

APPRAISALS IN META-JOURNAL HOUR 16

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The paper: Prevalence of Questionable Research Practices, Research Misconducted and their Potential Explanatory Factor: A Survey among Academic Researchers in The Netherlands [1].

Why was this study conducted?

Research that is trustworthy and of the highest quality is an essential component of sound public policy. Transparency is important to gain trust in research, on top of conducting relevant, reproducible, ethically sound as well as high methodological quality research. However, trust in research is often jeopardised by researchers committing in research misconduct such as falsification and fabrication of data (FFs) and violations of ethical and methodological norms. Therefore, continuous efforts to encourage responsible research practices (RRPs) that include open science practices such as open data sharing, registration of study protocols, open access publication over questionable research practices (QRPs) are needed. Some of the examples of QRPs are not submitting valid negative results for publication, not reporting flaws in study design and selective citation to enhance own findings. Thus, The National Survey on Research Integrity (NSRI) aims to estimate:

- i. disciplinary field-specific prevalence of QRPs, FF and RRPs
- ii. associations between explanatory factors and QRPs, FF and RRPs

How was it done?

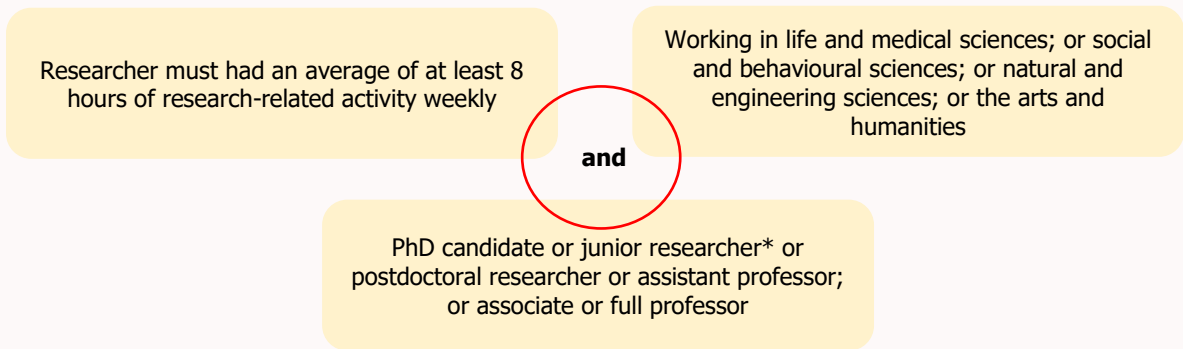
Ethics approval

The NSRI is approved by The Ethics Review Board of the School of Social and Behavioural Sciences of Tilburg University. The full NSRI questionnaire, its raw anonymized dataset, the complete data analysis plan, its source codes and version controls of the analysis (displayed in Github) can be found on the Open Science Framework [2].

Study design

This cross-sectional survey was conducted using a web-based anonymised questionnaire whereby academic researchers working at/or affiliated to at least one of 15 universities or 7 medical centres were invited to participate.

Selection criteria



*individual with a Masters or PhD degree doing a minimum of 8 hours per week of research related tasks under close supervision



YouTube

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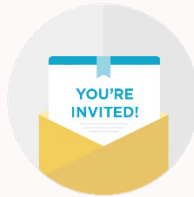
The survey was conducted by a trusted market research company, Kantar Public. Roles of the company includes:

- Send out survey invitations
- Email reminders to target groups
- Send anonymised dataset to research team at the end of data collection

Study activities



Universities and University Medical Centers supplied Kantar Public with the email addresses of their eligible researchers; or through publicly available resources for other institutions



First email invite was sent to:

- Obtain informed consent
- Inform NSRI's purpose and identity protection measures
- Link for the survey for those consented invitees



- The NSRI was open for 7 weeks whereby 3 reminder emails were sent to non-responders, at 1 to 2 weeks interval
- After data analysis plan had been finalized and preregistered on Open Science Framework, Kantar Public sent anonymized dataset containing individual responses

Survey instrument

Background questions

- Weekly average duration of research-related work
- One's dominant field of research
- Academic rank
- Gender
- Involvement in empirical research



Four components of questionnaire

- 11 Questionable Research Practices
- 11 Responsible Research Practices
- 2 Fabrication and Falsification
- 12 Explanatory Factor (75 questions)

Three-year timeframe was chosen to limit recall bias

All respondents received the same set of questions on QRPs, RRPPs and FFs

11 Questionable Research Practices (QRP)

- Adapted from a recent study from a recent study where 60% of the surveyed participants came from the biomedical disciplinary field, however, a series disciplinary field specific focus groups were conducted to ensure the 11 QRPs were applicable to multidisciplinary target group of participants in the study.
- All QRPs had 7-point Likert scales ranging from 1 to 7 where 1 = never and 7 = always (no intermediate linguistic labels were used) plus a "not applicable" (NA) answer option.

Very Unlikely	1	2	3	4	5	6	7	Very Likely
Not applicable								

2 Fabrication and Falsification

- Used the randomized response (RR) technique with only a yes or no answer option to obtain more honest answers.

Randomized Response	
In the last three years, I fabricated data in my research.	
<p><i>Clarification: Fabrication is making up data or results and recording or reporting them as real.</i></p> <p>1. Click on the 'start' button 2. The circle and triangle will start alternate 3. Click on the 'stop' button when you are ready to answer 4. Choose the symbol that represents your answer</p>	
1	Circle
2	Triangle
Randomized Response	
In the last three years, I falsified data in my research.	
<p><i>Clarification: Falsification refers to manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.</i></p> <p>1. Click on the 'start' button 2. The circle and triangle will start alternate 3. Click on the 'stop' button when you are ready to answer 4. Choose the symbol that represents your answer</p>	
1	Circle
2	Triangle

12 Explanatory Factor Scales (75 Questions)

- These scales were based on psychometrically tested scales most commonly used in the research integrity literature and focused on actionability.

	Scale	Scope
1.	Scientific norms*	Scientific ideals behavior of researchers may adhere or subscribe to
2.	Peer norms*	Perception of researchers' peers actual behavior towards research.
3.	Perceived work pressure	Burden on the current task/ job demand
4.	Publication pressure	Pressure to publish articles
5.	Pressure due to dependence on funding**	Related to securing grants, continuation of research, job security
6.	Survival mentoring (and survival)	Mentoring to survive in the field
7.	Responsible mentoring	Mentoring to ensure work are of higher quality, transparent and ethical
8.	Competitiveness of the research field*	Rivalry in own research field
9.	Distributional organizational justice*	Resource allocation, allocation of task, decisions on promotions and assessment by the management
10.	Procedural organizational justice*	Process of allocating task, resource, promotion and academic performance
11 & 12	Likelihood of QRP detection* by collaborators and reviewers	Collaborators: Defined as students, colleagues, or other academics with whom the researcher works together on one or more research projects. Reviewers: Defined as academic peers who in the context of publishing the work independently assess its quality.

*scales were piloted

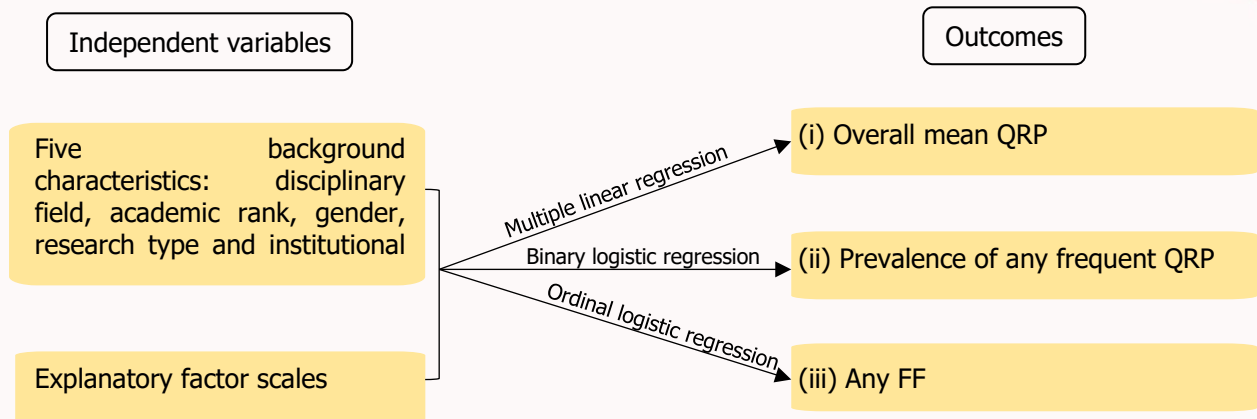
**not be piloted due to resource constraints but performed well in terms of psychometric properties (with a Cronbach's alpha of 0.76)

Refer to [S5 Table](#) for full list of the explanatory factor scales and their corresponding items

Missingness by Design

To optimize survey completion time, we employed a "missingness by design" approach. This involved assigning each survey participant to one of three randomly generated subsets, consisting of 50 explanatory factor items selected from a total pool of 75 (refer to [S5 Table](#)). The NSRI questionnaire's comprehensibility were pre-tested in cognitive interviews with 8 academics from different ranks and disciplines. Comments obtained from the interview includes improvement in layout such as the removal of an instruction video on the RR technique, clarity of the instructions and to focus on wording in the questionnaire by using different types of fonts. The full report of the cognitive interview can be accessed at the Open Science Framework [2].

Statistical analysis



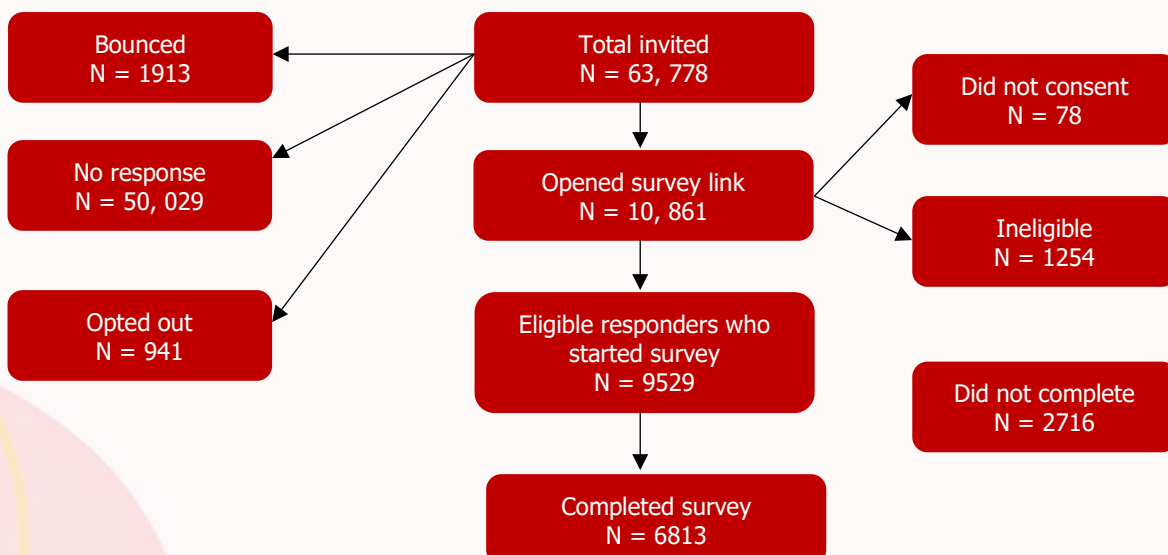
Analysis Strategies

- 1) **Scoring method:** Overall mean QRP score was averaged on the 11 QRPs, in which not applicable (NA) was recorded to 1. On the other hand, prevalence was calculated as the percentage of respondents who scored at least one QRP as 5, 6 or 7. At least one instance of falsification or fabrication was labelled as 'Any FF'.
- 2) **Multivariable analyses:** Multiple imputation with mice in R (version 4.0.3) was used to deal with the missingness by design generating fifty complete data sets. The regression models were fit to each of the 50 datasets, and the results combined into a single inference. All multivariable models contain the five background variables and the explanatory factor scale.

What was the findings?

Descriptive analysis

Out of 22 universities and University Medical Centers in the Netherlands, eight supported the NSRI. Figure below shows the flowchart of participation in the survey.



In terms of respondents' characteristics, majority of the participants are male (54.1%) with most of them being in the natural and engineering sciences fields (73.5%). Most female respondents' were in the social and behavioural sciences (51.5%). In terms of academic rank, female made up of less than 30% being the associate and full professors. Nearly 90% of the respondents in this survey engaged in empirical research. The characteristics of all respondents can be accessed from the supplementary [S1 table](#).

In addition, [Table 1](#) revealed that being postdocs and assistant professors reported highest scale scores for publication pressure (4.2), funding pressure (5.2) and competitiveness (3.7) as compared with other academic ranks. Researchers in the field of art humanities also showed the highest work pressure (4.8), publication pressure (4.1) and competitiveness (3.8) with the lowest score in mentoring for survival (3.6), peer norms (4.1) as well as organizational justice (3.9).

Prevalence of QRPs and research misconduct

[Table 2](#) shows the prevalence of QRPs and FFs. The five most prevalent QRPs (recorded the most Likert scale score of 5, 6 or 7) are:

- i. QRP 9: Not submitting or resubmit valid negative studies for publication (17.5%)
- ii. QRP 10: Insufficient inclusion of study flaws and limitations in publication (17.0%)
- iii. QRP 2: Insufficiently supervised or mentored junior co-workers (15.0%)
- iv. QRP 1: Insufficient attention to the equipment, skills or expertise (14.7%)
- v. QRP 7: Inadequate notes of research process (14.5%)

Less than 1% of the respondents reported that they had:

- i. QRP 6: Improper referencing of source (0.6%)
- ii. QRP 4: Unfairly reviewed manuscripts, grant applications or colleagues (0.8%)

In terms of academic rank, almost half of PhD candidates and junior researchers reported QRP 4: Unfairly reviewed manuscripts, grant applications or colleagues (48.75%). Across disciplines, those in life and medical sciences have the highest prevalence of any frequent QRP (55.3%) and highest prevalence estimate for any FF (10.4%) compared to the other disciplinary fields.

Regression analyses

[Table 3](#) reveals that across academic ranks, being a PhD candidate or a junior researcher is associated with a significantly higher odd of any frequent QRP (OR: 1.16). In terms of background, being non-male (female: -0.09; undisclosed: -0.18) and doing empirical research (OR: -0.15) were associated with lower overall QRP mean and any FF.

Logistic regression analysis indicates that as the publication pressure scale increases by one standard deviation, the odds of QRPs also increases by a factor of 1.22. On the other hand, the scales for scientific norms subscription, peer norms, and organizational justice have the opposite effect on these three explanatory factors. In other words, for each standard deviation increase on the scientific norms scale, the odds of frequent QRPs decrease by a factor of 0.88. Similarly, the odds decrease by factors of 0.91 for peer norms and 0.91 for organizational justice.

Ordinal regression analysis reveals that for each standard deviation increase on the scientific norms subscription scale or the perceived likelihood of detection by reviewers scale, the odds of any FF decrease by factors of 0.79 and 0.62, respectively ([Table 4](#)).

How much can we learn from this paper?

The NSRI was one of the largest surveys on research integrity conducted among academic researchers. This survey has not only investigated the prevalence of QRPs and FF but also a broad range of other potential explanatory factor. This comprehensive investigation encompasses all disciplinary fields and academic ranks, making it the most extensive study of its kind to date. In this survey, it was found that approximately half of the researchers engaged in at least one QRP over the last three years while one out of twelve participants admitted to falsifying or fabricated their research at least once. Generally, PhD candidates and junior researchers are more likely to engage in QRPs as compared to other academic ranks while postdocs and assistant professors expressed higher levels of publication pressure, funding pressure and competitiveness.

This survey was planned and conducted carefully with consideration of protecting respondents' identity to yield honest response. As such, the online survey was conducted by a third-party company with only anonymised data set sent to the research team upon completion of data collection. In addition, [randomised response technique](#) was also used to collect sensitive information while ensuring privacy and anonymity. By introducing this randomization element,

respondents' true responses are concealed among other random responses. This helps to protect their privacy and provides a level of plausible deniability, making it difficult to attribute a specific response to a particular individual. The collected data can then be analyzed using statistical techniques that account for the randomization process, allowing researchers to estimate the prevalence or distribution of sensitive behaviours or beliefs within a population without directly identifying individuals or compromising their privacy [3]. Data of the study also made available in support to the [Open Science](#) initiatives.

However, there are several limitations that can be addressed for improvements to plan or a similar larger study in another population. It is noted that the authors have conducted a series of disciplinary-field-specific focus group discussions (FGDs) to ensure the 11 QRPs questions were applicable to the multidisciplinary target group. However, the authors did not include or share whether there are any revision or modification to the 11 QRPs questions. Besides that, the authors should consider to elaborate more on the strategy of "missingness by design" especially on how 50 questions were randomly selected or whether a computed randomised system were used. In terms of analysis plan, recoding "not applicable" answers into "never" for the multiple linear regressions did not differentiate between not committing a behaviour because it is truly not applicable or intentionally refraining from doing so. Additionally, scale scores of 5, 6 or 7 indicated "any frequent QRP" could overestimate the prevalence of any frequent QRPs in the survey. Another potential limitation is misclassification of academic rank due to no years of experience collected, but only academic positions. Last but not least, the response rate is only 21.1% despite being a large study which may make one wonder whether the finding is representative of all academic researchers in Netherlands.

Reference

1. Gopalakrishna G, ter Riet G, Vink G, Stoop I, Wicherts JM, Bouter LM (2022). Prevalence of questionable research practices, research misconduct and their potential explanatory factors: A survey among academic researchers in The Netherlands. *PLoS ONE* 17(2): e0263023.
2. National Survey on Research Integrity on Open Science Framework [Internet] [cited 2021 July 20] Available from: <https://osf.io/ehx7q/>
3. Lensvelt-Mulders GJ, Hox JJ, Van der Heijden PGM, Maas CJ. Meta-analysis of randomized response research: thirty five years of validation. *Sociol Methods Res.* 2005; 33(3):319–48.