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# Research integrity guidelines and safeguards in Brazil

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**ABSTRACT**

Brazilian research output has been growing annually, and so have its domestic and international research collaborations. Accordingly, it is essential to harmonize research integrity guidance and regulations to ensure research quality. Therefore, this study aims to collect and analyze guidance documents on research integrity from Brazilian research performing organizations (RPO). Research integrity guidance documents, regulations, and policies were retrieved from 60 randomly selected universities in Brazil. The search was conducted via the universities' websites and confirmed by e-mail. The documents were analyzed based on inductive content analysis. Relevant documents from 20 RPOs were identified. 28% of the included institutions have developed their own guidelines or adopted some guidance document on research integrity. Best practices, misconduct and misbehaviors, principles, and institutional policies regarding sanctions differ between universities. The RPOs where research integrity guidance documents could be identified are concentrated mainly in the southeastern and southern areas. The number and distribution heterogeneity highlights the need to increase awareness and create regulatory documents on research integrity in Brazilian universities. Further Research Performing and Funding Organizations' initiatives are needed to foster research integrity in Brazil and harmonize it with international standards.

**KEYWORDS**

Research integrity; research ethics; research misconduct; Brazil; guidance on research integrity

## Introduction

Research integrity comprises professional, legal, and ethical responsibilities (Dinis-Oliveira 2020). To ensure the quality and robustness of research and maintain public trust in science, science must be guided by the principles of research integrity (RI). Best research practices have never been more imperative. In the face of a pandemic, such as that of covid-19, ensuring that research results are reliable is essential for a quick response to the crisis and maintenance of public trust. However, many papers related to the pandemic were retracted due to falsification, methodological concerns,

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Supplemental data for this article can be accessed on the publisher's website.

inappropriate interpretation of data and conclusions, as well as issues on conflict of interest and patient privacy (Dinis-Oliveira 2020; Retraction Watch 2021). In addition to the impact on public trust and misinformation, research misconduct and detrimental practices might entail economic, reputational, and personal costs (Stern et al. 2014; National Academies of Sciences and Medicine 2017).

Although misconduct cases have historically been treated as punctual and strongly determined by individual factors, the reality is more complex. Structural, cultural, situational, and organizational factors play an essential role along with individual factors when breaching research integrity (National Academies of Sciences, Engineering, and Medicine 2017). The lack of institutional policies focusing on scientific integrity, the pressure to publish quantity rapidly, and inadequate mentoring are some of the main motivations that may lead to misconduct (National Academies of Sciences, Engineering, and Medicine 2017; Davis, Riske-Morris, and Diaz 2007; Godecharle, Nemery, and Dierickx 2013).

Many countries have recognized the importance of raising awareness of research integrity and developing appropriate procedures for handling scientific misconduct. The US, for instance, introduced a regulatory authority for research integrity (US Office for Research Integrity-ORI) as early as 1992. European countries initiated an informal network, the European Network of Research Integrity Offices (ENRIO), to deal with research integrity issues. The ALLEA – All European Academies recognized the need for a common framework and initiated the European Code of Conduct for Research Integrity (ALLEA 2017). However, creating normative documents and institutions on a national level that explicitly addresses research integrity has not yet happened in most countries, including Brazil.

According to a report published by Clarivate Analytics in 2018 (Clarivate Analytics 2018), Brazil is the 13th largest producer of research publications globally, and its research output grows annually. Governmental bodies and research institutions have taken some measures by establishing institutional standards on research integrity or creating research integrity committees to safeguard and increase the quality of the Brazilian research output. However, Brazil's institutionalization of research integrity is still lagging compared to other countries. Therefore, this paper explores the role of research performing organizations (RPO) in promoting research integrity and preventing misconduct by publishing RI guidelines. This study aims to collect and analyze guidance documents related to research integrity at Brazilian RPOs.

## Methods

### Sample selection

Higher education in Brazil is structured into Universities, Colleges, University Centers, and Federal Institutes. For this study, only universities were considered since they must carry out research activities, according to the Brazilian regulation, and it is where most of the research is performed. According to the Higher Education census (BRASIL 2019), Brazil has 199 universities. We selected the universities in two steps to include a representative sample of universities. First, we included the top ten universities in Brazil, according to a national ranking (RUF 2019). For the remaining 189 universities, we performed a stratified sampling according to their rank. We divided the rank list into four groups, and 25% of universities from each group were randomly selected. In the end, 59 universities were included in the sample. In addition to the RPOs guidelines, we analyzed all national guidelines adopted by the selected universities. We screened the reference list of the guidelines and the citations to identify additional documents and RPOs.

### Documents search

We searched for official documents on research integrity, guidelines, or codes of conduct for best research practices, as well as documents addressing possible sanctions in cases of misconduct. We assessed the availability and accessibility of the documents.

We conducted the search process according to the following steps: Firstly, we manually screened the selected universities' websites. If the manual search did not yield tangible results, we searched on the website's search engine using a set of keywords and sorted the first five pages. The following keywords were used: "Integridade científica" (Scientific integrity); "Integridade pesquisa" (Research integrity), "Boa prática científica" (Good scientific practice), "Boa prática pesquisa" (Good research practice), "Má conduta científica" (Scientific misconduct), "Conduta responsável pesquisa" (Responsible conduct of research), "Ética científica" (Scientific ethics), and "Ética pesquisa"(Research ethics). When the keyword search did not generate results conforming to the eligibility criteria, we searched on Google using the same set of keywords and the institution's name. After this process, we contacted the universities by e-mail to confirm if the identified documents were the most up-to-date or if there was any document addressing the topic that was not found in the screening process. Additionally, we asked if there was an office or committee of research integrity at the institution.

### Eligibility criteria

We included only official documents focusing on research integrity or incorporating a specific section dedicated to it. We included documents that contained guidelines for best research practices, definitions and practices of misconduct, codes of conduct, and procedures and investigations of misconduct cases. We excluded the documents not widely adopted by the RPO (e.g., documents presented by a course or offered by a specific discipline). We also excluded documents where research integrity or research misconduct was not in the scope and documents unrelated to research (e.g., documents with codes of conduct for professionals, addressing teachers).

### Data analysis

This study is exploratory, and the selected documents were analyzed based on inductive content analysis, in which the themes and codes emerge from the data. Firstly, the first author carefully read the documents, and the observations regarding the content were discussed with the other author. Second, the themes (e.g., best practices examples, types of misconduct, principles) were extracted from the documents, organized, and coded. The third step involved grouping the data, reducing the number of categories, combining narrow headings into broader categories. We aggregated similar codes to enable the comparison of similarities and differences.

## Results

We could identify relevant documents from 20 RPOs (Supplementary 1). We retrieved the documents from the universities' websites, and some additional documents were collected in the confirmation phase by e-mail. One RPO guidance document was additionally identified through the reference list of other documents, and the institution (Fiocruz) was added to our sample, resulting in 60 RPOs. Seventeen RPOs provided RI guidance documents, and three RPOs provided only documents with potential sanctions, misconduct investigation procedures, or regulations of research integrity committees. The full coverage of the variables according to each university is available in the Open Science Framework (OSF) repository at https://osf.io/v8yu3/?view_only=7ae913b8b5cd48f0819648473221d511.

We retrieved relevant RI guidance documents from 17 RPOs (Figure 1). Ten RPOs have developed their own RI guidelines, and seven RPOs have officially adopted some guidelines on their websites. Among the adopted guidelines, two were developed by Brazilian research funding organizations (RFO). One was developed by a state RFO, The São Paulo Research Foundation – FAPESP, and the other by the national RFO, The Brazilian

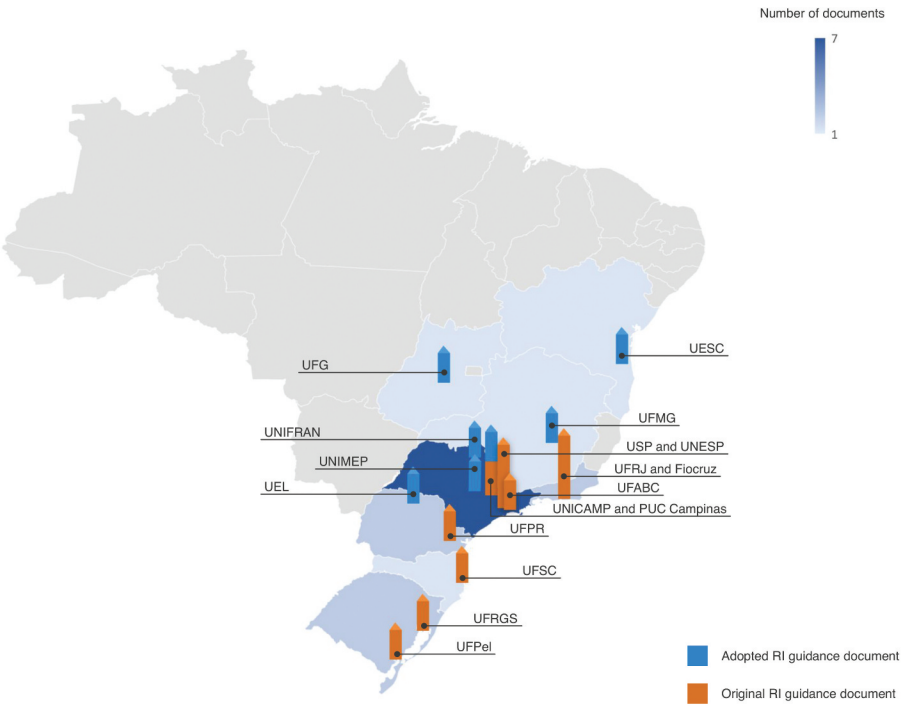


**Figure 1.** Map of the research performing organizations where research integrity guidance is available.

National Council for Scientific and Technological Development (CNPq). The Brazilian Academy of Sciences (ABC) and the Singapore Statement guidelines were the other used guidelines. We additionally assessed the three Brazilian guidelines adopted by the RPOs. The first version of all RI guidelines was implemented or approved after 2011, and in 2020, four new documents were issued. One ethics code, including research integrity in its scope, was published in 2009.

Most of the collected documents involve the following themes: (1) Principles of research integrity, (2) Best practices, (3) Misconduct and detrimental research practices, (4) Safeguards and responsibilities, (5) Handling scientific misconduct.

## *Principles*

Among the original guidance documents, ten documents explicitly identified principles of research integrity. Figure 2 presents the list of principles addressed in at least two documents. In addition to these principles, other 22 principles were mentioned in the analyzed documents (see Supplementary 2). There was an evident prevalence of the *Honesty* principle,

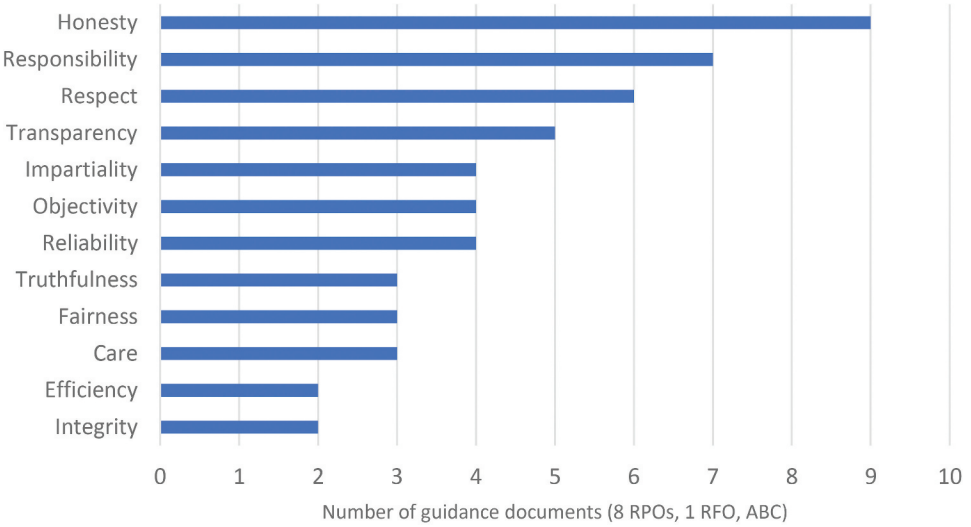


**Figure 2.** The number of documents addressing principles of research integrity.

found in 9 documents. The principles of *responsibility, respect, transparency, impartiality, objectivity*, and *reliability* were mentioned in more than four documents. In general, the principles were presented precisely, followed by instructions and examples (e.g., *Honesty* in the presentation, execution, and description of research methods and procedures and the interpretation of results). Other documents presented the principles followed by their definitions, allowing a broader interpretation (e.g. *Honesty*: act, condition, or situation of a clear and credible presentation of the activities of an individual or group of individuals produced under their responsibility to the academic community where it is situated, as well as the broader society). Three documents presented only a list of principles (e.g., *intellectual honesty, objectivity, impartiality, truthfulness, justice, and responsibility*).

## Best practices

Thirteen original guidance documents (10 RPOs, 2 RFOs, and one from the Brazilian Academy of Sciences-ABC) contained a set of norms to foster research integrity. The best practices by each institution are available in Supplementary 3. Figure 3 shows the number of institutions addressing each norm or theme of best practice. The guidance documents varied in detail and theme coverage. For instance, seven institutions mention best practices of *peer-review*. Some documents explored this theme concisely, with general instructions about peer-reviewing a paper or a grant proposal. While the theme was explored in detail in other documents, providing instructions related to conflict of interest, confidentiality, and plagiarism.

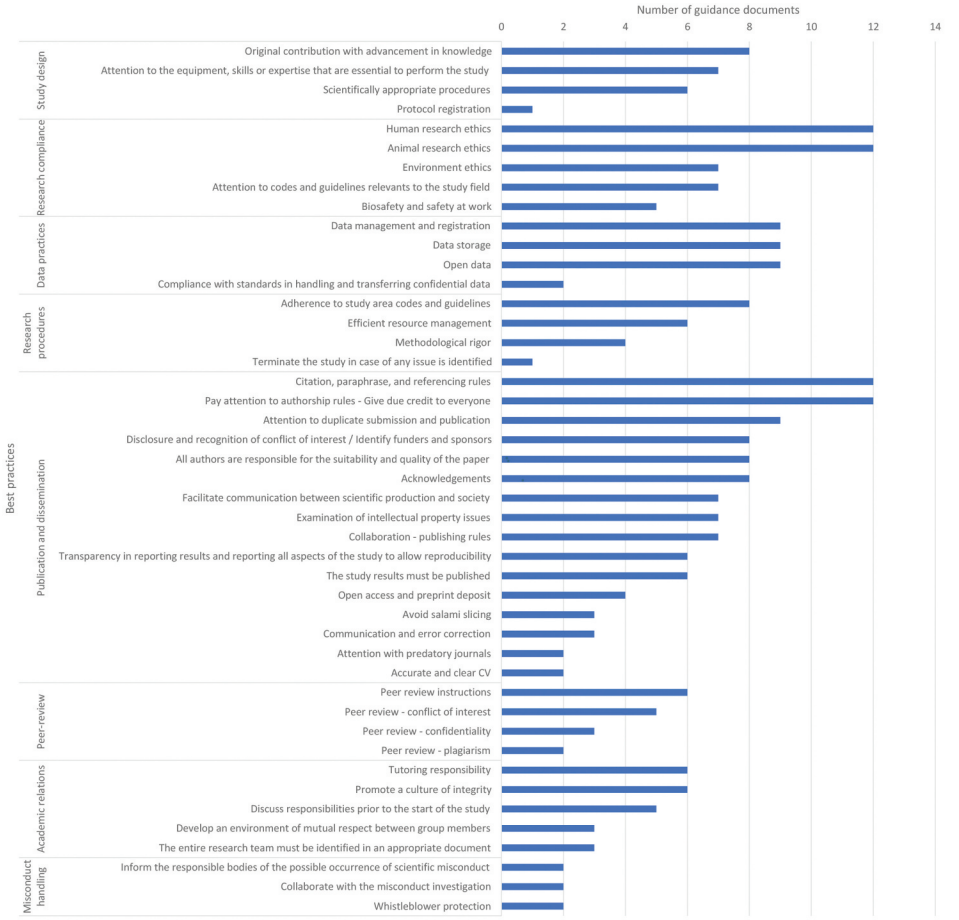


**Figure 3.** Best practices retrieved from the included guidance documents and the number of doscuments covering the practices.

We classified best research practices in the following themes: (1) Study design and proposal; (2) Research compliance; (3) Data practices; (4) Research procedures; (5) Publication and dissemination; (6) Peer-review; (7) Academic relations; and (8) Misconduct handling. Figure 3 shows that the most covered themes concern attention to the study design, human and animal ethics, data practices, citation and authorship rules, and conflict of interest. However, few guidelines explored peer review, academic relations, and best practices in misconduct cases.

## *Misconduct and detrimental research practices*

Fourteen documents from 13 institutions explicitly addressed scientific misconduct, and ten institutions explicitly defined scientific misconduct. Three different terms were used when defining scientific misconduct: “malpractices”,

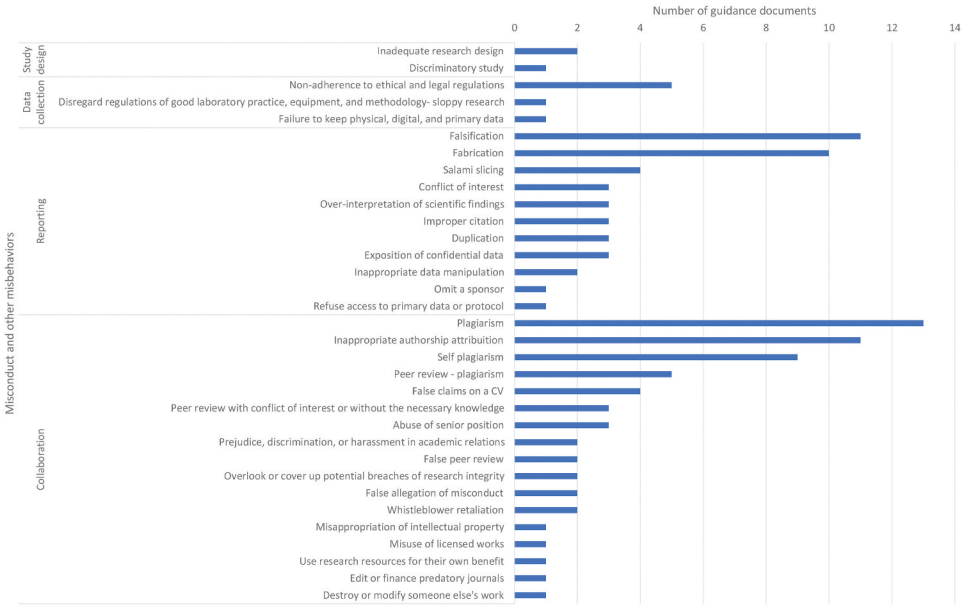


**Figure 4.** Misconduct and other misbehaviors retrieved the included guidance documents and the number of documents covering the topics.

"misconduct", and "fraud". The definitions mostly included various types of behavior and practices in addition to the traditional definition of fabrication, falsification, and plagiarism (FFP). The definitions were, in general, described as every practice, behavior, or conduct that disrespects the legal, institutional, and scientific regulations and violates the principles of integrity.

Three documents highlight that unwitting errors or opinion differences are not considered misconduct. Three documents also characterize as misconduct, negligence, omission, and inattention to best practices. Two documents associate the severity of misconduct with the intentionality and the extent of the consequences. One document associates the severity with the scientific record of the person involved.

We classified misconduct and other misbehaviors into four categories: (1) Study design; (2) Data collection; (3) Reporting; (4) Collaboration. Figure 4 shows the number of documents that included the malpractices as misconduct or misbehavior. The most frequently mentioned were plagiarism, found in 13 documents, falsification (11), inappropriate authorship practices (11), fabrication (10), and self-plagiarism (9).

## *Safeguards and responsibilities*

### *Research performing organizations*

Among the 60 RPOs, nine have established permanent institutional mechanisms, a research integrity office or committee assigned to deal with research

integrity issues. The first committee was created in 2013, and the two most recent in 2020. We could retrieve the statute and regulations from 7 committees. Most of the committees carry out their responsibility by:

- Implementing activities and programs to teach responsible conduct of research, promote research integrity, and prevent research misconduct;
- Preparing and publishing guiding documents related to best research practices;
- Providing technical assistance to the institution responding to allegations of research misconduct;
- Developing policies, procedures, and regulations related to the detection, investigation, and prevention of research misconduct.

In addition to the RPOs with permanent research integrity committees, one university has created an ad hoc commission of plagiarism and research misconduct to develop institutional guidance documents for investigating and sanctioning misconduct and creating educational material. Another university assigns responsibility for allegations of research misconduct to the ethics committee.

Moreover, some universities have explicitly stated their responsibilities in educating and promoting research integrity, maintaining adequate conditions for conducting research, preventing and managing misconduct.

### *Research funding organizations (RFO) and federal bodies*

We analyzed two RFO guidance documents. One document was developed by a state RFO, FAPESP, and the other by a national RFO, CNPq. In addition to these, we also analyzed the guidance document prepared by the Brazilian Academy of Sciences (ABC). The document prepared by FAPESP states that research institutions share with researchers the responsibility for preserving the integrity of scientific research. The funding agency requires institutions that benefit from its support to create bodies to promote a culture of RI among researchers and students and the prevention, investigation, and punishment of scientific misconduct that occurs in its scope. From its side, FAPESP is committed to promoting educational activities to disseminate RI values, consider institutional efforts for funding applications, conduct independent investigations on scientific misconduct allegations, and, when proven, apply punitive and corrective measures to its authors.

The Brazilian National Council for Scientific and Technological Development (CNPq) recommends two approaches: educational and preventive actions, promoting best practices and defining misbehavior, and actions to deter misconduct by investigating and sanctioning. The document also adds that research misconduct is a matter of interest to funding agencies,

ensuring that their resources are appropriately applied to people who can produce reliable advances in knowledge. The efforts should include identifying and discouraging detrimental research practices and encouraging integrity in producing and publishing research results.

The Brazilian Academy of Sciences states that the primary responsibility for investigating suspected misconduct lies with the institutions, which must have specific committees for this purpose. Additionally, the institutions must assure a comprehensive defense and confidentiality of the case until its complete investigation. The documents add that institutions should establish mechanisms for teaching, disseminating, and supervising best practices. It also states that funding agencies and publishers are responsible for ensuring best practices in the scientific environment.

## Handling scientific misconduct

### Investigations

Fifteen institutions (13 RPOs and 2 RFOs) have documents concerning investigations and sanctions in case of research misconduct. Where established, research integrity committees are involved in the procedures of investigation and sanctioning. Where there is no committee, the rectorate and pro-rectorate for research are responsible for the procedures. The documents varied substantially in detail. Some documents provide a detailed description of the investigation process, with flow charts. Other documents provide a brief description of handling misconduct. Four institutions explicitly state that anonymous allegations are welcome, while two institutions state that only identified complaints will be accepted. However, the importance of confidentiality during the process is mentioned in most of the documents.

### Sanctions

References to potential sanctions in case of misconduct were found in 15 documents. Eight documents (7 RPOs and the Brazilian Academy of Sciences) mention that some misbehaviors are liable to corrective or punitive action, but the potential sanctions are not described. However, four documents associate misconduct severity with the severity of the sanctions, and one document highlights that FFP and inappropriate authorship constitute severe misconduct.

Seven other documents (6 RPOs and one RFO) provide detailed information on sanctions. Of these, four documents are for students only or contain a specific section for students. In the case of students, sanctions may include a reprimand warning, suspension, course failure, dismissal, and revocation of the degree. The documents vary in details and possible sanctions, but they highlight that fraud and plagiarism are liable to punitive or corrective

sanctions. The other three documents deal with sanctions for all those involved in the case of misconduct. In addition to measures applied to students, other administrative sanctions may apply.

In the RFO documents, the potential measures include a reprimand letter to the authors, the temporary suspension for fund and scholarship applications, and the return of the resources granted to the authors. The RFO may also take contractual measures, such as canceling grants and scholarships for which the authors of scientific misconduct are beneficiaries or responsible. Corrective measures may also involve the requirement to correct records and research reports related to the misconduct case, notification of misconduct by affected persons or institutions.

Besides administrative sanctions, researchers can also face civil and criminal procedures. The violation of copyrights and related rights is subject to Article 184. of the current Brazilian Penal Code. The offender is also subject to the framing of the crime of ideological falsehood, provided in Article 299. of the Penal Code. Plagiarism is also liable to civil procedure. The person who plagiarizes may be liable for moral and material damages (Articles 944. and 927. of the Brazilian Civil Code).

## Discussion

In Brazil, the awareness of research integrity started at a slow pace until the development of its initiatives. The first Brazilian Meeting on Research Integrity Science and Publication (BRISPE) in 2010 was an important event that raised awareness and stimulated further discussion in Brazil. The first guideline on research integrity was developed by the funding agency FAPESP in 2011, which addresses the grantees of its funds in São Paulo. The guidelines were the first in its genre from a funding agency and have motivated new initiatives from different institutions and organizations. In the same year, The Brazilian National Council for Scientific and Technological Development (CNPq) published its first guidelines, targeting their grantees from all over the country. Four years later, the 4th World Conference on Integrity in Research was organized in Rio de Janeiro in 2015 and succeeded in bringing themes that have raised deep reflections and concerns to the scientific community in Brazil. However, most of the RPO guidance documents found by our study have only been launched in the past three years.

In 2018, the Bonn PRINTEGER Consensus Statement (Forsberg et al. 2018) provided guidance for RPOs on thirteen key issues. The key issues address education, mentoring, research and work environment, RI culture, and others. Our study investigated the available information through institutional documents on six key issues: 1. Increase transparency of misconduct cases, 2. Open up research, 3. Implement safe and effective whistle-blowing

channels, 4. Protect the alleged perpetrators, 5. Establish a research integrity committee and appointing an ombudsperson, and 6. Make explicit the applicable standards for RI.

In relation to information and standards on RI, the results show that only 28% of the included institutions have developed their own guidelines or adopted some document regarding research integrity. For the remaining institutions, 36% responded to our e-mail stating that they are currently working on a guideline or do not have any official guidance document on research integrity. No information was found for 20 universities (33%), even after repeated contacts by e-mail and reminder e-mails requesting clarification.

In addition, the universities having RI guidance documents are disproportionately distributed in the country, and they are primarily concentrated in the southeastern and southern regions. However, these universities are responsible for the largest majority of all citable scientific publications in Brazil, according to the Clarivate Analytics report (Clarivate Analytics 2018). Furthermore, approximately 40% of the RPOs that have developed or adopted RI guidelines are from the State of São Paulo. This result can be explained by the initiatives on RI by the state funding agency FAPESP. This finding demonstrates the important role of funding agencies in motivating the universities to foster and increase awareness of RI.

### *Best practices*

There is high heterogeneity in RFO and RPO guidelines related to best practices. The guidelines vary both in detail and in the covered themes. The year of the documents may have contributed to these differences, as the RI field has gained more relevance in the past years, and the changing research environment brings emerging issues from time to time. Although best practices documents cannot cover every possible ethical situation in research practice, it is important to cover at least the core aspects that can be applied across different scientific fields and research methods. The most prevalent themes, included in more than 90% of the guidelines, are related to the adherence to human and animal ethics regulations, the attention to authorship rules, and consideration of citation, paraphrasing, and referencing rules. Human and animal ethics are nationally regulated, and their referred committees must approve every research involving humans or animals. The regulations are extensive and cover different themes and research contexts for both biomedical and non-biomedical research. Although our study was mainly focused on RI, human and animal ethics were covered by most of the included guidelines. Some documents briefly mention the importance and obligation to follow the national guidelines, while others highlight some

important points such as informed consent, confidentiality, and vulnerable populations.

### Principles

*Honesty and responsibility* were the most frequently mentioned principles. This result is similar to Chinese university documents (Yi, Nemery, and Dierickx 2019). *Honesty* was also one of the most mentioned principles by European universities (Aubert Bonn, Godecharle, and Dierickx 2017). The principle is also present in the ALLEA Code (ALLEA 2017) and the book Fostering Integrity in Research (National Academies of Sciences, Engineering, and Medicine 2017), which were often cited by the Brazilian guidelines.

### Misconduct and detrimental research practices

There was a lack of consistency in the definition of misconduct between the documents. In addition to the elements of the widely accepted FFP, other misbehaviors such as inappropriate authorship and self-plagiarism were frequently defined as misconduct. In general, the documents defined misconduct as behaviors that violate the principles of integrity in research and that are in disagreement with legal norms and/or ethical requirements. A broader definition of misconduct can also be found in other international policies and guidelines (Resnik, Rasmussen, and Kissling 2015; Dal-Ré et al. 2020). A clear definition benefits the compatibility to international standards and ensures fairness in the procedures by setting predictability and transparency. However, the strict definition can also diminish the importance of other behaviors that affect the integrity of the research.

### Safeguards, sanctions, and investigations

The available information regarding investigations and sanctions widely varies between the assessed RPOs. The heterogeneity is due, among other reasons, to the lack of formal mechanisms to deal with research misconduct cases. For example, only 15% of the RPOs have established an RI committee. In the absence of committees established at the national level, as the examples from Denmark, with the Danish Committee on Research Misconduct (DCRM), or in the Netherlands, with Netherlands Board on Research Integrity, this responsibility lies on research institutions and institution-based committees. However, we found that even where there is a specific committee on research integrity, most of those do not have clear and publicly available information on procedures of investigations and modes of sanctions. This gap in the information available about how misconduct

allegations are handled and addressed can affect the process's transparency and opens too much space for negotiation.

Furthermore, standardized procedures could also support the trust of the research community. However, the lack of standard procedures does not seem to be a peculiarity of Brazil, and it has been explored by several studies assessing institutional research misconduct reports (Grey et al. 2019; Gunsalus, Marcus, and Oransky 2018). The studies raise concerns on the preparedness and ability of institutions to handle misconduct cases objectively. One reason for concern is that cases of misconduct can affect institutions' reputations. Furthermore, the fact that they are responsible for the investigations can affect the objectivity and transparency of the process. Therefore, it is crucial to establish reasonable standards and criteria for misconduct investigations and potential outcomes to enhance transparency and impartiality, reassuring the role of institutions in protecting research integrity.

### Limitations

We cannot exclude the possibility that some existing documents have not been identified in our study. Although we have contacted the selected RPOs for confirmation and feedback, more than one-third of them have not responded even after repeated reminder e-mails. Furthermore, although we have included RFOs documents and guidelines, they have not been part of our search strategy. Therefore, we cannot exclude the possibility that an RFOs document was not identified in our study. Nonetheless, we are confident that our search strategy has led to the inclusion of all relevant documents.

### Practical implications

International collaboration in scientific publishing has undergone a steady and exponential growth in Brazil over the last decade. This growth not only refers to the number of collaborations but also to their quality, as Brazilian researchers have collaborated with prominent research topics (McManus et al. 2020). In response to this changing geography of scientific collaborations, it would be essential to harmonize research ethics and integrity standards to assure research quality.

In 2015, Vasconcelos and colleagues reported the beginning of research integrity initiatives in Brazil (Vasconcelos et al. 2015). The authors highlighted the pioneering actions of funding agencies, such as FAPESP and CNPq, and some educational initiatives on courses addressing research integrity by RPOs. At that time, the authors called for the need for universities to engage and develop institutional-based initiatives and policies.

However, how much has changed since then? Our results show that although the most prolific RPOs have begun to develop policies and safeguards on research integrity, the number and geographic distribution of RPOs have still proved to be very incipient, even when compared to other emerging countries (Yi, Nemery, and Dierickx 2019). Very few institutions have clear guidelines and policies on research integrity and misconduct, and even fewer have established a committee of research integrity.

The absence of RI guidelines and policies at the RPOs does not mean that there are no other educational approaches to address research integrity issues or that the research is not conducted with integrity. Conversely, making clear RI guidelines available on the institutional website does not mean that the information reaches all the target groups. However, the investigation of other educational resources and their effectiveness in the adherence to RI standards are out of the scope of our study. Nevertheless, evidence has supported the relationship between the lack of research integrity policies and the likelihood of scientific misconduct (Fanelli, Costas, and Larivière 2015).

Institutionalizing RI education and policies can be challenging in low and middle-income countries. Therefore, it is necessary to coordinate initiatives from different stakeholders to foster research excellence in Brazil. On the part of the RFOs, several initiatives have proven effective in fostering RI. One example is the European Union's funding programs, which has been committed to ensuring RI in projects financed by it. The latest funding program, Horizon Europe, will require participating institutions to have clear plans for promoting RI and applicants' commitment to the European Code of Conduct for Research Integrity. In the case of RPOs, it is necessary to develop clear RI policies and develop a plan for implementing and evaluating the policies and handling RI breaches. The national bodies for funding, promotion, and regulation of research and graduate programs in Brazil, such as CNPq and CAPES, could be key players in coordinating the actions for fostering RI.

Furthermore, the themes and content of RI guidelines and policies for research misconduct should comply with international standards and transcend institutional boundaries. This harmonization will ensure reliability and fairness in research collaborations (Vasconcelos et al. 2012). However, as highlighted by Desmond and Dierickx (2021), harmonization does not mean uniformity. Core values, best practices, and research misconduct definition must be harmonized, but other additional practices can be subject to different institutional regulations.

## Conclusion

Our study shows that only a few Brazilian RPOs have clear guidelines and policies on research integrity. There are even fewer RPOs with clear information available on how allegations of misconduct are handled and addressed. The

lack of clear procedures affects the transparency of the process and fairness in the case of collaborations. In addition, the results demonstrate that funding agencies have an important motivating role for RPOs in adopting or creating RI initiatives. Further RPOs and RFOs initiatives are needed to foster research integrity in Brazil and harmonize it with international standards.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Data availability statement

The dataset supporting the results and conclusions of this article is available in the Open Science Framework (OSF) repository at https://osf.io/v8yu3/?view_only=7ae913b8b5cd48f0819648473221d511

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## References

ALLEA. 2017. *The European Code of Conduct for Research Integrity*. Revised ed. Berlin. http://www.allea.org/wp-content/uploads/2017/04/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf

Aubert Bonn, N., S. Godecharle, and K. Dierickx. 2017. "European Universities' Guidance on Research Integrity and Misconduct." *Journal of Empirical Research on Human Research Ethics: JERHRE* 12 (1): 33–44. doi:10.1177/1556264616688980.

BRASIL. 2019. *Censo da Educação Superior*.

Clarivate Analytics. 2018. "Research in Brazil: A Report for CAPES by Clarivate Analytics."

Dal-Ré, R., L. M. Bouter, P. Cuijpers, C. Gluud, and S. Holm. 2020. "Should Research Misconduct Be Criminalized?" *Research Ethics* 16 (1–2): 1–12. doi:10.1177/1747016119898400.

Davis, M. S., M. Riske-Morris, and S. R. Diaz. 2007. "Causal Factors Implicated in Research Misconduct: Evidence from ORI Case Files." *Science and Engineering Ethics* 13 (4): 395–414. doi:10.1007/s11948-007-9045-2.

Desmond, H., and K. Dierickx. 2021. "Research Integrity Codes of Conduct in Europe: Understanding the Divergences." *Bioethics* 35 (5): 414–428. doi:10.1111/bioe.12851.

Dinis-Oliveira, R. J. 2020. "COVID-19 Research: Pandemic versus "Paperdemic", Integrity, Values and Risks of the "Speed Science." *Forensic Sciences Research* 5 (2): 174–187. doi:10.1080/20961790.2020.1767754.

Fanelli, D., R. Costas, and V. Larivière. 2015. "Misconduct Policies, Academic Culture and Career Stage, Not Gender or Pressures to Publish, Affect Scientific Integrity." *PLoS One* 10: 6. doi:10.1371/journal.pone.0127556.

Forsberg, E.-M., F. O. Anthun, S. Bailey, G. Birchley, H. Bout, C. Casonato, G. G. Fuster, et al. 2018."Working with Research Integrity—Guidance for Research Performing

Organisations: The Bonn PRINTEGER Statement." *Science and Engineering Ethics* 24 (4): 1023–1034. doi:10.1007/s11948-018-0034-4.

Godecharle, S., B. Nemery, and K. Dierickx. 2013. "Guidance on Research Integrity: No Union in Europe." *The Lancet* 381 (9872): 1097–1098. doi:10.1016/S0140-6736(13)60759-X.

Grey, A., M. Bolland, G. Gamble, and A. Avenell. 2019. "Quality of Reports of Investigations of Research Integrity by Academic Institutions." *Research Integrity and Peer Review* 4 (1): 3. doi:10.1186/s41073-019-0062-x.

Gunsalus, C. K., A. R. Marcus, and I. Oransky. 2018. "Institutional Research Misconduct Reports Need More Credibility." *JAMA* 319 (13): 1315–1316. doi:10.1001/jama.2018.0358.

McManus, C., A. A. B. Neves, A. Q. Maranhão, A. G. Souza Filho, and J. M. Santana. 2020. "International Collaboration in Brazilian Science: Financing and Impact." *Scientometrics* 125 (3): 2745–2772. doi:10.1007/s11192-020-03728-7.

National Academies of Sciences, Engineering, and Medicine. 2017. Fostering Integrity in Research. Washington, DC: The National Academies Press.

Resnik, D. B., L. M. Rasmussen, and G. E. Kissling. 2015. "An International Study of Research Misconduct Policies." *Accountability in Research* 22 (5): 249–266. doi:10.1080/08989621.2014.958218.

Retraction Watch. 2021. "Retracted Coronavirus (COVID-19) Papers." Accessed 1 March 2021. https://retractionwatch.com/retracted-coronavirus-covid-19-papers/

Stern, A. M., A. Casadevall, R. G. Steen, and F. C. Fang. 2014. "Financial Costs and Personal Consequences of Research Misconduct Resulting in Retracted Publications." *Elife* 3: e02956. doi:10.7554/eLife.02956.

Vasconcelos, S. M., N. H. Steneck, M. Anderson, H. Masuda, M. Palacios, J. C. Pinto, and M. M. Sorenson. 2012. "The New Geography of Scientific Collaborations. Changing Patterns in the Geography of Science Pose Ethical Challenges for Collaborations between Established and Emerging Scientific Powers." *EMBO Reports* 13 (5): 404–407. doi:10.1038/embor.2012.51.

Vasconcelos, S. M. R., M. M. Sorenson, E. H. Watanabe, D. Foguel, and M. Palácios. 2015. "Brazilian Science and Research Integrity: Where are We? What Next?." *Anais da Academia Brasileira de Ciencias* 87 (2): 1259–1269. doi:10.1590/0001-3765201520150165.

Yi, N., B. Nemery, and K. Dierickx. 2019. "How Do Chinese Universities Address Research Integrity and Misconduct? A Review of University Documents." *Developing World Bioethics* 19 (2): 64–75. doi:10.1111/dewb.12231.