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# Scientific Misconduct and Research Integrity in Human Research

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# Scientific Misconduct and Research Integrity in Human Research

Dissertação de candidatura ao grau de Mestre em Medicina, submetida ao Instituto de Ciências Biomédicas Abel Salazar – Universidade do Porto


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Porto, 05 de junho de 2020

Ao meu avô materno (*in memoriam*),

que sempre acreditou neste sonho.

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**RESUMO**

**Introdução e Objetivos:** A integridade é um princípio fundamental na investigação científica. O não cumprimento dos princípios de integridade, transparência e ética no decurso de uma investigação definem comportamentos de más práticas científicas. Apesar da existência de códigos de ética e de boas práticas em investigação, comportamentos científicos questionáveis e fraudulentos constituem hoje em dia um sério problema. Em Portugal, a informação disponível sobre este assunto é escassa. Nesse contexto, este estudo foi realizado com o objetivo de obter uma visão geral sobre más práticas em investigação em cinco instituições públicas com atividades de investigação na área biomédica.

**Material e Métodos:** Para a recolha de dados foi adaptado e aplicado um questionário anónimo *online,* dirigido a investigadores na área da saúde e ciências da vida. Questões sobre más (ou questionáveis) práticas em investigação, praticadas por si e observadas noutros investigadores, potenciais razões porque acontecem e repercussões nas práticas científicas de estudantes e futuros investigadores constituíram o questionário.

**Resultados e Conclusões:** O questionário foi preenchido por 236 participantes (77% do sexo feminino). As práticas científicas mais frequentemente auto referidas e observadas noutros investigadores foram, a citação sem consulta da fonte primária (64%) e inclusão de autores (ou investigadores) num artigo (ou numa equipa de investigação) de forma indevida. Embora a fraude científica (falsificação, a fabricação e o plágio) ter sido considerada por 96% dos inquiridos, como muito grave ou grave, 34% admitiram ter falsificado, fabricado ou plagiado pela menos uma vez e 79% observaram alguma dessas práticas noutros investigadores. Os motivos mais frequentemente apontados para a má conduta em investigação foram os recursos humanos e /ou materiais insuficientes e pressão para publicar. Mais de 90% dos inquiridos considerou que as más práticas em investigação se repercutem nas atitudes futuras dos estudantes relativamente à ciência e investigação e que a formação em integridade científica pode ter um impacto positivo no seu percurso científico. Este estudo contribui para uma melhor perceção das más práticas de investigação mais frequentes, permitindo uma melhor avaliação do problema e possibilitando a implementação de medidas preventivas.

**ABREVIATURAS**

CHUP: Centro Hospitalar e Universitário do Porto

ESS-P.Porto: School of Health

FFP: falsification, fabrication and plagiarism

ICBAS: Institute of Biomedical Sciences Abel Salazar

IQR: interquartile range

ORI: Office of Research Integrity

QRPs: questionable research practices

SB-UCP: School of Biotechnology of Catholic University of Portugal

UP: University of Porto

USA: United States of America

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O artigo original foi redigido de acordo com as normas da revista *Science and Engineering Ethics* para a formatação de manuscritos. As mesmas podem ser consultadas no site da revista, através do URL https://www.springer.com/journal/11948/submission-guidelines, acedido pela última vez a 03 de junho de 2020.

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# SCIENTIFIC MISCONDUCT AND RESEARCH INTEGRITY IN HUMAN RESEARCH

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**ABSTRACT**

Integrity in research is an essential attribute of human research. Scientific (research) misconduct happens when standards of integrity, transparency and ethics are disregarded. Despite the existence of codes of ethics and research responsible practices, research misconduct remains a serious problem. Little is known about these topics in Portugal. This study aimed to get an overview and the perceptions of research misbehavior of five public institutions with research in the biomedical field.

An anonymous online survey was developed and distributed to health and life sciences researchers. They were asked about research misconduct and questionable research practices performed by themselves and others, about the potential causes for research misbehaviors and their impact on scientific practices of students and researchers. The questionnaire was completed by 236 responders (77% female). The most frequently self-reported behaviors were citing without reading the primary source (64%) and including authors (or researchers) to a paper (or to a research team) not qualified for authorship (or research team) (51%). These were also the most observed misbehaviors in other researchers. Although data falsification, fabrication and plagiarism were classified as serious/very serious by 96% of responders, 34% admitted having falsified, fabricated or plagiarized at least once, and 79% observed any of these misconducts in others. The most reported motive for research misbehavior was insufficient human and/or material resources and pressure to publish. This study contributes to a better understanding of the extent of research misconduct, allowing for a better evaluation of the problem and making possible to implement preventive measures.

**Key words:** Research integrity; research misconduct; questionable research practices; research misbehavior

Declarations

**Funding**: Not applicable

**Conflicts of interest/Competing interests**: Not applicable

**Ethics approval**: the study was approved by two Ethical Committees (Centro Hospitalar Universitário do Porto and School of Health (ESS-P.Porto)), and by the Institutional Review Boards at all five participating institutions

**Consent to participate**: Implied consent text provided as part of an anonymous survey. Participants that completed the survey and clicked submit, consented to participate in the study.

**Consent for publication** (include appropriate statements) Not applicable. The manuscript does not contain individual person's data in any form.

**Availability of data and material** (data transparency): The datasets generated during and/or analysed during the current study are not publicly available because we don't have approval to do so from the five Institutional Review Boards and from respondents who agreed to participate in the study. However, they are available from the corresponding author on reasonable request.

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## INTRODUCTION

Integrity in research is essential to the development of credible, effective and safe human research. A recent report says that research integrity is about "the performance of research to the highest standards of professionalism and rigor, in an ethically robust manner"(Maura Hiney, 2015).

Scientific (research) misconduct happens when these standards of integrity, transparency and ethics are neglected or disregarded (Maura Hiney, 2015; Hermerén, 2017). Research misconduct is not a new phenomenon, but it has acquired greater visibility in recent years. The study of research behavior gained more and more prominence over the last 25 years, and research misconduct has emerged as a critical topic with scientific, political and public attention worldwide (Aubert Bonn et al., 2017; Artino et al., 2019; ORI, 2016)

There is no globally accepted definition of research misconduct, and definitions vary by institution (Resnik et al., 2015; Sabir et al., 2015). However, some consensus have been developed in the last years, and research misbehaviors are now typically divided into two categories: deliberate scientific misconduct, commonly defined as falsification, fabrication, and plagiarism (FFP), and detrimental or questionable research practices (QRPs) (Artino et al., 2019; Steneck, 2006; L. M. Bouter et al., 2016). Although, FFP are major research misbehaviors and clearly unethical, several other minor research misbehaviors are far more prevalent and therefore deserve greater attention (Shaw, 2019; Resnik et al., 2017; Steneck, 2006; L. M. Bouter et al., 2016). Execution of research projects without proper planning, inappropriate statistical analysis, suppression of negative findings, inappropriate citation for non-scientific reasons, multiple submissions and trivial publications, unethical authorships (honorary and ghost authorship), and failing to disclose conflict of interests, are a few examples of minor research misbehaviors, usually called QRPs, which can be more detrimental than FFP. Actually, all of these practices violate good research practice and research integrity and their frequency of occurrence is much higher. (Yi et al., 2019a; L. M. Bouter et al., 2016; Steneck, 2006; Kumar, 2008; Roberts and St John, 2014; Resnik et al., 2017; Resnik and Shamoo, 2017; Pedersen, 2014).

Scientific research should be conducted based on rigorous methodological approaches during planning, conduction, analysis, documentation and publication of the studies (Pedersen, 2014; Handley, 2016; Stavale et al., 2019; ORI, 2016). However, these principles are not always followed, thus possibly hindering scientific progress throughout the world (P. I. Okonta and Rossouw, 2014; Felaefel et al., 2018; Yi et al., 2019b). Investigations based on unreliable findings and unethical research leads to untrustworthy conclusions and compromises the advances of scientific knowledge. Beyond the negative impact at scientific level, research misbehaviors can also have significant social and economic impacts, particularly with regard to the wasting of time and funding, and to unnecessary and potentially harmful exposure to wrong medical decisions. (Stavale et al., 2019) The creation of the Office of Research Integrity (ORI) in the United States of America (USA), the development of codes of conduct for the integrity of scientific research and the rules for publishing scientific articles have been some of the efforts to fight and reduce detrimental scientific practices (Hermerén, 2017; ORI, 2016; The World Conferences on Research Integrity, 2020). Nevertheless, significant frequencies of research misconduct practices have been reported by researchers (Fanelli, 2009; Artino et al., 2019).

The topics of scientific misconduct and research integrity are transversal to all areas and are particularly relevant in health and life sciences. Some studies have reported that research misbehavior occurs to a substantial degree in biomedical research (Yi et al., 2019b; Kumar, 2008). Studies performed by medical and clinical investigators reported higher percentages of misconduct than research in other fields, including biomedical field (Fanelli, 2009), which is even more worrying (Yi et al., 2019b). A recent Malaysian study also revealed the significantly higher prevalence of academic research misconduct among healthcare academics compared to their non-healthcare counterparts (Tiong et al., 2018).

Despite a significant amount of literature on scientific misconduct and research integrity worldwide, data regarding these topics in Portugal is scarce. And although the teaching of health professionals focuses on clinical practice, it is important to understand the perception and research practices in some scientific communities linked to the teaching of medicine and other areas of health and life sciences. These practices will familiarize and conditionate students' attitudes towards science and scientific research. We aimed to get an overview and the perceptions of research misbehavior of five Portuguese public institutions with research in the biomedical field. Thus, the purposes of this study were: a) to obtain estimates of the frequency of self-reported and observed research misconduct and QRPs; b) to obtain information on the seriousness attributed to these practices; c) to explore the potential causes for research misbehaviors; and d) to understand the impact that training on scientific misconduct and research integrity could have on scientific practices of students and researchers.

## MATERIAL AND METHODS

This observational cross-sectional multicenter study was conducted in five institutions in Porto (Portugal) with biomedical research activity and it was addressed to life sciences and medicine researchers. These five institutions were: Institute of Biomedical Sciences Abel Salazar (ICBAS), a medical school from the university of Porto (UP); Centro Hospitalar Universitário do Porto (CHUP), a teaching university hospital; Institute of Public Health of the University of Porto (ISPUP), a research and training institution of UP; School of Biotechnology of Catholic University of Portugal (SB-UCP), a higher school and research center focused on bioengineering, microbiology and nutritional sciences; and the School of Health (ESS-P.Porto), a higher education school in the area of healthcare technologies. The target population consisted of: 1) master and doctoral students; 2) individuals with masters and doctoral degrees and post-doctoral students; 3) graduated individuals working in research positions (e.g., research assistants and technicians~~);~~
4) academic faculty; 6) health professionals with biomedical research activities.

Based on a previous study, (Silva et al., 2014), from our group, an online survey was developed using google forms (https://www.google.com/forms/about/) and tested on 10 researchers to evaluate the comprehensibility of the items (pilot study). In this pilot phase, participants were informed about the purpose of the study, and completed the digital survey in the absence of the authors.

After considering their doubts and suggestions, the survey was optimized and divided into four parts (Additional file): 1) sociodemographic characteristics; 2) identification of scientific misconduct and QRPs (self-admitted and knowledge of misbehavior by others) and severity attributed to different situations; 3) main reasons for research misconduct; and 4) repercussions on students of misconduct and QRPs.

In part 2), participants were asked about scientific misconduct and QRPs at different levels (planning and execution of the research proposals, data analysis and results interpretation, manuscript writing, research team definition, manuscript authorship and manuscript publication). Participants were asked about this misconduct and QRPs regarding themselves ("never, "occasionally" or "frequently") and regarding other investigators they knew (yes/no); they were also requested to classify the seriousness attributed to each of the questionable or bad practices using a 4-point Likert scale (0 – "not serious", 1 - "slightly serious", 2 - "serious", 3 - "very serious").

In part 3), participants were asked about the reasons for their own scientific research misconduct and QRPs and those of others, and the importance attributed to each one.

Prior to beginning data collection, the study was approved by two Ethical Committees and by the Institutional Review Boards at all five participating institutions. Then, an invitational email was sent to institutional email addresses in December 2019, followed by a reminder in January 2020. To protect the identity of potential respondents, the emails were sent by each institution and not by the study authors. The email included information about the authors and purpose of the study, and a link to the online questionnaire available on the website of Google Forms. At the start of the survey, it was guaranteed that questionnaire was anonymous and that data would not be presented separately by institution. Participants gave their consent to participating by clicking further.

**Statistical analysis**

Descriptive statistics were used to characterize the study sample and estimate absolute frequencies of the different response options. The Kolmogorov-Smirnov test was applied to test the distribution of the variables, and continuous variables were expressed as medians and 25th-75th quartiles (IQR, interquartile range) due to non-Normal distribution. Categorical variables were presented as frequencies and percentages.

Mann Whitney U test was used to examine the scores differences between gender and Spearman's correlation analysis was used to identify the correlation between age and time involvement in research activities with the seriousness scores attributed to each research behavior. Statistical software (SPSS version 26, IBM, USA) was used for analysis. A p-value $<0.05$ was considered to be statistically significant.

## RESULTS

### Sample characterization

The study sample consisted of 236 responders who answered to the mailed survey. The demographic characteristics and professional background information of the participants are shown in Table 1. Ages ranged 22 to 76 years, with a median age of 36 years (IQR: 30-49). The median time of professional activity was 12.5 years (IQR: 6-25 years) and the median duration of involvement in research was 8 years (IQR: 3-15 years). One hundred and four researchers (44%) have been involved in research for more than ten years. Regarding the place of work, most of respondents (58%) worked in a Research Centre, while 49% worked in a University and 38% worked in a University Hospital. Many of respondents (40%) were working in more than one institution.

### Scientific misconduct and questionable research practices

*Self-reporting and knowledge of other researcher's misbehaviors*

Figure 1 summarizes the frequency of self-admitted misconduct and other QRPs and knowledge of scientific misbehavior by other researchers. The three situations more commonly self-admitted as being *frequently practiced* were: inappropriate inclusion of authors/researchers in the research team (11.6%), citation without reading the primary source (original article) (5.7%) and execution of research projects without proper planning (5.2%). The more frequent respondents' self-reported acts as *occasional practice*, were also citation of articles or materials without consulting the primary source (58%), inappropriate inclusion of authors/researchers in the research team (40%) and overvaluation of data/results for corresponding to expectations (33%). Furthermore, combining both situations, the most frequently self-reported behaviors were citing without reading the primary source (64%), adding one or more authors/researchers to a paper or research team who did not qualify for authorship or team researcher (51%) and overvaluation of data/results for corresponding to expectations (37%). In contrast, the least self-admitted situations were failing to include conflicts disclosure, asking or paying someone to write the manuscript and using someone else's ideas as if they were their own.

Frequencies of observed or having knowledge of scientific misbehavior by other researchers were much higher than self-reported misbehavior, ranging from 18% and 85%. The most reported QRPs performed by others were adding one or more authors/researchers to a paper or research team who did not qualify for authorship or team researcher (85%), accepting/requesting to be unethically allocated as an author/or a researcher (81%), and citing articles or materials without consulting the primary source (76%).

*Falsification, fabrication and plagiarism*

Scientific (research) misconduct is usually defined as FFP. Thus, five of the 20 detrimental practices evaluated were included in this definition (total or partial reproduction of research projects without author's consent; data fabrication and falsification; data suppression, misappropriation of ideas; and misappropriation of sentences and texts) were aggregated in a new variable named "*FFP*" coded as *yes* or *no*. If any of those five practices were admitted the new variable "*FFP"* was coded with yes; if none of the four practices were admitted, the new variable was coded as "not". Accordingly, 34% of respondents

admitted having falsified, fabricated or plagiarized at least once, and 79% observed or had knowledge of any of these misconducts.

*Seriousness attributed to research misconduct practices*

The severity atributted to the assessed research misconduct and QRPs is displayed in figure 2. The research practices most classified as "very serious" were data falsification and fabrication (87%), total or partial reproduction of projects without the author's consent (78%) and misappropriation of ideas (67%). Adding the categories "very serious" and "serious", the most frequent research misbehaviors were the same, with frequencies of 96% for data falsification and fabrication, 93% for inappropriate reproduction of projects without the author's consent and for misappropriation of ideas. The practices more frequently classified as "not serious" were selecting trivial or already studied subjects in order to increase scientific production (11%), citing without reading the primary source (original article) (6.1%) and overvaluation of data for achieving the desired results (overselling of results) (5.7%).

*Gender, age, time involved in research and seriousness attributed to research misconduct*

Female gender attributed higher severity scores to the bad research practice of accepting or requesting to be unethically allocated as an author and/or researcher ($P$=0.04) and for paying or asking someone to write and prepare a manuscript for publication ($P$=0.001). There were no other significant differences between males and females.

The seriousness attributed to omission of citation of relevant work of other researchers for non-scientific reasons had a weak positive correlation with increasing age (rho=0.196, P=0.003), and the severity attributed to misappropriation of other's sentences and texts showed a weak positive correlation with duration of involvement in research activities (rho=0.135, P=0.042). No other significant correlations were observed.

**Reasons for research misconduct practices**

Participants were asked about the extent to which they believe a variety of known factors have contributed to research misconduct and QRPs in themselves and in the others (Table 2). Insufficient human and/or material resources (54%), complexity/delay in submission/approval of research projects (48%) and lack of time (45%) were the most self-reported reasons. The least self-admitted motive was the conviction that the risk of detecting research misconduct is low and there are no proper punishments for these situations (13%).

The most reported reasons for research misbehavior in general (other researchers) were the pressure to publish (82%), the ambition for career progression and desire for recognition (80%), as well as the pressure to obtain financing (73%).

The most scored reasons for bad/questionable research according to its relevance (relevant and very relevant) were pressure to obtain financing (95%), insufficient specific knowledge and training (study design, statistical analysis, writing and publishing a manuscript) (92%), insufficient human and/or material resources (89%) and pressure to publish (88%).

**The impact of research misconduct on students**

The last part of the questionnaire regarded the impact of scientific misconduct and QRPs on students and the importance of training on research integrity on scientific practices. Almost all respondents considered that bad research practices have a significant impact on students' future attitudes towards science and 92% considered that training in research integrity, study design and responsible conduct of research could have a positive impact of research practices of students and researchers (Fig. 3).

## DISCUSSION

This study aimed to get an overview of scientific misconduct and QRPs among biomedical investigators (self-reported and observed in other researchers), the rankings of the seriousness, the possible causes of these behaviors, and the impact they could have on students and other researchers' scientific practices. The most frequently committed scientific misconducts was undoubtedly unethical authorship practices, both self-reported and observed in others. Pressures at various levels (to publish and to obtain financing) and insufficient human and/or material resources were the most reported causes of scientific misbehavior; and an overwhelming percentage of respondents stated the negative impact of research misconduct and QRPs on students and other researchers and how training and teaching integrity in research could mitigate these detrimental practices. As far as we know, this is the first study on this topic in such a large sample of biomedical researchers and the first performed in Portugal.

Improper inclusion of authors in the manuscript and/or researchers in the research team was the most self-admitted research misbehavior by our respondents and the most observed in other researchers. Furthermore, to inappropriately accepting or requesting to be an author or a researcher without doing any significant work towards the research activities and/or not contributing significantly to manuscript writing, were also QRPs more committed by themselves and in others. Our findings are in line with other studies (Roberts and St John, 2014; Artino et al., 2019; Smith et al., 2019; Martinson et al., 2005; Felaefel et al., 2018), and corroborate the results of a recent survey, where the most frequently reported research misbehaviors, within 43 items, were QRPs related to authorship (Artino et al., 2019). In a questionnaire applied online to researchers who have published one or more articles between 2011 and 2015, nearly half (46.6%) also reported authorship problems, namely their degree of involvement in the research and disagreement with the listed authors (Smith et al., 2019). "Inappropriately assigning authorship credit" was self-reported as 10% in a USA survey, (Martinson et al., 2005) and "granted authorship to non-deserving individuals" was 18.4% among Middle East researchers (Felaefel et al., 2018).

Authorship implies responsibility and confers credit for intellectual work. Integrity in authorship is, therefore, intrinsic to integrity in research, and any evidence of unethical practices related to authorship threatens the credibility of the scientific community as a whole (Karani et al., 2013). This complicated issue have motivated the International Committee of Medical Journal Editors to develop explicit criteria to prevent unethical authorship practices and clearly defined the recommendations that authorship should be based (ICMJE, 2020). Maybe because of this, prevalence of inappropriate authorship worldwide and in Europe has been declining but remains at significant percentages, covering approximately 20% to 30% of all scientific publications (Aliukonis et al., 2020; Wislar et al., 2011). In particular, "honorary" (guest/gift/coercive) and "ghost" authorships are clearly unacceptable. Honorary authorship is the most prevalent deviation from the responsible authorship standards (Aliukonis et al., 2020) and clearly unethical because someone who has done little or nothing is unfairly credited with a scientific publication (Artino et al., 2019). In fact, this inappropriate form of authorship is scientific fraud since it is a deliberately false representation of truth (Hermerén, 2017; Shaw, 2019). Although 68.4% of our respondents have classified

lack of authorship as a serious or very serious problem, the frequency of inappropriate authoring behaviors was notably high.

A complete discussion of all the behaviors assessed in this study is outside the scope of this article. Just a brief reference to the other two most self-admitted practices: citation without reading the primary source (original article) and execution of research projects without proper planning. When manuscripts are cited without full reading (e.g.: read the abstract only, use the reference list from another manuscript, etc.) it is difficult to understand the study methodology and limitations, therefore their critical evaluation is biased (Lindahl and Grace, 2018). Moreover, the citation of secondary sources without reading the original sources is considered plagiarism by some authors (Kumar, 2008). Thus, those journals or peer reviewers that promote the use of recent references instead of the primary may in fact discourage optimal referencing (Lindahl and Grace, 2018). And just a little comment to the importance and conscientious planning of research to ensure the accuracy and replicability of study findings, which reinforces the commitment to integrity and good practice in research (Pedersen, 2014).

Few studies have investigated less serious forms of misconduct or QRPs. These practices also violate good research and are detrimental for science, and this study addressed those practices. QRPs are more frequent than deliberate scientific misconduct and represent a significant issue that needs to be fought. This is important because such behaviors can waste resources, provide an unfair advantage to some researchers over others, and ultimately prevents scientific progress (Artino et al., 2019). Therefore, this study raises important concerns about the conduct of biomedical research, because researchers should be aware of ethical codes and of their responsibilities to the research community and to society.

Most studies of research misconduct have focused on conscious and major breaches of research integrity – FFP. Thus, using the ORI narrower definition of misconduct (FFP), five detrimental practices evaluated by our survey could be included in this definition. More than 30% percent of our respondents admitted having falsified, fabricated or plagiarized at least once, and nearly 80% have observed any of these serious misconducts in other researchers. This estimate is much higher than the average of 2% and 14% (admitted by themselves and observed in others) in a Fanelli's meta-analysis that examined 21 published studies, mostly from USA and United kingdom (Fanelli, 2009). A systematic review from China reported a self-admitted prevalence of fabrication and falsification of data of 2 to19%, and of plagiarism of 2 to 11% (Yi et al., 2019b) and a study from Nigeria showed that 42.2% committed some form of deliberate misconduct, namely falsification of data and plagiarism (P. Okonta and Rossouw, 2013). Definition of research misconduct, methodologies used, and study samples are quite different between studies, which make comparisons difficult (Felaefel et al., 2018). Furthermore, estimating the prevalence of research misconduct is difficult, or even impossible, because it represents an unacceptable behavior and it is not easy to get reliable data. An interesting study that applied a survey among statisticians measured prevalence of research misconduct from a different perspective, and more than a half knew at least one fraudulent project during their previous 10 years of work (Ranstam et al., 2000).

Research misconduct can be attributed to several factors, which are inherent to the definition of misconduct (Aubert Bonn et al., 2017). In this study, the most self-admitted reasons were insufficient human and/or material resources, complexity/delay in submission/approval of research projects and lack of time. Whereas, in general our respondents considered that the pressure to publish and to obtain financing, the desire for recognition and the ambition for a career progression were the main causes for scientific misconduct. These motives are similar to those in other studies (P. Okonta and Rossouw, 2013; P. I. Okonta and Rossouw, 2014). The known aphorism "Publish or Perish" describes the pressure to publish, which is considered a major driver for research misconduct (Errami and Garner, 2008), which is not supported by others (Fanelli et al., 2015). In fact, misconduct in research is multifactorial and several groups and categories of causal factors have been studied and implicated (Davis et al., 2007). However, an in-depth discussion of motives that can cause research is outside the scope of this article.

**Study limitations and strengths**

This study had some limitations. Firstly, the response rate could not be estimated. To protect the identity of potential respondents, the emails were sent by each institution and the authors had neither access to identification nor the number of investigators to whom the e-mail was sent. Secondly, it was a non-probability sample of researchers and as is the case with any self-reported questionnaire, there is a potential bias related with participants who agree to complete the questionnaire. Consequently, the extent to which the findings can be generalized to other researchers in Portugal should not be carried out. Furthermore, males and females were not equally represented among the responders, and there may be a gender bias. More than half of the researchers in our sample were females, probably due to women's greater willingness to participate in surveys.

Thirdly, we must mention that self-reports of inappropriate practices underestimate the real frequency of such behaviors. This limitation was also reported by other studies (P. Okonta and Rossouw, 2013; Artino et al., 2019; Felaefel et al., 2018; Martinson et al., 2005; Roberts and St John, 2014). There is probably some-under-reporting of questionable and serious misbehaviors among respondents towards social and professional acceptable positions despite the assurances of anonymity (Martinson et al., 2005). The opposite usually does not happen, that is admitting unethical practices if they do not do them (Artino et al., 2019). Therefore, it is possible that the true frequency of scientific misconduct and QRPs may still be higher than reported(P. Okonta and Rossouw, 2013). In contrast, results regarding behaviors of other colleagues might be falsely high, since the same misbehavior cases might be reported by multiple respondents(Fanelli, 2009; Felaefel et al., 2018).

Some strengths of this study should be highlighted. A previously constructed survey (Silva et al., 2014) was adapted to the characteristics of the study population and data was collected purposely for this study. The issues of scientific misconduct and research integrity are transversal to all areas and are particularly relevant in the area of health and life sciences. And although the teaching of health professionals focuses on clinical practice, it is important to understand the perception and research practices in some scientific communities linked to the teaching of medicine and other areas of health. Thus, the study included five

relevant biomedical institutions of our city, making it possible to obtain an image of the research behavior in a Portuguese research community. This study can provide a useful baseline measurement so that future studies could provide comparisons, additional information and possible interventions.

Scientific integrity must be an ethical principle of all research, and it is essential for conducting research of excellence. Research integrity is about much more than the absence of misconduct. It is about creating systems that boost the quality, relevance and reliability of all research (Stavale et al., 2019; Research integrity is much more than misconduct, 2019) This study also confirmed that inappropriate research practices have negative impact on students' future attitudes towards science and more than ninety percent considered that training in research integrity, study design and responsible conduct of research could have a positive impact of research practices of students and researchers. Several processes have been implemented to protect the credibility of research. Such interventions include regular training in research ethics and responsible conduct of research, institutional mechanisms to address research misconduct and the establishment of national bodies that address research misconduct such as the ORI (P. I. Okonta and Rossouw, 2014). Additionally, funding agencies, scientific journals and associations have also important roles to play in promoting research integrity and fighting scientific misconduct (Lex Bouter, 2020).

## CONCLUSIONS

This study documents that research misbehaviors, such as FFP exist in Portugal. But others –QRPs such as inappropriate authorship and improper citation appear to be more frequent. Science is a community built on trust therefore, it is everyone's responsibility to foster and promote a culture of scientific integrity. Nevertheless, rather than establish an absolute prevalence of misconduct and QRPs, we believe these data are better suited for helping the community understand the nature of the most common practices and concentrate on finding feasible solutions to improve our research enterprise.

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**TABLES**

Table 1 – Demographic, professional and research background of study participants (n=236*)

| Characteristic | n (%) |
|---|---|
| **Female (n, %)** | 181 (77) |
| **Institution (n, %)** | |
| Institute for Biomedical Sciences Abel Salazar | 50 (21) |
| Centro Hospitalar Universitário do Porto | 69 (29) |
| Institute of Public Health | 45 (19) |
| School of Biotechnology | 39 (17) |
| School of Health | 33 (14) |
| **Academic degree (n, %)** | |
| 1st degree (graduation) | 35 (15) |
| 2nd degree (master degree) | 50 (21) |
| 3rd degree (doctoral degree) | 95 (40) |
| Master student | 12 (5) |
| Doctoral student | 44 (19) |
| **University teaching career (n=120)** | |
| Assistant, Associate and Full Professor (1) | 68 (57) |
| Assistant, Associate and Full Invited Professor(2) | 52 (43) |
| **Research career (n=101)** | |
| Principal investigator | 13 (13) |
| Co-investigator | 27 (27) |
| Assistant, Fellow and Research Trainee | 61 (60) |
| **Hospital career (n=117)** | |
| Medical doctor | 63 (54) |
| Nurse | 17 (15) |
| Other health professionals | 37 (32) |
| **Participation in research projects** | |
| Coordinating investigator | |
| - Frequently | 29 (12) |
| - Occasionally | 36 (15) |
| Principal Investigator | |
| - Frequently | 53 (23) |
| - Occasionally | 61 (26) |
| Contributor Investigator | |
| - Frequently | 138 (59) |
| - Occasionally | 59 (25) |
| **Manuscript authorship (n, %)** | |
| First author | |
| - Frequently | 78 (33) |
| - Occasionally | 102 (43) |
| Last author | |
| - Frequently | 44 (19) |
| - Occasionally | 64 (27) |
| Other author | |
| - Frequently | 113 (48) |
| - Occasionally | 85 (36) |

*Unless otherwise stated; (1)Permanent staff at universities (2)Specially contracted personnel at universities

**Table 2** – Reasons for research misconduct practices

| | N (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | In Your case?[1] | | | In general?[2] | | | What is the relevance of this reason for bad research practices?[3] | | | |
| | Yes | No | Not aplicable | Yes | No | I don´t know | Nothing relevant | Slightly relevant | Relevant | Very relevant |
| **Conditioning reasons for research misconduct** | | | | | | | | | | |
| Lack of time | 107 (45) | 81 (34) | 48 (20) | 149 (63) | 44 (19) | 43 (18) | 8 (3) | 33 (14) | 119 (50) | 76 (32) |
| Insufficient specific knowledge and training | 85 (36) | 121 (51) | 30 (13) | 161 (68) | 38 (16) | 37 (16) | 4 (2) | 15 (6) | 112 (48) | 103 (44) |
| Insufficient human and/or material resources | 127 (54) | 74 (31) | 35 (15) | 171 (73) | 30 (13) | 35 (15) | 3 (1) | 23 (10) | 115 (49) | 94 (40) |
| Complexity/ delay in submission/approval of projects | 112 (48) | 72 (31) | 52 (22) | 157 (67) | 32 (14) | 46 (20) | 4 (2) | 30 (13) | 111 (48) | 87 (38) |
| Pressure to obtain financing | 66 (28) | 94 (40) | 76 (32) | 171 (73) | 12 (5) | 52 (22) | 2 (1) | 12 (5) | 112 (49) | 105 (46) |
| Pressure to publish | 99 (42) | 90 (38) | 47 (20) | 194 (82) | 13 (6) | 29 (12) | 4 (2) | 23 (10) | 101 (43) | 105 (45) |
| Ambition for career progression and desire for recognition | 74 (31) | 114 (48) | 48 (20) | 188 (80) | 16 (7) | 31 (13) | 5 (2) | 30 (13) | 107 (47) | 88 (38) |
| Risk of detecting research misconduct is low | 31 (13) | 140 (59) | 65 (28) | 115 (49) | 50 (21) | 69 (30) | 6 (3) | 31 (14) | 106 (46) | 87 (38) |
| Lack of clear and reliable regulation of scientific investigation | 62 (26) | 114 (48) | 60 (25) | 108 (46) | 71 (30) | 55 (23) | 11 (5) | 35 (15) | 110 (48) | 74 (32) |

[1]No missings [2] Missings in <1% of records of respondents [2] Missings in <3% of records of respondents

**FIGURES**

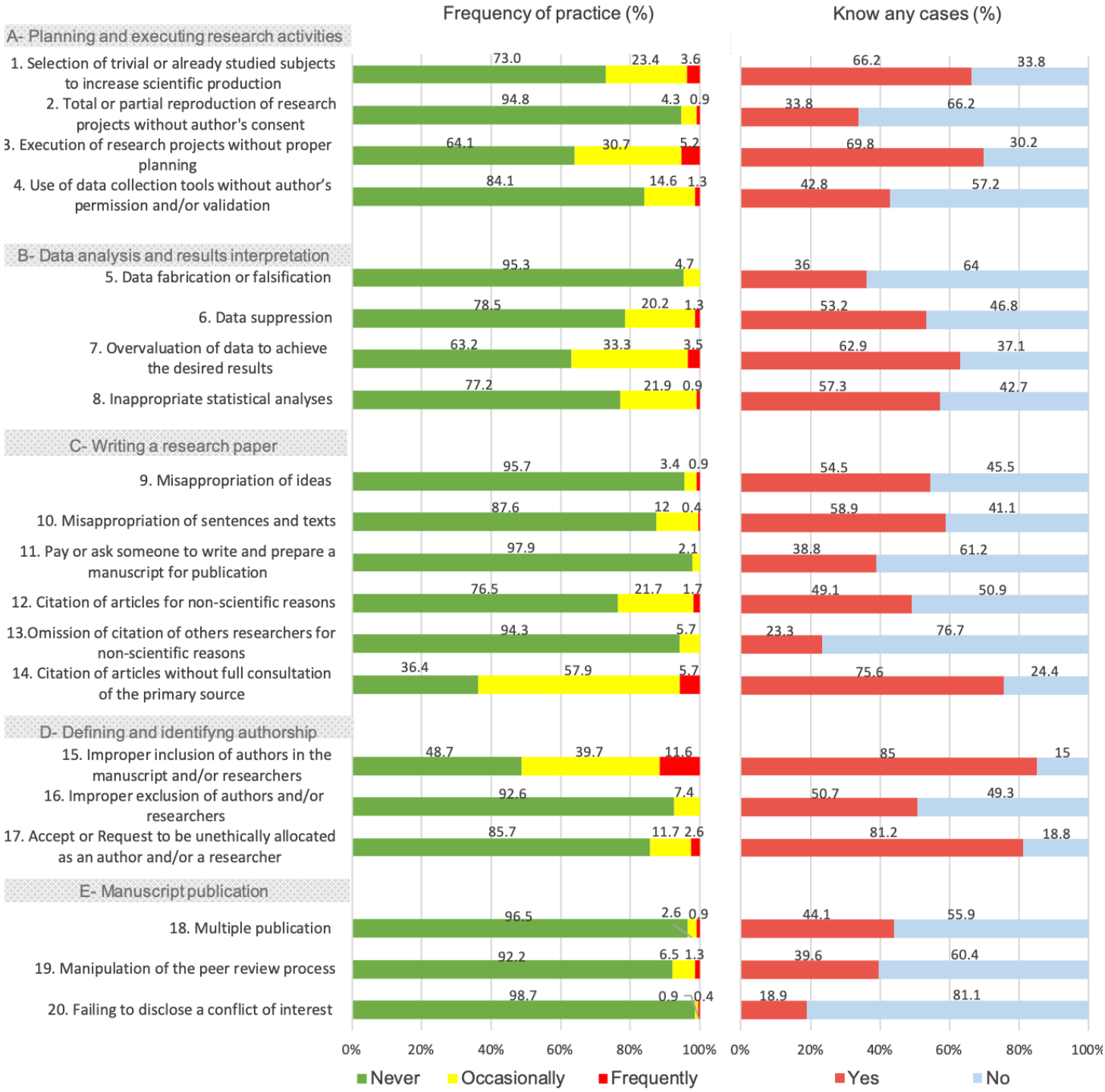



**Fig. 1 -** Frequency of self-reported misconduct and questionable research practices and knowledge of others researcher's misbehaviors

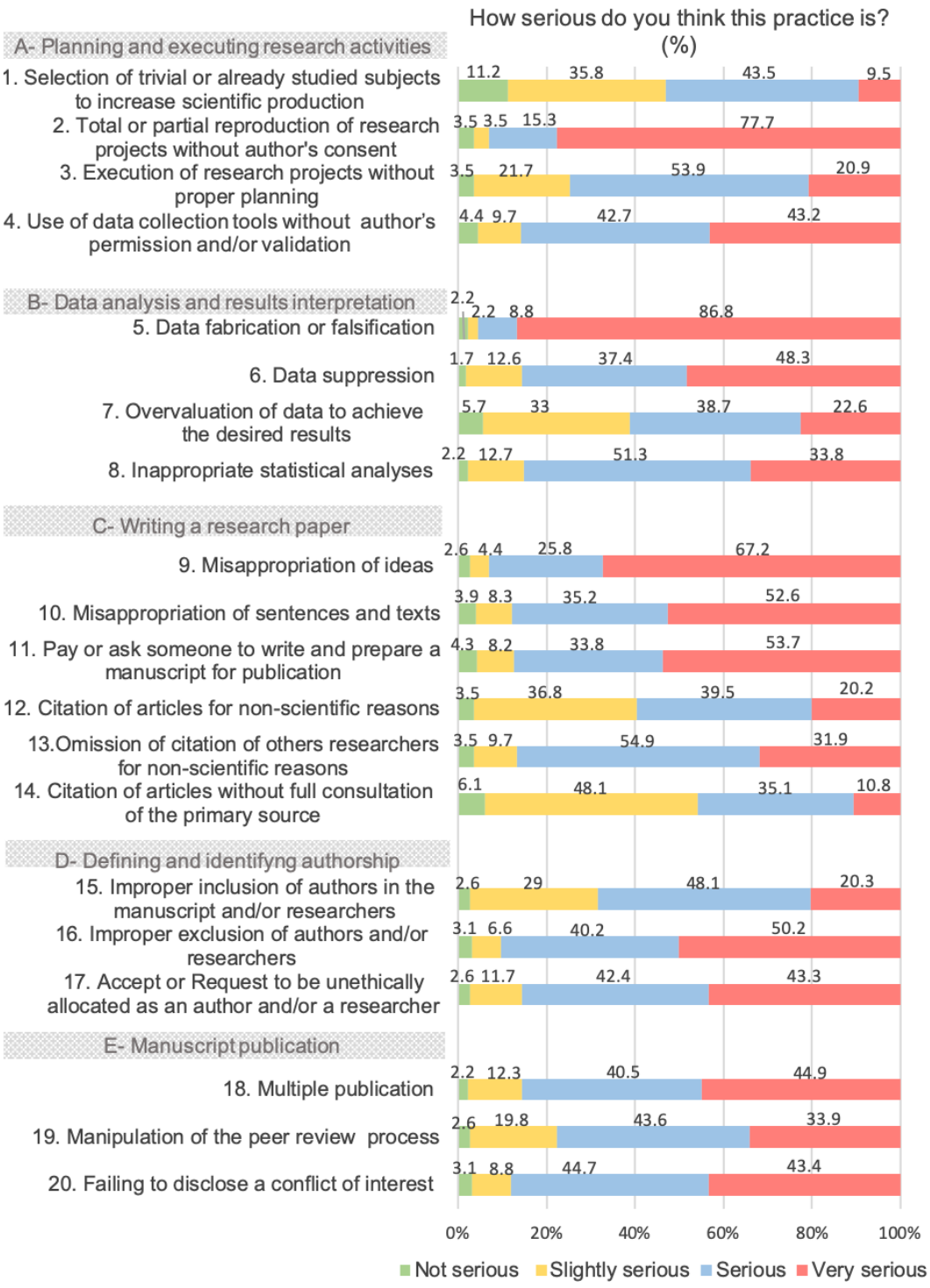
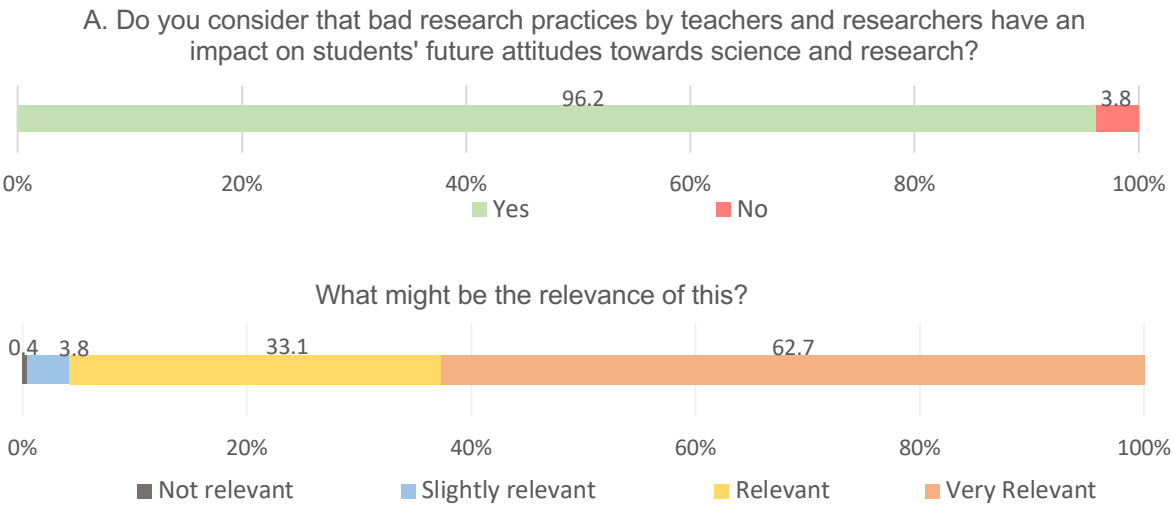
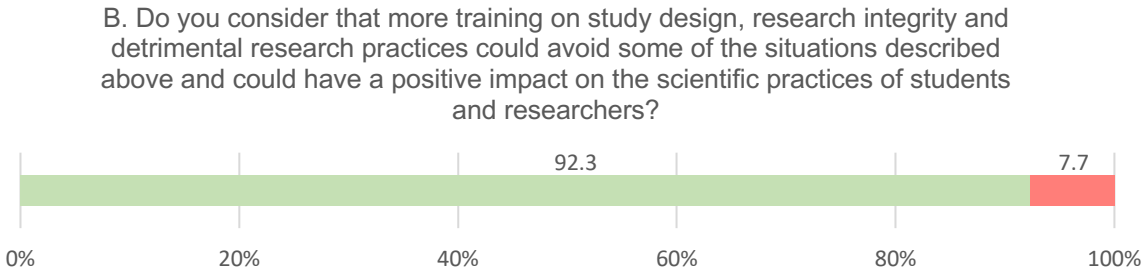



**Fig. 2 -** Seriousness attributed to research misconduct practices









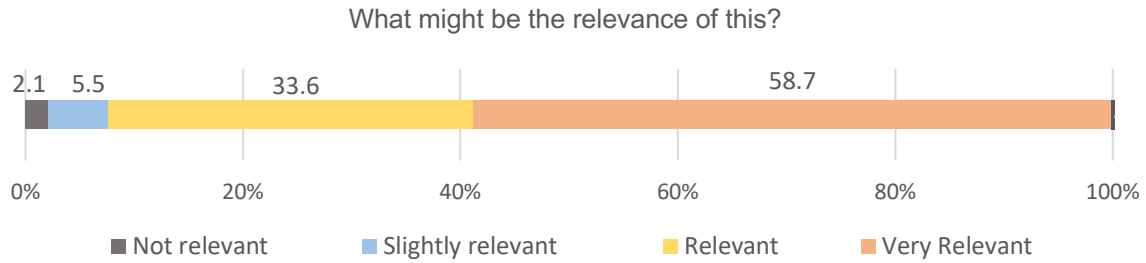




**Fig. 3 -** Students repercussions of scientific misconduct and questionable research practice

**ADDITIONAL FILE 1** – Questionnaire

## A-Personal information

**From which institution do you had access and answer this questionnaire:**

- Institute of Biomedical Sciences Abel Salazar (ICBAS)
- Centro Hospitalar do Porto (CHUP)
- Institute of Public Health of the University of Porto (ISPUP)
- School of Biotechnology of Catholic University of Portugal (SB-UCP)
- School of Health, (ESS-P.Porto)

**Gender:**

- Female
- Male

**Age (years): _____**

**How long have you been working? _____ years**

**How long have you been doing research? _____ years**

**Workplace(s):**

(You can tick more than one option)

- University Teaching Hospital
- Research centre
- University
- Other: _____

**Academic degree:**

- 1st degree (graduation)
- 2nd degree (master degree)
- 3rd degree (doctoral degree, PhD or equivalent)
- Master student
- Doctoral student

**University teaching career:**

- Not applicable
- Full professor
- Associate professor

- Assistant professor
- Invited Full professor
- Invited Associate professor
- Invited Assistant professor
- Assistant
- Other:_____

**Hospital career:**

- Not applicable
- Medical doctor
- Nurse
- Pharmaceutical
- Dietitian/nutritionist
- Healthcare technician
- Administrator
- Another one

**Polytechnic teaching career:**

- Not applicable
- Coordinator professor
- Assistant professor
- Invited coordinating professor
- Invited assistant professor
- Assistant
- Another one

**Research career:**

- Not applicable
- Coordinating investigator
- Principal investigator
- Contributor investigator (Co-investigator)
- Assistant
- Fellow trainee
- Research trainee

**Participation in research activities:**
(* Less than 1 time per year ** At least 1 time per year)

| | Never | Occasionally * | Frequently ** | Not applicable |
|---|---|---|---|---|
| **Coordinating investigator** | | | | |
| **Principal investigator** | | | | |
| **Contributor investigator** | | | | |

**Authorship in scientific publications**

(* Less than 1 time per year ** At least 1 time per year)

| | Never | Occasionally * | Frequently ** | Not applicable |
|---|---|---|---|---|
| First author | | | | |
| Last author | | | | |
| Other author | | | | |

## B- Planning and executing research activities

Regarding the situations mentioned below, please indicate how often do you practice them (if you actually practice them), if you know any cases that practice them, and how serious do you attribute them.

Definition: Occasionally (less than 1 time per year); Frequently (at least 1 time per year)

**1. Selection of trivial or already studied subjects to increase scientific production**

**1.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**1.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**1.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

**2. Total or partial reproduction of research projects without author's consent.**

**2.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**2.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**2.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

**3. Execution of research projects without proper planning (e.g.: setting goals, scheduling, defining tasks and the research team).**

**3.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**3.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**3.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

**4. Use of data collection tools (questionnaires, surveys) without author's permission and/or validation**

**4.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**4.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**4.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

## C- Data analysis and results interpretation

Regarding the situations mentioned below, please indicate how often do you practice them (if you actually practice them), if you know any cases that practice them, practices and how serious do you attribute them.
Definition: Occasionally (less than 1 time per year); Frequently (at least 1 time per year)

**1. Data fabrication or falsification**

**1.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**1.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**1.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

**2. Data suppression (failing to present data for not corresponding to the expected results)**

**2.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**2.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**2.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

**3 Overvaluation of data to achieve the desired results**

**3.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**3.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**3.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

**4 Inappropriate statistical analyses (e.g.: use of parametric tests without checking the necessary requirements, use of multivariable models without knowing the assumptions on which they ride, use of inappropriate methods for multiple inference)**

**4.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**4.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**4.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

## D - Writing a research paper

Regarding the situations mentioned below, please indicate how often do you practice them (if you actually practice them), if you know any cases that practice them, practices and how serious do you attribute them.

Definition: Occasionally (less than 1 time per year); Frequently (at least 1 time per year)

**1. Misappropriation of ideas (use of others' ideas as their own)**

**2.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**1.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**1.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

**2. Misappropriation of sentences and texts (use of others' sentences/texts as their own)**

**2.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**2.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**2.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

**3. Pay or ask someone to write and prepare a manuscript for publication**

**3.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**3.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**3.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

4. **Citation of articles for non-scientific reasons (e.g.: inappropriate use of self-referencing, for personal and professional interests, to increase the chances of publication, etc.)**

**3.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**3.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**3.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

5. **Omission of citation of the relevant work of other researchers for non-scientific reasons (e.g.: not to assign credit to original publication, to establish priority of authorship, due to personal/professional interests/conflicts, etc.)**

**4.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**4.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**4.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

6. **Citation of articles without full consultation of the primary source (e.g.: read the abstract only, use the reference list from another manuscript, etc.)**

**5.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**5.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**5.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

## E- Defining and identifying members of a research team and authorship credits in scientific articles

Regarding the situations mentioned below, please indicate how often do you practice them (if you actually practice them), if you know any cases that practice them, practices and how serious do you attribute them.

Definition: Occasionally (less than 1 time per year); Frequently (at least 1 time per year)

1. **Improper inclusion of authors in the manuscript ("guest author") and/or researchers in the research team (e.g.: due to pressures, fear of retaliation, favour's retribution, for increasing the chances of publication, and not because they have participated in the study and deserve to be mentioned as authors)**

1.1 **How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

1.2 **Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

1.3 **How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

2. **Improper exclusion of authors and/or researchers (e.g.: due to personnel or professional conflicts or interests, due to retaliation, etc.)**

**2.1 How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

**2.2 Do you know one or more cases?**

☐ Yes ☐ No ☐ Not applicable

**2.3 How serious do you think this practice is?**

☐ Not serious ☐ Slightly serious ☐ Serious ☐ Very serious

3. **Accept or Request to be unethically allocated as an author and/or a researcher (e.g.: without doing any significant work towards the research activities and/or in the writing of the manuscript, without having reviewed/revised the manuscript and without having made a significant intellectual contribution, just for being hierarchically superior, etc.)**

3.1 **How often do you practice?**

☐ Never ☐ Occasionally ☐ Frequently ☐ Not applicable

3.2 **Do you know one or more cases?**

□ Yes □ No □ Not applicable

3.3 **How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

## F – Manuscript publication

Regarding the situations mentioned below, please indicate how often do you practice them (if you actually practice them), if you know any cases that practice them, practices and how serious do you attribute them.

Definition: Occasionally (less than 1 time per year); Frequently (at least 1 time per year)

1. **Multiple publication (publication the same content with or without modifications in different journals).**

**1.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**1.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**1.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

2. **Manipulation of the peer review process (use of influences of any kind to speed up or increase the chances of publication**

**2.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**2.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**2.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

3. **Failing to disclose a conflict of interest (financial, personal or any other type)**

**3.1 How often do you practice?**

□ Never □ Occasionally □ Frequently □ Not applicable

**3.2 Do you know one or more cases?**

□ Yes □ No □ Not applicable

**3.3 How serious do you think this practice is?**

□ Not serious □ Slightly serious □ Serious □ Very serious

## H- CAUSES OF RESEARCH MISCONDUCT

**1. Lack of time**

**1.1 In your case:**

□ Yes □ No □ Not applicable

**1.2 In general:**

□ Yes □ No □ I don't know

**1.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**2 Insufficient specific knowledge and training (e.g.: for study design, statistical analysis, writing and publishing a manuscriptetc.)**

**2.1 In your case:**

□ Yes □ No □ Not applicable

**2.2 In general:**

□ Yes □ No □ I don't know

**2.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**3 Insufficient human and/or material resources**

**3.1 In your case:**

□ Yes □ No □ Not applicable

**3.2 In general:**

□ Yes □ No □ I don't know

**3.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**4 Complexity and delay in submission/approval of research projects**

**4.1 In your case:**

□ Yes □ No □ Not applicable

**4.2 In general:**

□ Yes □ No □ I don't know

**4.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**5 Pressure to obtain financing**

**5.1 In your case:**

□ Yes □ No □ Not applicable

**5.2 In general:**

□ Yes □ No □ I don't know

**5.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**6 Pressure to publish**

**6.1 In your case:**

□ Yes □ No □ Not applicable

**6.2 In general:**

□ Yes □ No □ I don't know

**6.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**7. Ambition for career progression and desire for recognition**

**7.1 In your case:**

□ Yes □ No □ Not applicable

**7.2 In general:**

□ Yes □ No □ I don't know

**7.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**8. Knowing that the risk of detecting research misconduct is low and proper punishment is lacking**

**8.1 In your case:**

□ Yes □ No □ Not applicable

**8.2 In general:**

□ Yes □ No □ I don't know

**8.3 What is the relevance of this reason in bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

**9. Lack of clear and reliable regulation of scientific investigation**

**9.1 In your case:**

□ Yes □ No □ Not applicable

**9.2 In general:**

□ Yes □ No □ I don't know

**9.3 What is the relevance of this reason for bad research practices?**

□ Not relevant □ Slightly relevant □ Relevant □ Very Relevant

## The impact of research misconduct on students

1. Do you consider that bad research practices by teachers and researchers have an impact on students' future attitudes towards science and research?

   ☐ Yes ☐ No

   **What might be the relevance of this?**

   ☐ Not relevant ☐ Slightly relevant ☐ Relevant ☐ Very Relevant

2. Do you consider that more training on study design, research integrity and detrimental research practices could avoid some of the situations described above and could have a positive impact on the scientific practices of students and researchers?

   ☐ Yes ☐ No

   **What might be the relevance of this?**

   ☐ Not relevant ☐ Slightly relevant ☐ Relevant ☐ Very Relevant

   Leave your comment:_____

**APÊNDICE 1 –** QUESTIONÁRIO VERSÃO ORIGINAL

## A – Informação pessoal

⇒ **Unidade onde teve acesso e pela qual responde a este questionário:**
- CHUP
- ICBAS
- ISPUP
- ESS

⇒ **Sexo:**
- Feminino
- Masculino

⇒ **Idade**(anos): _____

⇒ **Tempo de exercício da profissão** (anos): _____

⇒ **Tempo dedicado à investigação** (anos): _____

⇒ **Local/locais de trabalho**:
(Pode assinalar mais do que uma opção se for o caso)

- Instituição de Ensino
- Hospital
- Centro/Unidade de Investigação
- Outra:_____

⇒ **Habilitações/ Grau académico**
- 1º Grau (licenciatura)
- 2º Grau (mestrado)
- 3º Grau (doutoramento)
- Aluno de mestrado
- Aluno de doutoramento

⇒ **Carreira de docente do ensino universitário**
- Não se aplica
- Professor catedrático
- Professor associado
- Professor auxiliar
- Professor catedrático convidado
- Professor associado convidado
- Professor auxiliar convidado
- Assistente
- Outra:_____

⇒ **Carreira hospitalar**

- Não se aplica
- Médico
- Enfermeiro
- Farmacêutico
- Técnico Superior de Saúde
- Técnico Superior Diagnóstico e Terapêutica
- Administrador
- Outra:_____

⇒ **Carreira de docente do ensino politécnico**

- Não se aplica
- Professor coordenador
- Professor adjunto
- Professor coordenador convidado
- Professor adjunto convidado
- Assistente
- Outra:_____

⇒ **Carreira de investigação**

- Não se aplica
- Investigador coordenador
- Investigador principal
- Investigador colaborador
- Assistente
- Estagiário
- Bolseiro

⇒ **Participação em atividades de investigação:**

(* Menos de 1x por ano **Pelo menos 1x por ano )

| | Nunca | Ocasionalmente* | Frequentemente** |
|---|---|---|---|
| Como investigador coordenador | | | |
| Como investigador principal | | | |
| Como investigador colaborador | | | |

⇒ **Publicação de artigos científicos**

(* Menos de 1x por ano **Pelo menos 1x por ano)

| | Nunca | Ocasionalmente* | Frequentemente** |
|---|---|---|---|
| Como primeiro autor | | | |
| Como último autor | | | |
| Como outro coautor | | | |

## B- Planeamento e execução de atividades de investigação

Relativamente às situações abaixo referidas, por favor indique a frequência com que as pratica (se efetivamente as pratica), se conhece um ou mais casos que as pratiquem e qual a gravidade que lhes atribui.
Legenda:
Ocasionalmente (menos de 1x por ano),

Frequentemente (pelo menos 1x por ano)

**1. Escolha de questões menos relevantes ou já esclarecidas para aumentar a produção científica.**

1.1 Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

1.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

1.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**2. Reprodução total ou parcial de projetos sem o consentimento do autor.**

2.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

2.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

2.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**3. Execução de projetos sem planeamento adequado. (ex: definição de objetivos, calendarização, definição de tarefas)**

3.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

3.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

3.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**4. Uso de instrumentos de recolha de dados sem validação ou sem autorização dos autores.**

4.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

4.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicáve

4.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

## C-Definição da equipa de Investigação

Relativamente às situações abaixo referidas, por favor indique a frequência com que as pratica (se efetivamente as pratica), se conhece um ou mais casos que as pratiquem e qual a gravidade que lhes atribui.
Legenda:
Ocasionalmente (menos de 1x por ano),
Frequentemente (pelo menos 1x por ano)

**1. Inclusão indevida de Investigadores na equipa de investigação (ex: para retribuição de favores, para evitar conflitos, apenas por ser diretor de serviço ou superior hierárquico).**

1.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

1.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

1.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**2. Exclusão indevida de investigadores (ex: por conflitos ou interesses pessoais/profissionais, por retaliação, etc).**

2.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

2.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

2.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**3. Aceitar/Exigir ser incluido indevidamente na equipa. (ex:sabendo que não vai participar, desconhecendo o conteúdo do projeto, apenas porque é o superior hierárquico, etc.)**

3.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

3.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

3.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

## D - Análise e interpretação dos dados

Relativamente às situações abaixo referidas, por favor indique a frequência com que as pratica (se efetivamente as pratica), se conhece um ou mais casos que as pratiquem e qual a gravidade que lhes atribui.
Legenda:
Ocasionalmente (menos de 1x por ano),
Frequentemente (pelo menos 1x por ano)

**1. Invenção ou adulteração de dados**

1.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

1.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

1.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**2. Desvalorização ou omissão de dados por não corresponderem ao desejado.**

2.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

2.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

2.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**3. Valorização excessiva de dados por corresponderem ao desejado**

3.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

3.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

3.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**4. Tratamento estatístico inadequado dos dados. (ex:utilizar testes paramétricos sem os requisitos necessários, escolha de testes inadequados )**

4.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

4.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

4.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

## E - Redação de artigos científicos

**1. Uso de ideias de outros como se fossem suas**

1.1 Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

1.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

1.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**2. Uso de frases/textos de outros como se fossem seus**

2.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

2.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

2.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**3. Pedir a alguém que redija o trabalho por si ou comprar o trabalho redigido**

3.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

3.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

3.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**4. Citação de artigos por motivos não científicos. (ex. por interesses pessoais, para aumentar o índice de citação dos artigos, para aumentar a probabilidade de publicação, etc.)**

4.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

4.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

4.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**5. Omissão de citação de artigos por motivos não científicos (ex. para fazer crer que é original, pelo facto dos resultados serem discordantes, por interesses/conflitos pessoais/profissionais, etc.)**

5.1Frequência com que pratica:

☐ Nunca ☐ Ocasionalmente ☐ Frequentemente ☐ Não aplicável

5.2 Conhece um ou mais casos

☐ Sim ☐ Não ☐ Não aplicável

5.3 Gravidade atribuída

☐ Nada grave ☐ Pouco grave ☐ Grave ☐ Muito Grave

**6. Citação de artigos sem consulta total da fonte primária. (ex. ler apenas o resumo, usar a lista de referencias de outro artigo, etc.)**

6.1Frequência com que pratica:

☐ Nunca ☐ Ocasionalmente ☐ Frequentemente ☐ Não aplicável

6.2 Conhece um ou mais casos

☐ Sim ☐ Não ☐ Não aplicável

6.3 Gravidade atribuída

☐ Nada grave ☐ Pouco grave ☐ Grave ☐ Muito Grave

## F- Autoria de artigos científicos

**1. Inclusão indevida de autores (ex. receio de retaliação, retribuição de favores, "enriquecer" o curriculum vitae, aumentar a probabilidade de publicação, etc.)**

1.1Frequência com que pratica:

☐ Nunca ☐ Ocasionalmente ☐ Frequentemente ☐ Não aplicável

1.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

1.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**2. Exclusão indevida de autores (ex: por conflitos ou interesses pessoais/profissionais, por retaliação, etc.)**

2.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

2.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

2.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**3. Aceitar/ exigir ser autor de um artigo indevidamente (ex. com participação insuficiente no trabalho e/ou na redação** do artigo, sem ler o artigo, apenas por superioridade hierárquica, etc.)

3.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

3.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

3.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

## G - Publicação de artigos científicos

**1. Publicação em mais de uma revista, na íntegra ou com ligeiras modificações do título e/ou conteúdo.**

1.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

1.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

1.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**2. Uso de influências de qualquer tipo para aumentar a probabilidade de publicação e/ou acelerar o processo.**

2.1Frequência com que pratica:

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

2.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

2.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

**3. Ocultação de situações de conflito de interesses económicos ou de qualquer outro tipo.**

**3.1Frequência com que pratica:**

□ Nunca □ Ocasionalmente □ Frequentemente □ Não aplicável

3.2 Conhece um ou mais casos

□ Sim □ Não □ Não aplicável

3.3 Gravidade atribuída

□ Nada grave □ Pouco grave □ Grave □ Muito Grave

## H-MOTIVOS CONDICIONADORES DE MÁS PRÁTICAS EM INVESTIGAÇÃO

**1. Tempo insuficiente.**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**2. Desconhecimento/ Falta de formação específica (ex: para elaboração de projetos, redação de artigos, análise estatística, etc.)**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**3. Recursos humanos e/ou materiais insuficientes.**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

4**. Complexidade/morosidade na submissão/aprovação dos projetos.**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**5. Pressão para obtenção de financiamento**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**6. Necessidade de aumentar quantidade de publicações.**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**7. Desejo de progressão na carreira e/ou obtenção de prestígio**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**8. Crença de que o risco de identificação e punição de más práticas de investigação é baixo.**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**9. Ausência de regulamentação clara e uniforme.**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não □ Não sei

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

Repercussões nos estudantes

**1. Considera que as más práticas de investigação pelos docentes e investigadores se repercutem nas atitudes futuras dos estudantes relativamente à ciência e investigação?**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

**2. Considera que a existência de formação sobre metodologia e integridade científica e más práticas de investigação poderia evitar algumas das situações acima descritas e repercutir-se de forma positiva no percurso científico dos estudantes e investigadores?**

No seu caso:

□ Sim □ Não □ Frequentemente □ Não se aplica

Em geral:

□ Sim □ Não

Relevância atribuída:

□ Nada relevante □ Pouco relevante □ Relevante □ Muito Relevante

Leave your comment:_____