a Registered Report entails researchers submitting their introduction, methods and analysis plan before collecting the data. In other words, there are two stages of peer review. Stage 1 review of Registered Reports considers the researchers' hypotheses and rationale for proposing a particular study (or set of studies) as well as the proposed methodology and analysis plan. If a Stage 1 Registered Report is accepted, then the researcher(s) can proceed with data collection. Importantly, acceptance of Stage 1 implies an "in principle acceptance" of the entire manuscript. Therefore, the main purpose of the Stage 2 review process is to ensure that the researchers followed the method and analyses proposed at Stage 1. In this way, Registered Reports depart significantly from the way in which traditional manuscript formats are reviewed. The focus is not on the perceived impact of the results, but rather on the appropriateness and adequacy of theory, method and the analysis plan before data are collected. For further details on Registered Reports, please see: <https://cos.io/rr/>. The full author guidelines for Registered Reports in *Developmental Science* can be found here: ([http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1467-7687/homepage/ForAuthors.html](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-7687/homepage/ForAuthors.html)). [Correction added on 25 January 2018, after first online

publication: The word '<text>' in the beginning of this paragraph has been removed, and the link <https://osf.io/8mpji/wiki/home/> has been updated to <https://cos.io/rr/>.]

WHY REGISTERED REPORTS?

In recent years, problems concerning the reproducibility and replicability of scientific results have come into sharp focus (Open Science Collaboration, 2015). Several factors that contribute to these problems have been identified and discussed (Forstmeier, Wagenmakers, & Parker, 2017). Among them are researcher biases that contribute to questionable research practices such as the so-called "*p*-hacking" (e.g., running different analyses and reporting only those that crossed a particular significance threshold) (Simmons, Nelson, & Simonsohn, 2011). The practice of "hunting" for statistically significant results goes hand-in-hand with the so-called "file drawer" problem which refers to the fact that significant results are more likely to be published than non-significant results, resulting in non-significant findings being stored away in researchers' file drawers (i.e., a bias towards publishing statistically significant results of research projects). Another problematic issue that has been highlighted is the practice of presenting hypotheses in Research Reports that were derived after seeing the data as if they were known before data collection began (also known as "Hypothesizing After Results are Known", or HARKing). These research practices, coupled with low average statistical power in scientific studies across fields, are thought to contribute to issues of replicability of research findings (Szucs & Ioannidis, 2017). It has been argued that such practices have been incentivized by traditional publication formats that put an emphasis on the results of research projects rather than the quality of the research process that generated them. Registered Reports represents a publication format that is specifically designed to ensure that researchers can publish their work without having or being asked by reviewers to engage in the aforementioned practices. More specifically, by requiring researchers to clearly specify their research questions and hypotheses before they collect the data, Registered Reports guard against such practices. Because researchers are required to provide a detailed plan for the ways in which they plan to analyse their data, Registered Reports prevent practices such as *p*-hacking and HARKing. Moreover, by requiring that researchers report a power analysis and power their design to a level of 90%, Registered Reports encourage statistical rigour and thereby limit the probability of false positives.



WHAT ARE THE BENEFITS OF REGISTERED REPORTS FOR RESEARCHERS?

The peer review of Registered Reports is focused on the study idea and the study design. Therefore, by being independent of the results of a study, the aim of Stage 1 peer review is to be highly constructive and to help prevent committing, potentially fatal, errors in design and analyses which are impossible to fix after the results are in (in the absence of collecting a new, often costly sample, using an improved methodology). Put differently, focus is on helping authors improve the way in which they plan to conduct their study and analyse their results. Rather than peer reviewers pointing out flaws in the methods or analytical approach after all the results are in, peer reviewers of Registered Reports serve as constructive advisers seeking to improve the methodology and analysis plan of a proposed study.

Beyond providing an arguably more constructive forum for peer review, Registered Reports incentivize high-risk, high-gain developmental science. Because research protocols are reviewed and, if deemed appropriate, accepted before the results are known, Registered Reports allow researchers risky research studies (potentially involving multiple sites). Such costly or complicated studies might otherwise not be conducted in cases where the eventual publication depends on the results of such efforts.

In addition, Registered Reports represent an important venue for the replication of landmark studies that have significantly influenced subsequent empirical investigations and theoretical models in developmental research, but have received little empirical confirmation or yielded conflicting results when tested in different laboratories or under varying conditions. In this way, Registered Reports provide a way to ensure that research in developmental science is cumulative in nature: by replicating critical findings that lie at the heart of research directions within the science of human development, Registered Reports can help to establish whether the theoretical models rest on solid empirical foundations.

DO REGISTERED REPORTS STIFLE “CREATIVITY” IN THE SCIENTIFIC PROCESS?

A common worry about Registered Reports is that they stifle the freedom of researchers to explore their data to find patterns that they did not necessarily predict when they first conceived of their study and planned their analyses. Registered Reports do not make such analyses

impossible. Rather they provide a clear way of separating between “planned” and “exploratory” analyses. Put differently, submitting a Registered Report does not mean that researchers have to report only the analyses they had proposed at Stage 1. They are free to report any additional analyses that they feel that data might warrant, but they have to clearly distinguish between planned and *exploratory* analyses. Relatedly, it is entirely possible for researchers to introduce minor deviations from Stage 1 approved procedures as long as the editors are informed and any such difference between the methods proposed during Stage 1 and are clearly highlighted in the final published report.

Developmental Science looks forward to developmental scientists submitting Registered Reports to the journal. During this process, the editors of *Developmental Science* are open to constructive feedback by authors, reviewers and readers on this new submission format and ideas of how to improve and refine the process. The editors of *Developmental Science* anticipate that this new format will further facilitate the publication of important discoveries in research on human development.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to Professor Chris Chambers of Cardiff University. Professor Chambers was instrumental not only in encouraging *Developmental Science* to consider adopting Registered Reports, but also advised the editors on the procedures and processes necessary for a journal to adopt Registered Reports.

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