Practices, Perceptions, and Patterns of Research Integrity (PRINT)

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A 'crisis in science' has been proclaimed[1], and although the litany of problems is attracting considerable attention[2-11], their scope and causes are unclear. Is there really a 'crisis' in experimental physics, and if so, is it comparable to the one claimed for, e.g., social psychology? Individual cases of obvious misconduct, i.e., fabrication, falsification, and plagiarism, capture much public attention[12]. However, such cases are relatively rare, and the damaging consequences of so-called questionable research practices (QRPs) for the quality and trustworthiness of science-based knowledge may be much more severe with potentially high societal costs. QRPs are central for the current 'crisis' and better understanding of them is paramount for improving research credibility. QRPs present themeselves in subtle 'shades of gray'; some are intentional, others unintentional, and some are more harmful than others. The prevalence of QRPs as well as the interpretation of their importance are likely to be field specific, dependent on the discrete epistemic cultures in which they emerge. Their prevalence could also be associated with institutional and national differences, including amplifiers related to governance structures such as performance assessment schemes. While phenomena such as publication pressures and hyper-competition are potential causal factors[13,14], the current evidence is, at best, scanty[15]. The proposed research project PRINT will target these gaps in our knowledge.

Research objectives

In accordance with the call, the overall aim of the proposed project is to provide a detailed mapping and improved understanding of the current state of research practice and integrity in Denmark, and subsequently to utilize the acquired knowledge to support efforts to strengthen integrity, notably the implementation of Danish Code of Conduct for Research Integrity (DCCRI). To understand how noteworthy QRPs are in the Danish case we need to answer these questions in an international context. Our project will therefore explore the Danish case and compare it to an international setting. Our project will cover all major fields of research as challenges to integrity and QRPs may differ across fields. Our main research objectives are: 1) to define and typologize QRPs; 2) to estimate their prevalence across domains, institutions, and countries; 3) to elucidate the most predominant mechanisms (e.g., incentives) potentially influencing QRPs, and examine how they relate to individuals, institutions, norms, and standards; 4) to provide a contextualized mapping of the current integrity of Danish research; and 5) on the basis of the findings, to provide recommendations for improving research integrity in Denmark and beyond[16]. The project duration is 24 months.

Outline of research

To comprehensively accomplish the overall research objectives outlined above, the proposed project is divided into three interrelated work packages.

Work Package 1 (WP1) combines theoretical analyses, systematic reviews, and an extensive qualitative data collection programme. The main objectives are to systematically review the relevant knowledge base and to elicit contextualized knowledge on QRPs and research integrity to be utilized in subsequent analyses, in particular to inform the construction of the survey instrument to be used in Work Package 2 (WP2). The systematic reviews will provide a much needed cross-disciplinary assessment of the current knowledge base of scientific misconduct, QRPs, and mechanisms leading to QRP, as well as effects of efforts to support research integrity. The qualitative data collection programme consists of focus group interviews which will provide an understanding of the perceptions of QRP and its potential causes among academics across disciplines in Denmark. Supporting individual interviews will examine incentive schemes, research integrity strategies, and justification mechanisms across eight Danish and eight international universities (from UK, US, Croatia, and Austria). The selection of countries and international universities reflects national differences in the research systems allowing for appropriate comparisons between the Danish and international set of institutions. Theoretical analyses will combine these findings and provide contextualised knowledge and typologies about QRPs to be used in the subsequent work packages.

Work Package 2 includes a large-scale survey aiming to cover all academics employed at the selected universities. The main objective is to examine prevalence, patterns, and perceptions of research integrity and QRPs as well as the mechanisms leading to various QRPs. To examine potential specific Danish practices, international multi-level comparisons are performed. The survey will include a general part with questions of relevance for all participants and a specific part tailored to researchers within specific fields. The survey instrument will be based on general and field-specific input on QRPs established in WP1. Care will be taken in the counstruction of the survey instrument to counter social desirability bias enabling us to derive realistic estimates of QRPs[17]. We will conduct quantitative analyses of the survey data, e.g., with the aim of estimating upper and lower bounds of the actual prevalence of QRP across fields. We will also probe the data with multi-level models covering predictors of QRP as well as relevant covariates to explore the incentives and other possible mechanisms that may influence research practices positively or negatively. The extent and cross-disciplinary scope of the survey, as well as its international comparative element, makes it unique among studies of research integrity.

Work package 3 (WP3) consists of three specific 'meta-research'[18] studies. This approach has previously produced important knowledge in relation to issues of research integrity[19,20]. Whereas the survey relies on researchers' perceptions, conjectures and preferences for 'truth telling', and depends on 'suffcent' response rates, 'meta-research' of publication data can been seen as an extensive and unobtrusive measure for studying research and publication beahviour. Indications of QPR can be inferred from methodologial and publication practices and the approach enables us to specifically

address issues of individual integrity (i.e. intentional QRPs) as well as issues of 'system integrity' where researchers unintentionally employ QRPs by following ingrained but essentially flawed norms. The objectives of WP3 are therefore to complement and contrast findings from the survey in WP2 by further examining QRPs and their potential explanations using different data. We propose three specific studies. (A) We will examine indications of QRPs in a large sample of publications from the 16 selected universities. The findings will not only supplement prevalence findings from WP2, but will also indicate threats to research integrity that go beyond individual researchers. (B) The Danish research system is generally becoming more competitive, yet a previous study claims that in a US-setting "… competitive academic environments increase not only scientists' productivity but also their bias"[19]. We will examine to what extent competition and publication pressures are positively related to QRP in Denmark and compare this to selected control countries. (C) Finally, using our unique database access[21], we will examine potential predictors affecting research integrity, e.g., national research misconduct policies, academic culture, career stage, authorship and gender.

The research team, coordination and feasibility

All work packages will commence in month 1 of the project and the data collection in WP2 will start in month 10. The core research team consists of 9 highly experienced senior researchers from a broad range of disciplines. The team includes international experts on research integrity, evaluation and scholarly incentives, survey methodology, statistics, and has substantial experience handling large-scale international surveys and integrity analyses with the neccesary infrastructure already in place. PI of the team will be Jesper W. Schneider who, in collaboration with co-PI Niels Mejlgaard, will coordinate the project activities. The research project will be a collaborative effort with all core team members participating in all work packages, supported by two postdocs and technical staff at the host institution. Schedules and specific responsibilities of the core researchers are noted in the budget.

Dissemination activities

Because the project concerns research issues with broad relevance across fields and countries and will build unique, large-scale datasets, ambitious targets for academic publishing can be set. We aim to publish 2 papers in top multidisciplinary journals, at least 5 papers for 2nd tier journals, and at least 5 papers for journals specialised in research integrity and/or evaluation. Project results will also be relevant to broader communities of stakeholders. To optimize the interaction between the project, researchers and stakeholders engaged with the DCCRI as well as with local implementation schemes, a 'national forum' will be established. Members will act as a sounding board for the project and will receive all outputs emerging from the project. Workshops will be conducted to coproduce a policy-paper stipulating the implications of project results for the continued implementation of the DCCRI. To ensure international dissemination and discussion of the results, the project will collaborate with the European Network of Research Integrity Offices (ENRIO).

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