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## Embracing Open Science and Transparency in Health Psychology

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## Embracing Open Science and Transparency in Health Psychology

Failures to replicate ‘high profile’ effects in psychology and behavioural science (e.g., Doyen, Klein, Pichon, & Cleeremans, 2012; Hagger et al., 2016; Pashler, Coburn, & Harris, 2012), as well as general issues in the reproducibility of research findings more broadly (Motyl et al., 2017; Open Science Collaboration, 2012, 2015), has resulted in increased scepticism over the value of published evidence in these disciplines and their role in informing practice and solving social problems. The issues around replication and reproducibility of research findings has led to calls for greater transparency from researchers in the conduct, reporting, and dissemination of their results (Chambers, Feredoes, Muthukumaraswamy, & Etchells, 2014; Ioannidis, 2014; Laraway, Snyckerski, Pradhan, & Huitema, 2019; Munafò et al., 2017; Nosek et al., 2015). The ‘crisis’ of replication in psychology has been attributed to numerous factors, particularly questionable research practices (Motyl et al., 2017) such as selective reporting (Simonsohn, Nelson, & Simmons, 2014), *p*-hacking (Head, Holman, Lanfear, Kahn, & Jennions, 2015), and hypothesizing after results are known (HARK-ing; Kerr, 1998; Rubin, 2017). Numerous methods have been proposed to prevent or minimize researchers unwittingly, or even deliberately, engaging in such practices. Collectively, these methods generally focus on promoting greater transparency in the conduct and reporting of research, and guidelines have been drawn up explaining the practice, and disseminated broadly (Cooper, 2011; Ioannidis, 2014; Munafò et al., 2017; Nosek et al., 2015). While these guidelines have been advocated and endorsed by an increasing number of high-profile organizations (e.g., American Psychological Association, 2019; Association of Psychological Science, 2019), universal uptake present considerable challenges. Health psychology, as a relatively new and forward-looking discipline, is in a unique position to lead the way in adopting and promoting open science recommendations. At *Health Psychology Review*, a flagship journal of the European Health Psychology Society (EHPS), and a leading international forum for world-class reviews and research syntheses in the field, we have embraced open science and transparency. We have

made a series of changes to our submission requirements so that the journal is at the forefront of open science approaches to research dissemination and, as always, with the vision of publishing results that are not only of high quality, but also trustworthy and credible. In this editorial I outline some of the changes we have made to our editorial policies to promote open science and maximize transparency in the research published in the journal.

### **Open Methods, Materials, and Data**

*Health Psychology Review* has required authors publishing reviews with empirical content (i.e., systematic reviews, meta-analyses, meta-syntheses, meta-reviews) to make their data freely available from submission for some time now. Data sharing is a cornerstone of open science. The idea is that all consumers of research published in peer-reviewed outlets should be able to see the evidence on which the authors of the research have based their conclusions, and, should they wish, verify the analytic procedures that led them to arrive at those conclusions (c.f., Hales, Wesselmann, & Hilgard, 2018; Nosek et al., 2015). In addition, the practice of data sharing can also make an important contribution to the peer review process allowing reviewers to see how authors have arrived at particular outputs and associated interpretations and, should they wish to do so, conducting confirmatory and even re-analyses of the data. Data sharing, therefore, provides confidence among those making decisions about what gets published, and those reading the research, that the findings and interpretation of data in published research are sound. As a journal publishing reviews, *Health Psychology Review* requires authors to publish any empirical data on which their review is based. For quantitative reviews this might include data extracted for a meta-analysis or systematic review (e.g., effect size estimates, study characteristics, variable and study coding, ratings of risk of bias or study quality, inter-rater agreement data for assessments or coding of studies etc.). For qualitative reviews, this might mean any coding or classification based on iterative readings of the included pool of studies. We also require authors to include other materials that may accompany the review and assist in its interpretation (search strings from database searches, study flow diagrams). Much of this

also coincides with adequate reporting, and we require review authors to provide a PRISMA (Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009) checklist to ensure that key review components are adequately reported and where they can be found. In addition, we also expect authors of empirical reviews to provide analysis scripts used to generate their analyses in statistical analysis software (e.g., R ‘code’, SPSS or STATA syntax and commands, or algorithms from analytic software such as Comprehensive Meta-Analysis or RevMan) and the actual output from the software. Authors are recommended to provide their data files, analysis scripts, and output in commonly-available file formats (e.g., .txt, .dat, .doc, .xls, .csv, .pdf) so that research consumers that do not have ready access to such proprietary software are still able to read them.

Taylor and Francis, the publishers of *Health Psychology Review*, have been wholly supportive of the embracing of data sharing and provide authors with the opportunity to host shared files as supplemental materials linked to the online version of the published article. The supplemental materials are permanently hosted by the publisher and are accessible to all readers that have access to the full-text version of publication via a url on the article front matter. However, authors also have the option of sharing their data externally via one of the permanent online repositories available dedicated to data sharing in the scientific community, such as the Open Science Framework (<http://osf.io>), FigShare (<https://figshare.com/>), or Dryad (<https://datadryad.org/>)<sup>1</sup>. Hosting on external sites also has the advantage of enabling access to the research data and materials for those who do not have full access to the article via personal or institutional prescription. In addition, sites also have a facility to prevent public access to the data during peer review, and provide ‘read only’ links to be embedded in the peer reviewed version so that reviewers can access the data during the review process.

To date, authors have, by and large, been extremely receptive to the advent of this compulsory data-sharing policy in *Health Psychology Review*. There have been very few

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<sup>1</sup>These are just a few examples, many open access repositories for data sharing are available.

occasions where authors have not been able to share their data. This issue is a far greater one in journals that publish primary research, such as data sets for research that is particularly sensitive or classified (e.g., data collected from government organizations or the military), owned by another organization, or the authors have not been granted capacity for sharing data by the institutional review board or research ethics committee of their university or organization. As reviews, by definition, report on secondary data, issues such as these that limit or preclude data sharing seldom arise. Furthermore, researchers with large data sets which may be the basis of multiple reviews are often reluctant to share their data. However, it is important to point out that authors are only required to publish the ‘minimal’ data set used to generate the analysis in the research reported on the immediate article. Researchers, therefore, need not report the full data set for manuscripts that only the data on which their analyses were conducted, but should be fully transparent in declaring the content of the full data file (e.g., number of variables, study characteristics, and data extracted from the included studies).

### **Pre-Registration**

Generation of data and evidence on which knowledge in health psychology is founded is generally based on a hypothetico-deductive or ‘scientific’ model with clearly defined stages: (i) conceptualize a problem and formulate theories that are then translated into hypotheses to be tested; (ii) design studies with appropriate methods and measures to test the hypotheses; (iii) collect data to verify or reject (disconfirm) those hypotheses; and (iv) interpret and report (often through publication) the findings. However, certain questionable research practices at each stage have the potential to threaten the validity of research findings produced via this model and introduce bias to knowledge. Examples of these practices are inadvertent biases when generating hypotheses, collecting data, or conducting analyses; HARK-ing; conducting multiple unplanned or exploratory analyses<sup>2</sup> based on the data rather than hypotheses; and

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<sup>2</sup>Advocates of open science note that both the deductive hypothesis-testing and exploratory approaches to data analysis are valid means to generate knowledge in psychology. However, it is important that the analytic approach

selectively excluding participants or data points from a data set to detect a result that surpasses a given critical probability level in analyses (*p*-hacking or data ‘dredging’). While such questionable research practices can be subversive, they are often the result of inherent confirmation biases introduced to the research process by the researcher. As Munafò et al. suggest: “confirmation and hindsight biases can encourage the acceptance of outcomes that fit expectations or desires as appropriate” (p. 2). In addition, researchers are often motivated to find ‘statistically significant’ findings because they believe journals will be unlikely to publish null findings. Similarly, journal editors and reviewers may also equate statistically significant findings with ‘scientific significance’, which may further bias the kinds of results that get published and perpetuate beliefs that journals favor such findings

Numerous means to subvert such biases and questionable research practice include blinding researchers that collect the data, and researchers that conduct data analyses, to research hypotheses. Another solution is to pre-register study methods before the research has been conducted, meaning researchers specify their hypotheses, methods, and data analyses before data have been collected and are, therefore, committed to conducting the research as specified. An increasing number of scientific journals, including EHPS journals such as *Psychology and Health*, now offer a *registered reports* option. This article type requires authors to submit manuscripts outlining their theory and hypotheses, methods, and planned analyses before the research is conducted. The manuscript is then subjected to peer review, and the journal is committed, in principle, to publishing the subsequent research if it passes peer review regardless of the outcome. Essentially, the registered report combines pre-registration with peer review. Such practices are meant to minimize bias in research findings and, wherever possible, eliminate practices that could introduce bias.

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is clearly identified when reporting and interpreting findings, given the potential for data-driven exploratory analyses to lead to bias. Furthermore, exploratory analyses presented as being hypothesis driven is misleading. Exploratory analyses, therefore, should need to be labelled as such, and should feed in to the research process through, for example, informing subsequent confirmatory tests using a deductive approach (c.f., Cronbach & Meehl, 1955; Hagger, Gucciardi, & Chatzisarantis, 2017).

Reviews of research, particularly reviews with empirical content, such as systematic reviews and meta-analyses, can also be subject to the same biases as primary research. For example, researchers may bias the study selection process, screen studies selectively, conduct multiple unplanned and exploratory analyses, or selectively include or eliminate studies from analyses. As a consequence, the editorial team at *Health Psychology Review* now advocates pre-registration of reviews submitted to the journal. Pre-registration should be conducted on a publicly-available registry such as *Prospero* or the *Open Science Framework*. These registries are free of charge and require review authors to pre-register the essential components of their research. Important components of the registration of systematic reviews and meta-analyses include: research questions or hypotheses; search strings (e.g., keywords); data sources and databases; criteria for study inclusion and exclusion; population of interest; effect, intervention, or exposure of interest; primary and secondary outcome variables and associated data for extraction; potential conditional or subgroup analyses (e.g., moderator analyses, sensitivity analyses); risk of bias or study quality assessment; and timeline of the review. Authors of reviews are required to pre-register them in advance of submission, provide the pre-registration number from the registry (if applicable), and provide a link to the pre-registration in the submission. If the review was not pre-registered, then authors will be required to provide a reason why they had not done so during submission process.

Pre-registration of empirical reviews submitted to *Health Psychology Review* will be compulsory from January 1, 2020, with a probationary period throughout 2019 in which review pre-registration is strongly encouraged but not a condition for submission and registration. After the probationary period, empirical reviews that have not been pre-registered will not be eligible for submission to *Health Psychology Review*. Conceptual and narrative reviews are exempted from pre-registration. We expect pre-registration to be a further step forward in ensuring that research published in *Health Psychology Review* meet the highest standards of credibility and trustworthiness.



It is also important to note that pre-registration should not preclude researchers from conducting exploratory analyses, that is a common misconception. Pre-registration is a practice designed to make a clear distinction between pre-planned analyses designed to address specific sets of hypotheses specified a priori and exploratory post-hoc analyses conducted after data has been collected. By pre-registering their hypotheses and associated analyses, researchers make an explicit declaration of their commitment to their a priori analyses, but they can also conduct additional analyses which may, for example, clarify or broaden or deepen understanding of the pre-registered analyses. It is widely acknowledged that exploratory analyses are a useful means of discovery and may be extremely beneficial in understanding phenomena, and driving forward research agenda. Such analyses may inform future pre-registered studies to provide further confirmatory evidence to verify the exploratory finding.

### **Transparent Peer Review**

Masked or open peer review? - A perennial question for publishers and editors of peer reviewed journals, and one to which there is no definitive answer. On the one hand, masked peer review is a means to minimize potential reputation bias (positive or negative!) by reviewers of the manuscripts they review of authors known to them. On the other, reviewers are often alerted to authors' identity based on other identifying information or markers available in the manuscript, or may try to guess the identity of the authors (not necessarily correctly!), which may also lead to biases along the way. There is also, of course, many other biases that reviewers can introduce when reviewing manuscripts and making recommendations on publication, which masking cannot prevent. In addition, the anonymity afforded to reviewers under a double-masked system of peer review can give them license to make highly critical or disparaging comments to authors with impunity. In keeping with the climate of openness and transparency in publishing, and the introduction of new policies in that spirit (open methods, materials and data, and pre-registration), *Health Psychology Review* has made the decision to move from a masked peer review system to an 'open' peer review system. The

new system is a single-masked peer-reviewed system in which identities the authors of submitted are made known to the reviewers by default, while reviewers identifies are masked to authors unless reviewers elect to disclose their identifies to the authors. The editorial team strongly encourages reviewers to reveal their identities to authors in the spirit of transparency, but respects reviewers' right to preserve their anonymity should they wish.

### **Conclusions and the Way Forward**

The way scientific knowledge is generated and disseminated is changing. There is a recognition among many scientific communities that current practices in the generation and publication of research, and the associated culture within academia of “getting published”, can lead to biases and questionable research practices, typified by highly-profile failures to replicate of key effects and noted inherent biases in published research (Chambers et al., 2014; Nosek et al., 2015). Changes to research practices have been advocated to minimize bias and promote greater trustworthiness and credibility of research findings through greater transparency in reporting and procedures to eliminate questionable research practices (Munafò et al., 2017). At *Health Psychology Review* we have introduced two key policies that require authors of reviews with empirical content (e.g., systematic reviews, meta-analyses, meta-syntheses, meta-reviews) submitted to the journal to embrace important practices designed to promote openness and transparency: (i) sharing of methods, materials, and data, and (ii) pre-registering reviews. Sharing of methods, materials, and data has been a requirement for more than two years, and authors have very much embraced this policy. Pre-registration is currently encouraged and will become compulsory from January 1, 2020. These policies are aimed at ensuring that reviews published in the journal are of the highest standard and make credible contributions to advancing knowledge. It is also important to recognize that these changes from part of an ongoing process to maximize transparency. Future considerations may be the introduction of greater means to signal the commitment to open science, such as the introduction of a system of ‘badges’ on articles that demonstrate good practice in open science,

such as providing open data, open materials, and pre-registration (Association of Psychological Science, 2019; Kidwell et al., 2016). A further consideration may be to introduce a registered review report article type for reviews, which, I think, would be a first. Authors submit their plan for their review to the journal before conducting their research, and if the plan passes peer review there is an in-principle commitment by the journal to publish the review regardless of the findings. In addition, in the spirit of transparency and openness, we have also introduced open peer review: authors' identities are known to reviewers, and reviewers are encouraged to sign their reviews. Taken together, these policies are designed to ensure that *Health Psychology Review* is at the forefront of openness and transparency in health psychology research, and publishes reviews and syntheses of research in the field that make a lasting contribution to knowledge and will be valued as trustworthy and credible by the health psychology community.

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