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**A Registered Report Survey of Open Research Practices in Psychology
Departments in the UK and Ireland**


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Abstract

Open research practices seek to enhance the transparency and reproducibility of research. Whilst there is evidence of increased uptake in these practices, such as study preregistration and open data, facilitated by new infrastructure and policies, little research has assessed general uptake of such practices across university researchers. The current study estimates psychologists' level of engagement in open research practices across universities in the United Kingdom and Ireland, while also assessing possible explanatory factors that may impact their engagement. Data were collected from [insert final number of participants] psychology researchers in the UK and Ireland on the extent to which individual researchers have implemented various practices (e.g., use of preprints, preregistration, open data, open materials). Here we present the summarised descriptive results, as well as considering differences between various categories of researcher (e.g., career stage, subdiscipline, methodology), and examining the link between researcher's practices and their self-reported capability, opportunity, and motivation (COM-B) to engage in open research practices. Results show [e.g., that there is wide/little variability across the discipline as well as differences between established researchers and postgraduate research students/postdoctoral researchers, who are more/less likely to be engaging in responsible research practices]. Estimating the prevalence of responsible research practices is important to assess sustained behaviour change in research reform, tailor educational training initiatives, and to understand potential factors that might impact engagement.

Keywords: responsible research practices; open science practices; researcher engagement; replication crisis; credibility revolution

Problems for Science and Psychology

It is widely accepted that there is a replication crisis in psychology (De Boeck & Jeon, 2018; Giner-Sorolla, 2019; Maxwell et al., 2015; Munafò et al., 2017; Pashler & Wagenmakers, 2012). It has been estimated that up to 60% of findings in psychology cannot be replicated (Klein et al., 2018; Open Science Collaboration, 2015), and these replication failures cannot seemingly be explained by simple methodological or sample differences (Ebersole et al., 2016; Klein et al., 2018). By now, evaluations of replicability have been conducted across a range of disciplines, from economics (Camerer et al., 2016) and experimental philosophy (Cova et al., 2021), to cardiovascular health (Prinz et al., 2011) and cancer biology (Begley & Ellis, 2012; Errington et al., 2021), reporting wide variability in “successful” replications (30%-90%). These studies, and the relatively low rates of replication, have resurfaced a plethora of problematic issues that seem to permeate the scientific literature, including *p*-hacking, selective reporting, hypothesising after the results are known (HARKing), and publication bias (Ioannidis, 2005; Kerr, 1998; Rosenthal, 1979; Simmons et al., 2011). Acknowledging the existence of these problems has led to a focus on the concept of “questionable research practices” (QRPs) and attempts to estimate their prevalence in psychology (e.g. John et al., 2012). While questionable research practices may not be considered as outright fraud, and may reflect previously well established research norms, they occupy a grey area in terms of research integrity, and certainly fall well short of idealised views of how researchers should behave (Merton, 1942; Ritchie, 2020).

In this paper, rather than revisiting and enumerating questionable research practices, we focus instead on the positive behaviours that psychology researchers engage in – termed *responsible research practices* (RRPs; Gopalakrishna et al., 2021) – that serve to enhance the transparency, rigour and reproducibility of scientific findings. To understand the level of engagement with responsible research practices, and consider some factors that may impact

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engagement, we will conduct a large-scale survey-based study targeting psychologists conducting research in the UK or Ireland. In recent years, both countries have seen major pushes for increases in open research practices (e.g., via the Research Excellence Framework www.ref.ac.uk, UK Reproducibility Network www.ukrn.org, and National Open Research Framework www.norf.ie), although to date there is little in the way of discipline-specific survey data that quantifies the extent of researcher engagement. We will provide descriptives of the overall levels of engagement for a range of responsible research practices, and conduct a series of exploratory regression analyses to examine which factors are most strongly associated with higher levels of engagement.

We first review some recent studies examining the level of engagement in responsible research practices, before outlining the benefits of discipline-specific surveys and our specific focus on psychology. Finally, in viewing science as behaviour (Norris & O'Connor, 2019; O'Connor, 2021), and taking inspiration from the COM-B model of behaviour change, we consider specific factors related to capabilities, opportunities, and motivations, that may impact researcher engagement in open research practices.

Recent work on Responsible Research Practices

Two recent national studies on open research - Gopalakrishna et al., (2021) and Norris et al., (2022) - investigated both the prevalence of responsible research practices and considered a range of possible explanatory variables. Gopalakrishna and colleagues conducted a survey of researchers based in the Netherlands, finding large differences in engagement in various practices. For example, the most commonly incorporated practices included “disclosing conflicts of interest” (96.5%) and “avoiding plagiarism” (99.0%), while the least common practices included “preregistration of study protocols” (42.8%) and “keeping comprehensive research records” (56.3%).

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Gopalakrishna and colleagues also found differences in engagement based on academic discipline, academic rank, researcher gender, and research methodology. Specifically, researchers in life sciences and medicine showed more engagement in responsible research practices than those in the social and behavioural sciences; associate professors and professors were more engaged in responsible research practices than assistant professors and post-doctoral researchers; male researchers engaged in more responsible research practices than female researchers; and researchers employing non-empirical research methods engaged in fewer responsible research practices than those engaged in empirical research.

In considering what factors might be related to the extent of researcher engagement in responsible research practices, Gopalakrishna et al. found that increased publication pressure was related to lower engagement, whereas mentoring, funding pressure from institutions, scientific norm subscription, likelihood of questionable research practice detection by collaborators, and work pressure, were all positively related to engagement in responsible research practices.

In the UK, Norris and colleagues (2022) similarly found large differences in engagement depending on the specific practice, ranging from 76.5% of researchers pursuing open access publishing, down to 8.3% of researchers submitting a Registered Report journal format. Norris et al., also found a disconnect between researcher awareness of specific practices and their actual implementation of these practices, with respondents highlighting improved incentives, dedicated funding, and appropriate recognition in promotion and recruitment criteria as factors that would help them engage further with open research.

Both of the above studies take a broad approach, examining uptake of responsible research practices across a range of disciplines, albeit with differing levels of granularity. This means that the number of researchers surveyed for any given discipline is relatively

small, and it may be difficult to generalise from these samples to disciplines as a whole. For example, responses to the Norris et al. survey (2022), with 1,274 participants, included data from 216 psychology researchers, representing 17% of the total sample, and an estimated 1% to 2% of psychology researchers in the UK. In addition, Norris et al.'s work explicitly targeted institutions that were currently members of the UK Reproducibility Network (<https://www.ukrn.org/>); a group which promotes and fosters open research practices, which means those institutions are likely to be more engaged with open research practices than non-member institutions, possibly leading to reported engagement rates that are higher than the norm. It is likely that the disciplinary differences observed in these studies emerge from researchers from different disciplines having differing priorities, differing concerns regarding the replication crisis, combined with different capabilities, opportunities, and motivations for engaging in responsible research practices. Furthermore, researcher behaviour varies not just across disciplines but within disciplines, too; studies show that in subdisciplines of psychology, there can be wide variability in how researchers engage with responsible research practices.

Responsible Research Practices in Psychology

Psychology researchers have played a major role both in recognising and diagnosing the extent of replication and reproducibility issues in science (e.g., Open Science Collaboration, 2015; Simmons et al., 2011), while also being at the forefront in terms of generating potential solutions, whether pushing for enhanced reproducibility (Munafò et al., 2017), advocating for study preregistration (Nosek et al., 2018), or introducing Registered Reports to a wide range of the discipline's leading journals (Chambers & Tzavella, 2022). Nonetheless, there are now several literature evaluation studies that have examined to what extent psychologists engage in specific responsible research practices. When looking at these practices in isolation, this research suggests a relatively low uptake, as well as variability

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across psychology subdisciplines. For example, Holcombe et al. (2019) note that for vision sciences, engagement in practices such as open data and open code is low. Towse et al. (2021) show that while data sharing is low across the board in psychology (at around 4%), data sharing in social psychology journals is higher than that observed for cognitive science or applied psychology journals. Rochios and Richmond (2022) show that data and materials sharing in developmental psychology articles was lower than in cognitive psychology articles published in *Psychological Science*. However, at the moment there is little in the way of comparative data across psychology, and nothing that covers the full breadth of subdisciplines in psychology, something that we address in the current study.

As well as considering differences in engagement with responsible research practices within psychology, there are other reasons why discipline-specific surveys, rather than cross-disciplinary or discipline-agnostic studies, such as those of Gopalakrishna et al., and Norris et al., can be useful. First, focussing solely on psychology should enable us to reach a larger, more representative sample of researchers than has been achieved with previous studies. By focussing on all psychology departments, and psychologists working outside traditional psychology departments (e.g., in larger units of Social Sciences, or within Business and Management Schools), we aim to gain a fuller picture of the level of engagement within the discipline. Having a larger sample, will also make it easier to make comparisons between different groupings, for example, between subdisciplines of psychology, or between researchers at institutions that provide support via institutional leads for open research or open research working groups, compared to those institutions that do not (see also the work being conducted as part of the STORM project: <https://osf.io/av4ky/>).

A second advantage of focusing on a single discipline is that we can make more fine-grained distinctions in survey questions that are of relevance to researchers in psychology, but perhaps less relevant to those working in other fields. For example, where a

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more discipline-agnostic survey might probe engagement with study preregistration generally, we can incorporate more fine-grained questions that distinguish between sub-elements of the preregistration process, such as distinguishing between the preregistration of study hypotheses, designs, and analysis protocols. Each of these elements are important in their own right, and currently we do not know if researchers who are preregistering studies give equal weight to these distinct elements. Having this level of detail will provide important information to help in identifying training needs or developing targeted policy interventions.

Third, in also identifying potential barriers to entry to responsible research practices, the survey will help identify areas of psychology or components of the research process where people may need additional support, training, or incentives, that will allow us to develop targeted ways to support researchers in responsible research practices, and improve the credibility of psychological science more generally.

In sum, psychology, as a discipline, has been at the centre of discussions of the replication and reproducibility crisis, and has been one of the areas leading the way in terms of open science reform. However, in the wake of such endeavours, and despite major pushes to increase transparency and reproducibility, it remains unclear the extent to which psychologists specifically are engaging with responsible research practices, and whether their uptake is similar across subdisciplines of psychology.

Capability, Opportunity, and Motivation as explanatory factors for engagement in open research

Science is behaviour (Norris & O'Connor, 2019), and conducting transparent and replicable science requires researchers to enact many specific behaviours, several of which are at odds with historical scientific norms. With this in mind, we can look to the literature on behaviour change to theorise how to encourage individuals to increase their engagement in

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responsible research practices, and to identify potential barriers to such change. Behaviour change has been studied extensively with regards to facilitating healthy behaviours, such as reducing smoking (Armitage, 2008), alcohol consumption (Armitage & Arden, 2012), stress-induced eating (O'Connor et al., 2015), and increasing physical activity and healthy nutrition (Seppälä et al., 2017). Here, we apply the COM-B model (Cane et al., 2012; Michie et al., 2011) which is situated at the centre of the Behaviour Change Wheel (Michie et al., 2011) and provides a way of viewing potential influences on behaviour change. The COM-B framework proposes a 'behaviour system' involving three essential conditions for behaviour change: *capability*, *opportunity*, and *motivation*. These 3 pillars of the model can be further subdivided, with Capability referring to both an individual's *psychological* and *physical* ability to participate in an activity. Opportunity refers to external factors, *social* or *physical*, that make a behaviour possible. And lastly, motivation refers to the conscious (*reflective motivation*) and unconscious (*automatic motivation*) cognitive processes that direct and inspire behaviour.

While the COM-B model has been applied successfully to a range of health-related areas, Norris and O'Connor (2019) explicitly raise the possibility of applying this behaviour change approach to promote the uptake of open research practices. Specifically, they applied the Behaviour Change Wheel approach to help understand how open research practices may be identified, how barriers towards these behaviours may be tackled, and how interventions can be developed to increase responsible research practices. Moreover, the barriers and facilitators were mapped onto the COM-B model. In other words, how could a researcher's capabilities, opportunities, and motivations affect the likelihood that they will engage with responsible research practices?

Indeed, in the recent survey by Norris et al. (2022), certain elements of the COM-B model relating to opportunity and capability were especially relevant to future possible

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engagement in responsible research practices. For example, “Incentives from funders, institutions or other regulators”, and “Recognition of Open Research in promotion and recruitment criteria” were prominent examples of researchers citing *social opportunities* impacting their future engagement. “More training using Open Research practices” and “More information on Open Research practices” were highlighted as aspects of *psychological capability* that were deemed important by many respondents.

The COM-B approach therefore allows us to consider both personal (e.g., psychological capability) and structural (e.g., social opportunity) factors that may impact the behaviours in question. This is an important aspect of the framework – since researchers do not exist in a scientific vacuum, we need to consider, for example, to what extent local norms or institutional support contribute to a researcher’s level of engagement in open research behaviours. Do institutions provide increased capability (e.g., through offering department-level open research training), increased opportunity (e.g. through funding available to pay for open access publication; or institutional incentives like open research awards, Merrett et al., 2021), and increased motivation (e.g., by promoting the advantages to researchers of responsible research practices)? And how do these features of the research environment impact on researcher behaviour (see Stewart et al., 2021)?

Goals of This Survey

In the current survey, we ask psychologists working in Higher Education institutions about their engagement in responsible research practices that cut across the entire research process, while also explicitly asking them to consider factors related to their capability, opportunity, and motivation for engagement in open research. Answers to these questions will provide a census on the degree of uptake of responsible research practices in psychology in the UK and Ireland, and will help to monitor progress and sustained behaviour change in open research, as well as assessing the need for tailored educational initiatives to increase

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uptake. Furthermore, applying the COM-B model in a discipline-specific manner may provide insights into potential barriers and incentives, both systemic and individual, that impact on engagement with open research across psychology.

We hope that a targeted drive for recruitment (e.g., contacting individual researchers directly) will result in a representative snapshot of open research behaviours by psychological scientists in the UK and Ireland, reducing the possible bias towards only those actively engaging in open research behaviours (although self-selection bias is always likely to impact on survey responses to a certain extent). We also investigate possible explanatory factors using the COM-B model by assessing capability, opportunity, and motivation to engage in responsible research practices. This theoretically-driven framework will allow us to consider open research through the lens of behaviour change.

Method

Ethical Approval

This design follows the four principles in the British Psychological Society code of Human Research Ethics (Oates, 2021). Briefly, this means it includes procedures to ensure valid consent were built into the online questionnaire and pre-emptive review was conducted by the Social Research Ethics Sub-Committee of Maynooth University (Ethics ID 2448789).

Participants

Participants are academics, researchers, and PhD students working in a unit with psychology in the title (e.g., Department/School of Psychology) or in the psychology subject area of a larger unit (e.g., School of Social Sciences) in a higher education institution in the UK or Ireland. All psychology researchers working at higher education institutions in the United Kingdom and Ireland are invited to participate. To be considered eligible, researchers have to perform, on average, at least 8 hours of research-related activities per week (following Gopalakrishna et al., 2021), consider themselves a researcher in psychology, and

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be at any career stage from PhD level to full professor (i.e., including PhD candidate, junior researchers, postdoctoral researcher, lecturer, senior lecturer, assistant professor, research fellow, reader, associate or full professor).

Design and Procedure

This a cross-sectional, web-based survey examining the notion of responsible research practices and the COM-B model. The survey is fully anonymised, and designed to allow participants be able to complete it in approximately 10 minutes. Researchers are contacted in one of two ways: either via individual emails, or via email distribution lists (e.g., through contacting individual departments or heads of department to cascade the survey to researchers). Distribution lists are particularly important for accessing PhD students and non-faculty researchers, who are not always fully represented on university staff webpages. The email invitation contains details about the aims of the study and a direct link to participate. The survey will be open for 8 weeks, and we will send up to 3 reminder emails during this period. Once the 8-week period has elapsed, if we have not achieved a sample size of 2000 participants we will extend the survey window for 4 weeks, and also advertise via commonly used social media channels (e.g., Twitter, Mastodon). After this point the survey will be closed and data collection will be terminated.

Once a participant has opened the survey, they are presented with an information page followed by a consent form. Following completion of the consent page, participants complete the screening questions (whether they spend at least 8 hours per week on research activities, including supervision duties, and if they are based in the UK or Ireland). They will then provide some demographic information on academic rank, psychology subdiscipline, and primary research methodology). If respondents indicate that they spend less than 8 hours per week on research activities, they can proceed no further with the survey. Once this point has been passed, the participant is free to complete the remainder of the survey.

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Survey

The survey has five general components: Participant Information & Informed Consent, Demographics and confirmation of researcher status, Responsible Research Practice Questionnaire (19 items - 15 items on researcher's general practices - see Table 1, and 4 linked to first-contact with open research), COM-B Questionnaire (14 items related to capability, opportunity, motivation - See Table 2), 3 short additional items (1 item relating to institutional support, 1 item on academic roles of influence (e.g., journal editor roles, member of grant funding panels), 1 open text question for general comments), and a final debrief. Following the debrief, participants will be asked if they would like to be entered into a draw to win one of 50 £20 gift vouchers, and if they choose, will be directed to a separate survey page to provide their email address. In this way, participant contact details will never be linked with survey responses. The full set of survey questions can be found in Appendix A and on the OSF project page (https://osf.io/xjby2/?view_only=9450c4c6c43b4d19a789bcf14e953ad2).

Table 1 Statements regarding responsible research practices.

Component of the research process	Statement
Conflicts of Interest	I always disclose who funded my studies and all my relevant financial and non- financial interests in my publications
Open Materials	I deposit my study materials and stimuli on a publicly accessible repository
Open Data	I contribute, where appropriate, to making my research data findable, accessible, interoperable and reusable in accordance with FAIR principles
	I deposit the raw anonymised data, and processed data (used for reported analyses) on a publicly accessible repository OR, where data anonymization is not possible, I deposit my identifiable raw and processed data in a controlled archive that provides access to future researchers.

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Open Analysis and Code	I deposit analysis scripts, analysis code, or statistical output files on a publicly accessible repository
	I deposit source code for any computational research (e.g., neural networks, machine learning, cognitive architectures etc.) on a publicly accessible repository
Study Preregistration	I preregister my study hypotheses, and make them available on a publicly accessible repository (e.g., AsPredicted, OSF etc.)
	I preregister study designs/protocols, and make them accessible on a publicly accessible repository
	I preregister analysis plans, and make them available on a publicly accessible repository
	I preregister analysis code or scripts (e.g., R code, syntax files), and make them available on a publicly accessible repository
	I submit manuscripts for publication as Registered Reports (i.e., where the manuscript is reviewed, and may receive in-principle acceptance, prior to data collection and analysis)
Dissemination and Review	I make my academic manuscripts freely available prior to publication, for example via a preprint repository (e.g., PsyArXiv, BioArxiv, OSF Preprints etc.), personal webpage or other fully open online repository
	I publish my work in open access journals
	I sign my reviews when peer-reviewing manuscripts
	I share slides from my research talks on a publicly available repository, or agree to have a research talk I've given made publicly available (e.g., via YouTube or other online platform)

Table 2 The statements used in the survey relating to the COM-B model for behaviour change. These statements relate to capability (C), opportunity (O), and motivation (M) as three key factors or elements linked with changing behaviour (B). Capability refers to an individual's psychological and physical ability to participate in an activity. Opportunity refers to external factors that make a behaviour possible. Lastly, motivation refers to the conscious and unconscious cognitive processes that direct and inspire behaviour.

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COM-B Condition	Statement
Physical Capability	I am physically capable of engaging in open research practices (e.g. I have sufficient physical stamina, I have sufficient physical skills)
Psychological Capability	I am equipped with the skills necessary to engage with open research practices
	I have enough information and training on open research practices
Physical Opportunity	I have access to the appropriate research infrastructure to engage in open research practices (e.g., access to appropriate repositories, computing resources etc.)
	I have enough time to implement open research practices in my work
	I have sufficient financial support to engage in open research (e.g., to cover costs of video recordings, transcription/translation, data storage etc.)
Social Opportunity	Others in my wider research environment engage with and encourage the use of open research practices
	There are adequate incentives from funders, institutions or other regulators to engage in open research
	There is sufficient recognition of open research in promotion and recruitment criteria
Reflective Motivation	I am sufficiently motivated to engage with open research practices
	I believe open research practices to be a positive thing
	I consciously plan on working more with open research practices in the future
Automatic Motivation	I have developed the habit of engaging in open research practices as an everyday part of my research process
	When I think about my research, I automatically think about the open research elements as well

The questions on responsible research practices and explanatory variables were generated to cover the complete research cycle of a psychologist, taking into account study design, data collection, analysis, publishing, sharing of data/code/materials, and conflicts of

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interest. All authors were involved in iteratively developing the questions until the final set and phrasings for each were agreed. All 15 questions on responsible research practices have a 7-point Likert scale ranging from 1 = Never to 7 = Always, in addition to a “Not Applicable” option. Following this, four questions assess researcher’s first contact with open research (i.e., when they first engaged with any of the responsible research practice questions mentioned, providing a year, or N/A response), and whether they had specifically been involved in study preregistration, submitted a Registered Report, or been involved in a large-scale, multi-site study (involving a replication or original research). The latter three questions have Yes/No (and N/A) responses.

The questions on explanatory factors were generated based on the COM-B approach to behaviour change, and also drew on existing surveys by Keyworth et al. (2020), Norris et al. (2022), and Osborne and Norris (2022). Unlike previous surveys, we include statements relating to all 6 elements of the COM-B approach: physical and psychological capability, physical and social opportunity, and reflective and automatic motivation. Briefly, Capability questions refer to an individual’s psychological and physical ability to participate in an activity. Opportunity questions relate to external factors that make a behaviour possible, such as having sufficient opportunities to engage in open research, and whether open research practices are considered normative in their wider research environment. Lastly, Motivation questions relate to the conscious and unconscious cognitive processes that direct and inspire behaviour, such as the extent to which respondents feel personally motivated to engage in responsible research practices, and the extent to which they have automatised the inclusion of responsible research practices in their research process. These questions are focussed on the individual researcher and their environment at the current point in time, rather than for example highlighting areas that they would like to see improvements in the future (see e.g., Norris et al., 2022). As with the research practice questions, participants provide a rating on

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a 1 to 7 scale, which will provide a more fine-grained picture than utilising binary responses. A rating of 1 means "strongly disagree" with the statement, while a rating of 7 means that you "strongly agree". See Table 2 for a list of these statements.

We include one question on positions of influence that academics may occupy as part of their academic service duties (e.g., journal editors, members of grant review panels). It is possible that those occupying such roles may exert more influence on research practices in their wider community than those who do not occupy roles of influence. One further question taps into broader institutional support, assessing whether the respondent's department or university have a local open research working group, or whether there is an institutional lead for open research, either of which would signal higher-level support from the institution for open research approaches generally (Yes/No/Don't Know response). Finally, respondents are provided with an open text box to provide any additional information regarding open research generally, or regarding benefits/challenges to engaging with open research practices. Analysis of responses in the open text box are not planned for the current study, but may be analysed at a future point. In this event, a separate analysis plan will be developed. A draft survey is accessible here:

https://maynoothpsychology.qualtrics.com/jfe/form/SV_5p9kSzMrtuG3Ybk

Data Availability

Analyses will be conducted in JASP (Wagenmakers et al., 2018), and all scripts and output files will be made publicly available on the project's OSF page [insert project page on acceptance]. Raw, anonymised data will be made available, with specific institutional information withheld to protect the identity of respondents and institutions.

Data Processing and Statistical Analysis

The preregistered analysis plan (see Appendix B for full details, also available on the Open Science Framework) is based on that of Gopalakrishna and colleagues (2021) for the

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Dutch national survey of research practices. Our goal is firstly to describe the general trends in the data, and secondly to explore how aspects of people's capabilities, opportunities and motivations relate to the extent of engagement with responsible research practices. To this end, we report a series of exploratory regression analyses to examine which factors are most strongly associated with open research practices. While these analyses are exploratory, we nonetheless used G*Power (Version: 3.9.1.6 Faul et al., 2007) to estimate sample sizes required for 90% power for a range of effect sizes, and include this information in a table in Appendix C. With our final sample size of [XXX] participants, we achieve 90% power to detect effect sizes of $d > .XX$ with alpha set at .05 for the regression analyses with up to 8 predictors.

Our approach to pre-processing the data has been heavily informed by the work on the Dutch National Survey by Gopalakrishka and colleagues (2021), but there are some notable exceptions. For example, because there are no subgroups in the present study (and all participants will answer all questions), data analysis will not involve any imputation or missingness analysis. Following Gopalakrishna et al., there are no item non-responses; participants are required to answer and continue with the next questions or to withdraw from the survey. Although this approach removes the possibility of missing values, one must acknowledge that such decisions may impact the quality of the collected data. For a majority of questions participants may respond N/A if the question does not apply to them. There may be various reasons for N/A responses, but whatever these reasons, an N/A indicates that this behaviour has not been performed.

For any responsible researcher practice questions where N/A is a viable answer, "not applicables" will be replaced by the lowest value 1 ("Never") (see e.g., Gopalakrishna et al., 2021). This implies that we interpret 'NA' on these items as "behaviour has not been performed" lumping possible reasons together. For COM-B explanatory factor questions, if

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an N/A response is selected, these values will be replaced by the midpoint value of the scale. This implies that we interpret 'NA' on these items as indicating that the respondent neither agrees nor disagrees with the statement. Responses to the question on academic roles of influence will be recoded as binary, where 0 = "no roles of influence", and 1 = "at least one role of influence".

If a survey is incomplete, either through technical error or through a participant withdrawing from the study, partial data will not be included in any subsequent analyses. Similarly, if participants show aberrant response patterns (e.g., the same ratings for all questions), or if the time taken to complete the survey is more than 60 minutes (which is approximately 4-5 times longer than it should take), those responses will be excluded from further analysis.

For descriptive analyses, for each research practice question (Qs 1-15) we will calculate the mean, standard deviation, 95% confidence intervals, and overall prevalence. Prevalence reflects the percentage of responses that are 5, 6, or 7 on the likert ratings scale (e.g., 73% engage in the practice of study preregistration). For first-contact with open research practices (Qs 16-19), we report the percentage of 'Yes' responses. For COM-B and additional explanatory questions (Qs 20-33) we report the mean scores, standard deviations, and 95% confidence intervals for each. For all descriptives we will also report means broken down by subsdiscipline, academic rank and gender. Second, we assess the relationships between the measures (Qs 1-33), generating a Pearson's correlation matrix between all scale variables. Previous work in this area (e.g, findings from Gopalakrishna et al., 2021, and Norris et al., 2022) has not reported full correlation matrices across research practices, and therefore, we don't have clear expectations as to whether we will see consistent correlations across practices, or whether we will see more variability in correlations, perhaps reflecting

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researchers taking a more buffet-style approach to open research, selecting particular RRP, but not others.

For regression analyses, independent variables are the 6 explanatory variables from the COM-B component of the survey (reflecting physical/psychological capability, physical/social opportunity, reflective/automatic motivation). Mean scores will be calculated for each participant for each of the 6 elements. All independent variables will be mean centred prior to analysis, and all multiple regression models contain a base set of background variables dummy coded for: subdiscipline, academic rank, gender, and research methodology. These background variables are entered simultaneously into the regression model, prior to the addition of explanatory variables or interactions.

All interaction models will also contain the separate variables that make up the interactions. We will also conduct further exploratory analyses to consider the effect of Country (UK, Ireland), University type (e.g., Russell Group, post-92 institution etc.), and institutional support (i.e., whether there are local/institutional open research leads).

Regression models will estimate the impact of each of the explanatory predictors individually in separate regression models, and then simultaneously as a single regression model for each of the dependent measures. Linear regression analyses will be performed on the primary dependent measure of Responsible Research Practice mean, with further binary logistic regressions examining participation in specific practices: preregistration, registered reports, and large-scale/multi-lab studies.

Results

<Results to be added following data collection>

Descriptives

Regression analyses

Discussion

<Discussion to be added following data collection>

Survey Data Limitations

We acknowledge that any survey tool brings with it some limitations and tradeoffs. This survey was implemented to allow responses to be anonymous, and we must acknowledge that such a choice may impact people's responses. On the one hand, anonymous responses prevent us from requesting further useful information (e.g., such as asking people to provide evidence of their engagement in various research practices). On the other hand, requiring people to provide their identities may lead to more socially desirable responding, for example by rating their level of engagement in open research practices as being much higher, since they know their responses are tied to their identity.

The impact of anonymous vs non-anonymous responding is an open empirical question – and an interesting metascientific one – but not one we can do justice to in the current study. However, evidence suggests that anonymous surveys tend to result in a lower level of social desirability than non-anonymous surveys (see Dodou & de Winter, 2014 for a meta-analysis of such effects). Furthermore, many studies also show that those who believe their behaviour is being monitored, or lacking privacy, moderate their behaviour in response to this belief (Bateson et al., 2006), and then conform to perceived norms rather than providing responses that reflect their own beliefs and behaviours (Kaminski & Witnov, 2014). On balance, we felt that the risk of socially-desirable responding was probably greater for non-anonymous responding, and so retaining anonymity for all participants was the preferred option for the current study.

Future Directions

This study provides a snapshot of engagement in responsible research practices in psychologists from the UK and Ireland, and considers some explanatory factors for

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researcher engagement in open research. This work provides several avenues for further research including: additional secondary analysis of the data collected (e.g., cross-country comparisons), use of the open materials and survey questions to conduct follow-up studies to track engagement over time or across different countries, or even to develop and test interventions based on the emergence of individual predictors of enhanced engagement. We hope that this work will contribute to developing a richer picture both in terms of level of uptake, and people's motivations for engaging in responsible research practices.

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Appendix A

Survey Structure and Questions

Note the headings for different subsections are not visible to survey respondents.

Part 1

Start, Participant Information & Informed Consent

(continue or decline if no consent)

Part 2

Demographics and research

Based in a HEI in the UK or Ireland (exit if answer = other)

Engage in research activities (8 hours per week minimum, including supervision - exit if not >8 hours per week)

Psychology subdiscipline (11 options)

Primary methodology used - quantitative, qualitative, mixed methods

Academic Rank

PhD student or junior researcher

Postdoctoral researcher,

Research Fellow / Senior Research Associate

Assistant Professor / Lecturer

Associate Professor, Senior Lecturer, Reader or Professor

None of the above

Gender (open question)

Part 3

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Research Practice Questions

Part 4

Explanatory Factor Questions - Capability, Opportunity, Motivation

Additional Questions e.g., institutional support

Any other comments

Part 5

Debrief, **Enter Draw** and End

Responsible Research Practices Survey Questions

Please rate on the 1-7 scale (or select N/A if not applicable) each of the following questions.

A rating of "1" indicates “Never”, while a rating of "7" indicates “Always”. For example, if you usually, but not always, do Practice A, you might select 5 or 6 on the scale, while if you have Never done Practice A, you would select 1.

Where reference is made to a public repository, we mean anywhere that a member of the public could access that information. This could include personal webpages, university repositories, as well as large-scale repositories like the Open Science Framework, Github, Zenodo, preprint servers (PsyArxiv, BioArxiv etc.) and many more.

Conflicts of Interest

1. I always disclose who funded my studies and all my relevant financial and non-financial interests in my publications

Materials And Data

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Shared Materials

2. I deposit my study materials and stimuli on a publicly accessible repository

Shared Data

3. I contribute, where appropriate, to making my research data findable, accessible, interoperable and reusable in accordance with the FAIR principle
4. I deposit the raw anonymised data, and processed data (used for reported analyses) on a publicly accessible repository OR, where data anonymization is not possible, I deposit my identifiable raw and processed data in a controlled archive that provides access to future researchers.

Shared Analysis and Code

5. I deposit analysis scripts, analysis code, or statistical output files on a publicly accessible repository
6. I deposit source code for any computational research (e.g., neural networks, machine learning, cognitive architectures etc.) on a publicly accessible repository

Preregistration and Registered Reports

Preregistration of Studies Prior to Collecting Data

7. I preregister my study hypotheses, and make them available on a publicly accessible repository (e.g., AsPredicted, OSF etc.,)
8. I preregister study designs/protocols, and make them accessible on a publicly accessible repository
9. I preregister analysis plans, and make them available on a publicly accessible repository
10. I preregister analysis code or scripts (e.g., R code, syntax files), and make them available on a publicly accessible repository

Registered Reports

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11. I submit manuscripts for publication as Registered Reports (i.e., where the manuscript is reviewed, and may receive in-principle acceptance, prior to data collection and analysis)

Dissemination and Review

Preprints

12. I make my academic manuscripts freely available prior to publication, for example via a preprint repository (e.g., PsyArXiv, BioArxiv, OSF Preprints etc.), personal webpage or other fully open online repository
13. I publish my work in open access journals
14. I sign my reviews when peer-reviewing manuscripts
15. I share slides from my research talks on a publicly available repository, or agree to have a research talk I've given made publicly available (e.g., via YouTube or other online platform)

First Contact with Open Research

16. Could you estimate the year that you first engaged with any of the open research practices described previously? Enter the year (e.g., 2017), or n/a.
17. I have preregistered at least one study, where I have been the principle or a lead researcher on the project (Yes/No)
18. I have submitted at least one registered report format article (Yes/No)
19. I have taken part in a large-scale or multi-site study (involving a replication or original research)

Capability, Opportunity, and Motivation, and General Attitude Questions

(where 1 indicates Strongly Disagree, and 7 indicates Strongly Agree)

Physical Capability

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20. I am physically capable of engaging in open research practices (e.g. I have sufficient physical stamina, I have sufficient physical skills)

Psychological Capability

21. I am equipped with the skills necessary to engage with open research practices
22. I have enough information and training on open research practices

Physical Opportunity

23. I have access to the appropriate research infrastructure to engage in open research practices (e.g., access to appropriate repositories, computing resources etc.)
24. I have enough time to implement open research practices in my work
25. I have sufficient financial support to engage in open research (E.g., to cover costs of video recordings, transcription/translation, data storage etc.)

Social Opportunity

26. Others in my wider research environment engage with and encourage the use of open research practices
27. There are adequate incentives from funders, institutions or other regulators to engage in open research
28. There is sufficient recognition of open research in promotion and recruitment criteria

Reflective Motivation

29. I am sufficiently motivated to engage with open research practices
30. I believe open research practices to be a positive thing
31. I consciously plan on working more with open research practices in the future

Automatic Motivation

32. I have developed the habit of engaging in open research practices as an everyday part of my research process

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33. When I think about my research, I automatically think about the open research elements as well

Institutional Support (Yes/No/Don't know)

34. Does your Department or University have an open research working group, or an open research institutional lead (e.g., affiliated with the UK Reproducibility Network or similar)?

Influential Roles (tick box)

35. We are interested in exploring the link between positions of influence and research practices. Have you held any of the following research-related roles in the last 5 years? Please select all that apply.

- a. Journal Editor / Associate Editor
- b. Grant Assessment Panel Member of a funding body
- c. Member of the board of a learned society
- d. Member of a government advisory panel
- e. Senior management of university in a research capacity
- f. Member of open research working group or wider network
- g. Other position of influence relating to research (free text)

Open Response Question

Do you have any additional comments to make regarding open research generally, or regarding benefits/challenges to engaging with open research practices? (open text box)

A draft Qualtrics survey is available here:

https://maynoothpsychology.qualtrics.com/jfe/form/SV_5p9kSzMrtuG3Ybk

Appendix B

Statistical Analysis Plan

First, to summarise the overall analytical approach, the analyses will start with basic descriptions of the data, followed by examination of relationships between variables, and more complex analyses concerning the relationships between engagement in open research practices and the explanatory factors that potentially impinge on engagement (e.g., capability, opportunity, motivation). We provide a detailed analysis plan below. Note that there is always the possibility that further analyses may be conducted in the future, or for this data to be combined with other datasets. In such cases, a clear separation will be made between results based on this data-analysis plan and results based on ideas that emerged later and were therefore potentially data-driven.

Pre-analysis

Our approach has been heavily informed by the work on the Dutch National Survey by Gopalakrishka and colleagues (2021), but there are some notable exceptions. For example, because there are no subgroups in the present study (and all participants will answer all questions), data analysis will not involve any imputation or missingness analysis. Following Gopalakrishka et al., there are no item non-responses; participants are required to answer and continue with the next questions or to withdraw from the survey. Although this approach removes the possibility of missing values, one must acknowledge that such decisions may impact the quality of the collected data. For a majority of questions participants may respond N/A if the question does not apply to them. There may be various reasons for N/A responses, but whatever these reasons, an N/A indicates that this behaviour has not been performed.

For any outcomes where N/A is a viable answer, “not applicables” will be replaced by the lowest value 1 (“Never”) (see e.g., Gopalakrishna et al., 2021). This implies that we interpret ‘NA’ on these items as “behaviour has not been performed” lumping possible

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reasons together. Responses to the question on academic roles of influence will be recoded as binary, where 0 = “no roles of influence”, and 1 = “at least one role of influence”.

If a survey is incomplete, either through technical error or through a participant withdrawing from the study, partial data will not be included in any subsequent analyses. Similarly, If participants show aberrant response patterns (e.g., the same ratings for all questions), or if the time taken to complete the survey is more than 60 minutes (which is approximately 4-5 times longer than it should take), those responses will be excluded from further analysis.

Details on Planned Analysis

General Details

1. On the Open Science Framework, a folder named “Data Analysis” will be created containing the original data file and any associated JASP analysis files, which include the results for all subsequent analyses.
2. The main analyses will be performed independently by two members of the research team, based on the principles laid out in the registered report analysis plan. Any inconsistencies between these analyses will be discussed and resolved, after arbitration by the core research team members, if needed.
3. For regressions, where we explore any 2-way or 3-way interactions between research practices and explanatory variables, if these models converge and do not yield standard errors > 100 times the corresponding regression coefficients, we will report their results.
4. The decisions on which independent variables will be included in the regression models will be described below. No automated variable selection techniques will be used.

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5. Deviations from the analysis plan as stipulated will be logged by the two analysts.
The same applies to decisions taken to reach consensus should the analysts reach different results.
6. All regression models (see D below) will contain a *base set* of 4 background variables coding for subdiscipline, academic rank, gender, and primary research methodology
7. Descriptive values will be calculated excluding any “not applicable responses”
8. For regression analyses, “not applicable responses” are recoded as “never” (a value of 1), as in Gopalakrishna et al. (2021).

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A. Descriptive statistics of the explanatory variable scales.

1. For each of the 6 explanatory variables scales, Mean scores and standard deviations for each explanatory variable are calculated (from responses to Qs 20-33)
2. We will also calculate the means and standard deviations for the explanatory variables broken down by subdiscipline, academic rank, gender, research methodology.

B. Overall descriptive statistics of outcomes.

1. Relative prevalences for scores for each responsible research practice (RRP) question (Qs1-15). Prevalence is calculated as the percentage of participants that scored 5, 6 or 7 among the participants that deemed the RRP at issue applicable.
2. Mean score and standard deviation for 15 RRP's overall.
3. Mean scores and standard deviations for each responsible research practice separately (Qs1-15)
4. Percentages who have engaged in specific practice (Q 17)
5. Percentages who have engaged in specific practice (Q 18)
6. Percentages who have engaged in specific practice (Q 19)
7. B2, broken down by subdiscipline and academic rank.

C. Descriptive statistics of the background variables.

1. Absolute counts and percentages of the 4 background factors: sub-disciplinary field (15 categories), academic rank (5 categories), gender (3 categories) and research methodology (3 categories)
2. Subdiscipline by rank (75 cells)

D. Multiple regression analyses for outcomes A5 – A8.

The table below specifies 44 regression analyses, 11 for the primary dependent variable (overall responsible research practice score), and 33 (3 x 11) for the dependent variables related to specific practices of preregistration, registered reports, and multilab collaborations. The Base Set of variables includes *subdiscipline*, *academic rank*, *gender*, and *research methodology*. Independent variables are mean-centred prior to regression analyses.

Dependent variables are:

1. RRP mean (B2), linear model. In the multiple linear regression analysis overall RRP mean is computed as the average score of the 15 RRP, with the not-applicable scores recoded to 1 (i.e., “never”)
2. Engagement in specific practices (B4), binary logistic model
3. Engagement in specific practices (B5), binary logistic model
4. Engagement in specific practices (B6), binary logistic model

Table of Planned Regressions

Regression Number	Independent Variables	Adjustment Variables	Additional Notes
1		Base set	Estimate effects of base set variables
2	Explanatory variable 1	base set	Estimate effects of explanatory variable 1

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3	Explanatory variable 2	base set	Estimate effects of explanatory variable
4	Explanatory variable 3	base set	Estimate effects of explanatory variable
5	Explanatory variable 4	base set	Estimate effects of explanatory variable
6	Explanatory variable 5	base set	Estimate effects of explanatory variable
7	Explanatory variable 6	base set	Estimate effects of explanatory variable
8	Explanatory variables 1-6	base set	Estimate effects of all explanatory variables simultaneously

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9	Institution Type * Rank	base set + separate variables that make up the interactions	learn if the effect of rank, if any, varies by type of institution (i.e., Russell Group, Post-92 etc.)
10	Institutional Support	base set + explanatory variables + separate variables that make up the interactions	Learn if the effect of explanatory variables varies by institutional support
11	Roles of Influence	base set + explanatory variables + separate variables that make up the interactions	Learn if the effect of explanatory variables varies by roles of influence

Note: Additional exploratory analyses may be conducted, and these will be noted as being unplanned prior to data collection.

**Appendix C
Power Analysis**

Although the analyses reported here are exploratory, in that we are not testing specific hypotheses, and nor are we looking for a smallest effect size of interest for any particular test, we have used G*Power (Fraunfelder et al., 2014) to estimate power/sample sizes for a range

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of possible effect sizes. The table below indicates the level of effect size detectable with varying sample sizes, with power of 90%, alpha set to 0.05, for regressions with up to 8 predictor variables. Effect sizes are rounded to 4 decimal places for f-squared values, and to three decimal places for Cohen's d values. These estimates do not take into account interactions between variables, and so power for any analysis of interaction effects will be weaker, resulting in noisier estimates of effect sizes.

Table 3 Caption: Estimated effect minimum sizes detectable with statistical power of 90% for a range of survey sample sizes for regression analyses with 8 predictor variables.

Total Sample size	Effect Size f-squared	Effect Size Cohen's d
100	0.2080	0.912
200	0.0998	0.632
300	0.0655	0.512
400	0.0487	0.444
500	0.0308	0.394
1000	0.0192	0.277
2000	0.0095	0.196
3000	0.0064	0.160
4000	0.0048	0.138
5000	0.0038	0.124