Editing Practice

ORIGINAL ARTICLE

Analysis of the multiple annotations and improper fund labeling of papers published by medical university journals

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ABSTRACT

Background: To investigate the trend of improper fund labeling and analyze the phenomenon of multiple annotations in one paper. **Methods:** A systematic sampling method was adopted to select academic papers from 23 medical university journals in the first issue of 2020 and the first issue of 2023. Each paper was screened, and the journal, number of issues, title, keywords, authors' names, their affiliated units, and approval numbers of all funding projects were recorded. Data of various projects of the National Natural Science Foundation of China (NSFC) were also extracted: Names, keywords, start and end dates of its projects; names of project leaders and participants; names of the applying units; completion status; and thesis titles. **Results:** The sampling method yielded 1090 sampled papers, 2014 funding projects, and 916 (84.04%) papers that received funding, with an average of 1.85 funded papers. A total of 392 papers had received support from 507 projects by the NSFC. Among the 2014 funding projects, 73.6% were labeled with appropriate timing, 7.7% had inappropriate timing, and 18.7% required clarification about whether there was any inappropriate timing. Twenty-one funding projects (1.0%) were approved for more than 10 years. The number of improper labeling of funding time in the first period of 2023 significantly decreased since 2020 (2.48 ± 1.44 *vs.* 4.35 ± 3.13, $P < 0.001$). Out of the 507 projects of the NFSC, 373 (73.6%) had content annotations that complied with regulations, 114 (22.5%) had no content annotations, 5 (1.0%) had no author annotations, and 15 had annotations that do not exist (2.9%). **Conclusion:** Improper funding labeling occurs in medical university journals. Relevant departments should take certain measures to curb the chaos in fund labeling. This is of great significance for maintaining academic integrity, clarifying the ownership of intellectual property rights, standardizing the use of funds, and improving the effectiveness of funding.

Key words: medical university journals, fund, improper labeling, multiple funding supports for one paper

INTRODUCTION

Funding projects are an important source of funding for medical research. The projects funded by the National Natural Science Foundation of China (NSFC), which is directly managed by the State Council, are the most important source of scientific research funding for various medical colleges and hospitals.[1] These funds have supported the production of a large number of medical papers, which have driven the development of medical research, improved the quality of talent training, and empowered the establishment of medical disciplines.

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In 1990, Zhang[2] statistically analyzed 85,750 papers published in a total of 1189 Chinese journals in 1988 and reported that 3796 papers (4.4%) were funded. He *et al.*[3] subsequently proposed that the fund–paper ratio can be used as one of the indicators for evaluating the academic quality of journals. With the incorporation of the fund-paper ratio into the *Chinese S & T Journal Citation Reports (Natural Science)*, the Chinese Science Citation Database (CSCD), and *A Guide to the Core Journal of China*, various journals have successively required funding support for paper publication[4]. The *Blue Book of Development on China's Scientific Journals Development (2023)* reported that in 2021,[5] the fund-paper ratio of China's scientific and technological journals was 48.25%, of which 80.95% were basic medical papers. With the surge in the number of funded papers, so has the phenomenon of improper labeling of various fund projects.

A literature search in the China National Knowledge Infrastructure (CNKI) using "fund", "labeling" and "misconduct/improper" as keywords yielded only four papers from 2014 to 2016. These papers focused on the hazards of improper fund labeling,[6] classification,[7] manifestations and countermeasures;[6] it was also pointed out that it is unreasonable for papers by independent authors to be labeled with multiple funding.[8] Wang[9] counted the funding acknowledged in papers published by core Chinese water conservation journals and categorized the false labeling into six cases: fabrication, addition by taking advantage of the publication time lag, co-authorship for reputation, simple enumeration, inconsistency between research content and fund content, and still labeling funds after project completion. Wang[9] also proposed solutions for identifying false fund labeling.

In 2015, the Council Meeting of the NSFC deliberated and passed the *Administrative Measures for Research Achievements of Projects Funded by the National Natural Science Foundation of China*,[10] which points out that "the principal investigator shall not regard the achievements obtained by others or participants or those irrelevant to the funded project as the project achievements". To a certain extent, this has curbed the phenomenon of "randomly attaching funds", and triggered in-depth discussions among researchers on funding-related papers. In 2017, Bai *et al.*[11] conducted an empirical study on the fund labeling in academic papers and found a serious mismatch between the content of the publication and the research content of the study, inconsistency between the acceptance date and the research period, fabrication of projects, and random attachment of the same project to multiple papers; corresponding counter-measures and suggestions were also proposed. In a previous study, Shu *et al.*[12] evaluated 158 papers with a fund-paper ratio of 82.28%; of these, 30 had more than two funds labeled, resulting in an over citation rate of 23.08% (30/130). Among 51 NSFC funding projects, 6 were expired, 1 was a supplementary fund, and the contents of 33 funding projects were irrelevant to the research papers. Gou[13] analyzed misconducts such as "fabricated labeling", "unauthorized labeling", "irrelevant labeling" and "improper labeling", and found that 32.38% of the fund labels in 35.68% of the papers were reasonable and reliable. Meanwhile, Liang *et al.*[14] found four similar scenarios in medical university journals—fabricated labeling, "unauthorized labeling", "far-fetched labeling", and "overdue labeling"—believed that fund labeling in journals recognized by the 100 Outstanding Academic Journals of China was better than that in other journals.

New academic standards for funding project applications, annotations, and completion reports were issued. In 2019, the *Ethical Standards for Scientific Journal Publishing*[15] (referred to as *the Standards*) was published. In 2020, the Ministry of Science and Technology issued *Several Measures (Trial) on Eliminating the Unhealthy Orientation of "Only Papers" in Science and Technology Evaluation*,[16] which emphasizes the "supporting role and relevance of representative works to related projects (topics)" and the verification of "paper publication status" by project management institutions. In the same year, the NSFC issued the *Measures for the Investigation and Handling of Research Misconduct in National Natural Science Foundation Projects*[17] (hereinafter referred to as *the Measures*), which stipulates that for academic misconduct related to fund designation, measures such as "oral reminders, criticism and education, or warnings" may be taken, and even "revoke the original funding decision and recover the funds already disbursed". Article 104 of the *Law of the People's Republic of China on Science and Technology Advancement (2021 Revision)* stipulates that "fabrication and forgery of scientific research achievements are not allowed".[18] These academic norms further clarify the definition, forms, and penalties for improper fund labeling. Currently, most research on fund labeling norms focuses on the origins,[6,8] manifestations,[8,9,10–12] and harms[6] of improper fund labeling, while empirical studies investigated the quantity and proportion of improperly labeled funds. However, no study has yet classified the basis for improper labeling according to the latest academic standards, compared the changes in fund labeling before and after the release of academic standards, and identified single papers that had multiple fund labels.

In this study, we selected 23 medical university journals as core Chinese journals and assessed the changes in fund labeling before (in 2020) and after (in 2023) the release of academic standards for fund labeling from 2020 to 2021. The aim is to discover the trends of improper fund labeling and further analyze the phenomenon of multiple fund labels in one paper, so as

to provide a basis for editorial departments to review fund labeling. This is of great significance for maintaining academic integrity, standardizing fund management, ensuring the fairness of scientific research evaluation, and strengthening intellectual property protection.

RESEARCH OBJECTS AND RESEARCH METHODS

Research objects

On December 15, 2023, we searched the CNKI database in the Medicine and Health Science and Technology field, which yielded 1268 journals. Using the keyword "PKU Core", the search results narrowed down to 37 journals: 14 comprehensive medical and health journals and 23 medical university journals.

Data acquisition

Twenty-three medical university journals were used as research objects. Using the systematic sampling method, we selected the entire issues of academic papers in the first issue of 2020 and the first issue of 2023 of each journal. Each paper was evaluated, and the following data were recorded: Publication journal, issue number, title, keywords, author names, institutional names, approval numbers of fund projects, and publication time.

Fund statistics

Since it is difficult to fully obtain the content of provincial, municipal, and military fund projects, only statistical analysis was conducted.

Approval numbers of research projects were extracted from the NSFC query website (https://www.letpub.com.cn/index.php?page=grant) and MedPeer (https://user.medpeer.cn/). For projects with consistent content, the following data were extracted: Project names, keywords, start and end dates of the project, names of the project leader and participants, names of the applying units, project conclusion status, and the names of the papers concluded from the project. The data retrieval was performed from December 15 to December 31, 2023.

Basis for the classification of improper labeling

Currently, there is no unified standard for the classification of improper fund labeling in China. According to *the Standards*,[15] improper fund labeling is classified as honorary labeling, irrelevant labeling, premature labeling, and overdue labeling. Article 43 of *the Measures*[17] categorizes improper fund labeling as unauthorized labeling, fictitious labeling, and irrelevant labeling.

The interpretation of "honorary labeling" in *the Standards*[15] is "listing co-authors from other institutions while annotating others' fund projects". Since it is impossible for outsiders to know whether the consent of others has been obtained for annotating others' funds, "unauthorized labeling" and "honorary labeling" are types of improper labeling that can only be determined after investigation, evidence collection, or confirmation of violations. In this study, these two types of improper labeling were excluded, and the interpretation of "unauthorized labeling" in *the Measures*[17] is "unauthorized annotation of others' scientific fund projects", that is, annotating others' funds without their consent.

In *the Measures*,[17] the term "fictitious labeling" is defined as "labeling fictitious scientific fund projects". In this study, fictitious labeling refers to marking nonexistent the NSFC projects in papers.

In *the Standards*,[15] the term "irrelevant labeling" is defined as "the research content does not match the fund project". In this study, "content-irrelevant labeling" occurs when there are no overlapping keywords between the names and keywords of NSFC projects and the titles and keywords of the published papers. Meanwhile, "author-irrelevant labeling" takes place if neither the principal investigator nor the participants of the NSFC project are included in the list of authors. In *the Measures*,[17] the term "irrelevant labeling" is defined as "labeling fund projects in scientific research achievements unrelated to the scientific fund project".

In *the Standards*,[15] the term "premature labeling" is defined as "the date of manuscript receipt is earlier than the approval time of the fund" and "overdue labeling" as "papers published after the project conclusion". However, the *Filling Instructions for the Final Report/ Achievement Report of National Natural Science Foundation Funded Projects (2016 Edition)* stipulates that "the project leader should continue to provide research achievements related to the funded NSFC within three years after the project conclusion, and submit them to the supporting unit as required, and include them in the project achievement archives". Therefore, in this study, NSFC projects associated with papers published within 3 years after the project conclusion are not considered to have "overdue labeling".

In addition to improper labeling, this study investigated "multiple annotations for one paper", wherein a paper is funded by more than two funding projects. If a paper involves different authors' institutions and is funded by different sources, does it involve repeated application for projects? Has the consent of the fund management department been obtained for sharing the fund achievements? Therefore, "multiple annotations for one paper" particularly requires the attention of the fund

management department and the journal editorial department.

RESULTS AND ANALYSIS

Cases of fund-supported papers in the first issues of 23 medical university journals in 2020 and 2023

A total of 1090 papers were published in the first issues of 23 medical university journals in 2020 and 2023, with a total of 2014 funding projects and 916 fund-supported papers (84.04%). The average number of funding annotations per funded paper should be 2.20, and the average funding annotations per paper (all sampled papers) should be 1.85 (2014/1090).

For the first issues of 23 medical university journals in 2020, the average number of papers was (24.30 ± 6.48), the average number of funds was (38.30 ± 16.24), the average number of fund-supported papers was (20.13 ± 6.58), the average proportion of fund-supported papers was (0.84 ± 0.13), and the average number of funds per paper was (1.59 ± 0.48). For the first issues of 23 medical university journals in 2023, the corresponding indicators were (23.09 ± 6.56), (41.03 ± 16.21), (19.70 ± 6.07), (0.86 ± 0.10), and (1.80 ± 0.52), respectively. There were no statistically significant differences between the indicators in 2020 and those in 2023 ($P > 0.05$ for all; Table 1). Three years after the issuance of relevant documents by the Ministry of Science and Technology and other ministries (in 2023), the average number of funds per paper, the proportion of fund-supported papers and the average number of funds per paper in each journal increased, but without a statistically significant difference.

A total of 507 NSFC projects and 392 papers funded by NSFC were included in the first issues of 23 medical university journals in 2020 and 2023 (Table 2). The following indicators were not significantly different between 2020 and 2023: Number of the NSFC projects (11.87 ± 6.53 *vs.* 10.17 ± 5.76), number of papers funded by the NSFC (9 [6.00, 10.00] *vs.* 8 [4.50, 10.50]), and ratio of papers funded by the NSFC (0.33 [0.27, 0.46] *vs.* 0.32 [0.26, 0.41]; all $P > 0.05$).

Analysis of the timing of fund indications and cases for 916 fund-supported papers among 2014 funding projects

Among the 2014 funding projects for 916 fund-supported papers by 23 medical university journals, 73.6% were marked with appropriate timing, 7.7% had improper annotations, and it could not be determined whether 18.7% had improper annotations (Table 3). There were 13 items (0.6%) where the submission date preceded the fund execution time; 908 items (45.1%) of the funds were marked for papers published 1-3 years after fund approval; 573 items (28.5%) of the funds were marked for papers published 4-6 years after fund approval; 122 items (6.1%) of the funds were marked for papers published 7-9 years after fund approval; and 21 items (1.0%) of the funds were marked for papers published more than 10 years after fund approval.

The number of improperly timed fund annotations in the first issues of 23 medical university journals was significantly different between 2020 and 2023. The number of funding projects with improper annotations in papers published in 2023 significantly decreased ($P < 0.001$; Table 4), possibly because after the implementation of *Several Measures (Trial) on Eliminating the Unhealthy Orientation of "Only Papers" in Science and Technology Evaluation*, *Measures for the Investigation and Handling of Research Misconduct in National Natural Science Foundation Projects*, and *Law of the People's Republic of China on Science and Technology Advancement (2021 Revision)* from 2020 to 2021, we realized that the conclusion of various funding projects would gradually become standardized and that funding could not be casually affiliated with irrelevant papers. At the same time, editorial departments have gained certain experience in reviewing the fund annotations of papers and have grasped a reasonable scale for fund review.

For example, item No. 9 in Table 5 shows a paper published on January 2, 2020. The receipt date of the manuscript was September 18, 2019. It was funded by two NSFC projects, with the approval dates in 2017 and 2019, respectively. Upon verification, the approval date of NSFC in 2019 was August 20, and the execution time was from January 2020 to December 2023. According to the content of the "Norms", this project did not meet the definition of early marking. However, it is stipulated in the Notice on Matters Related to the Application and Conclusion of the NSFC in 2023 that "achievements earlier than the start time of project funding shall not be included in the conclusion/achievement report". Therefore, this paper should be classified as "early marking" and therefore as an "improper annotation".

Analysis of 507 cases of fictitious and irrelevant annotations in NSFC projects

A total of 507 funding projects were from NSFC, and 1507 were from provincial, municipal, military, and university funds. According to the description in "1.4 Types of Improper Annotation", if there is no commonality among the paper title, keywords, and the fund, the fund is considered as an irrelevant annotation. Among the 507 NSFC projects, 373 (73.6%) were properly annotated in terms of content, 114 (22.5%) were annotated with irrelevant content, 5 (1.0%) were annotated with irrelevant authors, and 15 (2.9%) were

Table 1: Statistical results of fund and paper indicators for 23 different medical university journals at different sampling times (*n* = 23)

Items	Average number of papers	Average number of funds	Average number of papers per fund	Average ratio of papers to funds	Average number of funds per paper
Issue 1, 2020	24.30 ± 6.48	38.30 ± 16.24	20.13 ± 6.58	0.84 ± 0.13	1.59 ± 0.48
Issue 1, 2023	23.09 ± 6.56	41.03 ± 16.21	19.70 ± 6.07	0.86 ± 0.10	1.80 ± 0.52
t value	0.934	-0.981	0.426	-0.649	-1.688
P value	0.195	0.337	0.674	0.523	0.106

fictitious annotations.

Since the provincial, municipal, military and university funds do not disclose the details of application and project completion like NSFC, the 1507 non-NSFC funds can only be judged as to whether they belong to irrelevant annotations based on the fund project names and approval numbers. According to the statistics, the irrelevant annotations of non-NSFC funds include content-irrelevant annotations (Table 5, items 3-7) and overtime annotations (Table 5, items 1 and 6). Due to the limited available information, other types of irrelevant annotations cannot be determined. Among papers with content-irrelevant annotations, there are funds associated with social science funds, textbook establishment projects, educational reform projects, research projects in completely different disciplines, and laboratory construction projects.

Cases of multiple annotations in one paper in 916 fund-supported papers

Among the 916 fund-supported papers, 324 were marked with one funding project, 319 with two funding projects, and the maximum reached nine funding projects. Based on the results of "*Analysis of the timing of fund indications and cases for 916 fund-supported papers among 2014 funding projects*" and "*Analysis of 507 Cases of Fictitious and Irrelevant Annotations in National Natural Science Foundation Projects*", Table 6 lists the cases of improper annotation for multiple annotations in one paper. The most occurrences of improper time annotations were found in papers with eight annotations. Among the 24 funding projects, 4 (16.67%) had improper time annotations. The most occurrences of improper content annotations were found in papers with eight and seven annotations: Four National Natural Science Foundation projects and one National Natural Science Foundation project (accounting for 100%).

The average number of improper time annotations = number of funds with improper time annotations/(number of *X* annotations × number of *X* annotation papers) *X*: (2-9)

The improper content annotations in papers with multiple annotations = number of funds with improper content annotations/number of funds supported by NSFC

Compared with papers that are annotated with only one funding project, the average number of funding projects with improper time annotations for papers with multiple annotations is 16.50 items (10.44%), which is higher than the proportion of 20.00 items (6.17%) for papers annotated with one funding project. The average number of NSFC funding projects with improper content annotations for papers with multiple annotations is 13.88 items (46.49%), which is higher than the proportion of 17.00 items (14.17%) for papers annotated with one funding project. Considering that the proportion of improper content annotations in papers with 8 and 7 annotations is 100%, which has a significant impact on the average improper annotation, these two data points are removed. After recalculating the data for papers with 2-6 annotations and 9 annotations, the corrected average number of NSFC funding projects with improper content annotations is 17.67 items (28.66%), which is still higher than the proportion of 17.00 items (14.17%) for papers annotated with one funding project. In particular, among the papers annotated with nine funding projects, five papers were funded by the same nine funding projects.

DISCUSSION

Various types of improper annotation

A series of documents related to academic norms were introduced from 2019 to 2021.[15–18] After the publication of the definitions, forms, and penalties for non-compliant fund annotations, the Natural Science Foundation Committees of various provinces and other fund-sponsoring departments subsequently issued supporting regulations or notices. Our results showed that the average ratio of papers supported by the NSFC in the first issues of 23 medical university journals in 2020 and 2023 was 35.7%, which is higher than that reported by other studies: Bai *et al.,*[11] 20.8%; Shu *et al.*,[12] 25.3%; Gou,[13] 22.1%; Liang *et al.*,[14] 28.8%. The possible reason is that the NSFC provides relatively large numbers of funding projects for medical research, and

Table 2: Funding situation of papers supported by the NSFC in the first issues of 23 medical university journals in 2020 and 2023 respectively

No.	Journal name	Issue 1, 2020			Issue 1, 2023		
		Number of papers	Number of papers funded by NSFC	Number of grants by the NSFC	Number of papers	Number of papers funded by NSFC	Number of grants by the NSFC
1.	*Journal of Southern Medical University*	22	10	12	22	7	7
2.	*Journal of Zhejiang University (Medical Sciences)*	15	7	11	14	6	8
3.	*Fudan University Journal of Medical Sciences*	24	7	9	22	8	10
4.	*Journal of Jinan University (Natural Science & Medicine Edition)*	12	2	3	13	4	4
5.	*Journal of Central South University (Medical Science)*	11	5	5	17	3	3
6.	*Journal of Peking University (Health Sciences)*	31	10	14	30	12	20
7.	*Journal of Capital Medical University*	28	15	26	26	7	9
8.	*Journal of Jilin University (Medicine Edition)*	35	14	18	36	11	11
9.	*Journal of Zhengzhou University (Medical Sciences)*	37	9	13	25	10	12
10.	*Acta Academiae Medicinae Sinicae*	21	5	5	27	8	10
11.	*Journal of Sichuan University (Medical Sciences)*	23	8	11	35	12	13
12.	*Journal of Xi'an Jiaotong University (Medical Sciences)*	28	9	15	23	9	20
13.	*Acta Medicinae Universitatis Scientiae et Technologiae Huazhong*	24	7	11	24	12	13
14.	*Acta Universitatis Medicinalis Anhui*	32	21	28	29	22	25
15.	*Journal of China Medical University*	21	4	4	18	5	6
16.	*Journal of Shandong University (Health Sciences)*	23	4	5	20	4	8
17.	*Journal of Army Medical University*	16	10	15	12	2	3
18.	*Academic Journal of Chinese PLA Medical School*	26	4	5	19	4	4
19.	*Journal of Shanghai Jiaotong University (Medical Science)*	23	15	16	18	8	8
20.	*Journal of Sun Yat-sen University (Medical Sciences)*	20	10	15	24	12	15
21.	*Academic Journal of Naval Medical University*	21	7	7	21	9	13
22.	*Journal of Nanjing Medical University (Natural Sciences)*	30	9	9	33	8	8
23.	*Journal of Chongqing Medical University*	31	13	16	23	4	4
Total		554	205	273	531	187	234

Search time was November to December 2023. NSFC, National Natural Science Foundation of China; PLA, People's Liberation Army of China.

this study included leading medical university journals. Meanwhile, improper time annotations were found in 7.7% of the funding projects, which was lower than that reported by other studies: Bai *et al.*,[11] 10.8%; Shu *et al.*,[12] 11.8%; Gou,[13] 14.3%; and Liang *et al.*,[14] 5.4%. The differences may be related to the different publication times of the funded papers included in the studies, as well as the different disciplines and journal sections of

Table 3: The timing annotation of 2014 funding projects for 916 fund-supported papers

Annotation of funds within the paper	Number of Fund, *n* (%)	Whether there is improper annotation
Unable to determine the year of fund approval	377 (18.7)	Uncertain
Submission date equals or precedes the fund execution time	13 (0.6)	Yes, it belongs to critical premature labeling
Published 1-3 years after the fund approval	908 (45.1)	None
Published 4-6 years after the fund approval	573 (28.5)	None
Published 7-9 years after the fund approval	122 (6.1)	Yes, it belongs to overdue labeling
Published more than 10 years after the fund approval	21 (1.0)	Yes, it belongs to overdue labeling

Table 4: Statistical results of improperly timed fund annotations for 2014 funding projects in 23 medical university journals

Items	Number of funds with improper timing annotations	
	Issue 1, 2020	Issue 1, 2023
Numerical value	4.35 ± 3.13	2.48 ± 1.44
t value	4.158	
P value	< 0.001	

the sampled journals.

Although the states and provinces have formulated a series of academic norms, and universities and scientific research institutions continue to promote them, this article finds that there are still 22.50% of NSFC projects with irrelevant annotations. Bai *et al.*[11] found that 6.00% of the NSFC funding projects were severely inconsistent with the papers; Shu *et al.*[12] discovered that 64.71% of the NSFC funding project contents were irrelevant to the research paper contents; and Gou[13] and Liang *et al.*[14] found that 47.58% and 9.95%, respectively, of the NSFC funding projects were completely unrelated to the paper contents. The reason for the significant differences lies in the high subjectivity of the criteria used to judge the relevance between funds and papers. Each researcher has their own set of methods, and there is currently no objective standard. The classification criteria for improper annotations in this article are relatively lenient. Theoretically, the proportion of improperly annotated funds included should be relatively high. However, the rate of content-irrelevant annotations obtained is not the highest, which indicates that content-irrelevant annotations in funding projects are quite common. It is expected that the fund management departments can formulate relevant indicators so as to provide guidance in aspects such as fund application, mid-term assessment, fund conclusion, and the determination of the rationality of fund annotations by editorial departments.

Reflections triggered by multiple annotations in one article

The phenomenon of one academic paper being funded by multiple projects is not uncommon. Among the 2014 funding projects for 916 fund-supported papers in this study, 52.4% were annotated with two or more fund projects (Table 6), and 7.2% of the funds were annotated overtime or ahead of time. The statistical results of seven papers funded by nine funding projects show that among 63 funding projects, 6 (9.5%) were annotated overtime, and among 30 traceable funds, 3 (10%) were irrelevant to the paper content. This indicates that funding projects with multiple annotations have more improper annotations. Whether using one paper to serve as the achievements of multiple projects, namely "multiple attributions for one paper", constitutes academic misconduct remains inconclusive at present. Ye *et al.*[19] believe that multiple attributions for one paper are regarded as inaccurate reporting of scientific research achievements, leading to multiple reports of the same achievements and repeated funding, which is an unethical practice. Zhang *et al.*[20] believe that with the emergence of large platforms and major projects, a diversified funding pattern has arisen. It cannot be simply considered that multiple annotations in one paper are academic misconduct. Instead, the methods for evaluating fund performance need to be clarified.

The author believes that for projects completed by multiple centers, since multi-unit authorship is not prohibited, it is also impossible to prohibit multiple annotations in one paper. Our focus should be on what is the reasonable range of the number of funds that can be annotated in one paper? What proportion does this paper occupy in the fund project conclusion? If the funds annotated in one paper are roughly the same in content but come from different years and different funding sources, is there any academic misconduct in the fund application?

Table 5: Typical cases of improper time labeling of funds

No.	Title	Funding project number	The starting year of fund implementation	Submission date	Publication date
1	Progress on epigenetic regulation of iron homeostasis	31930***	2020	2019.11.19	2020.02.25
2	Research advance of ANRIL on atherosclerosis by regulating cell proliferation and apoptosis	2020C03***	2020	2019.12.02	2020.02.25
3	Progress on clinical application of orthodontic-implant combined therapy	LY20H140***	2020	2019.10.15	2020.02.25
4	Progress on clinical application of orthodontic-implant combined therapy	2020KY***	2020	2019.10.15	2020.02.25
5	Assessment of lumbar multifidus muscle degeneration by magnetic resonance spectroscopy and its association with health-related quality of life	2023ZDXM***	2023	2022.10.14	2023.02.25
6	Analysis of the epidemiological burden of age-related macular degeneration in China based on the data of global burden of disease	202307027***	2023	2022.07.06	2023.01.15
7	Risk factors for osteoporosis in patients with metabolic syndrome in old people with type 2 diabetes mellitus	2020***	2020	2019.06.03	2020.01.16
8	Non-Hodgkin's lymphoma complicated with human coronavirus HKU1 pneumonia: A case report and literature review	20231***	2023	2022.04.30	2023.01.28
9	Relationship among activity of daily life, social support and loneliness in rural elderly: Mediating effects of general self-efficacy	71974***	2020	2019.09.18	2020.01.02
10	Mechanism of scutellarin promoting autophagy *via* phosphorylation of transcription factor cAMP response element binding protein to protect myocardial cells from ischemia-reperfusion injury	2023Y0***	2023	2021.11.30	2023.01.28
11	ARHGEF16 variants screening and mutation function analysis for children with total anomalous pulmonary venous connection	81974***	2020	2019.08.05	2020.01.28
12	Research progress of the mechanism and treatment of macrophage in spinal cord injury repair	81974***	2020	2019.04.08	2020.01.28
13	Parameters of optic disc and macular in primary open-angle glaucoma measured by spectral domain optical coherence tomography and its influencing factors	81970***	2020	2019.11.14	2020.01.20

*** represents hidden numbers.

For the first question, it is reasonable for an author's institution to be annotated with 1-2 funds. With the increase in scientific research funds and the refinement of fund categories, the orientation of fund support has become clearer.[21] Meanwhile, given the common existence of scientific research cooperation, the number of jointly funded papers will increase, which calls for more scientific fund management evaluation. [22–23] Co-funded papers are not equivalent to repeatedly funded papers. It is a normal path of scientific exploration that the research topics declared by scientific researchers have certain intersections or continuations.[24] While the current research was published with the funding of the second fund, it utilized the technical methods, experimental reagents, and surplus funds from the first fund. The use of funds from both funds is within a reasonable range. If the paper is a multicenter study, the number of funding sources from the authors' institutions that can be listed should reflect the reasonable division of labor and collaboration among the participating institutions.

Regarding the second question, we should first review the announcements on matters related to the application and conclusion of the NSFC in the past 3 years. The announcement on matters related to the application and conclusion of NSFC in 2022[25] stipulates that "papers to be published or without indication of NSFC funding and project approval numbers shall not be included in the conclusion/result report; the content of papers shall not be directly copied as the content of the conclusion/result report". In 2023, based on the 2022 announcement, it was added that "achievements earlier than the start time of project funding shall not be included in the conclusion/result report".[26] In 2024, based on the 2023 announcement, it was added that "research achievements obtained by non-principal investigators or non-main participants shall not be included in the conclusion/result report; research achievements unrelated to the funded project shall not be included in the conclusion/result report".[27] There is no clear stipulation on the proportion of papers in the conclusion, but it is generally proposed that irrelevant personnel and irrelevant achievements shall not be included in the conclusion/result report. This shows that the NSFC has gradually realized the performance evaluation in fund conclusion and will gradually standardize the fund conclusion work. In 2022, Guangdong Province issued the *Guangdong Provincial*

Table 6: Cases of multiple and improper annotations in 916 fund-supported papers

Multiple annotations in one paper	Number of papers	Total number of funds	Number of funding projects with improper time annotations, *n* (%)[a]	Number of funds supported by NSFC, *n*	Number of improper content annotations by NSFC, *n* (%)[b]
9 annotations	7	63	6 (6/63; 9.52%)	19	5 (5/19; 26.23%)
8 annotations	3	24	4 (4/24; 16.67%)	4	4 (4/4; 100%)
7 annotations	2	14	2 (2/14; 14.29%)	1	1 (1/1; 100%)
6 annotations	16	96	10 (10/96; 10.42%)	23	6 (6/23; 26.09%)
5 annotations	33	165	21 (21/165; 12.73%)	45	13 (13/45; 28.89%)
4 annotations	54	216	14 (14/216; 6.48%)	60	20 (20/60; 33.33%)
3 annotations	158	474	31 (31/474; 6.54%)	70	24 (24/70; 34.29%)
2 annotations	319	638	44 (44/638; 6.90%)	165	38 (38/165; 23.03%)
1 annotation	324	324	20 (20/324; 6.17%)	120	17 (17/120; 14.17%)
Total	916	2014	-	507	-

Funding time was lacking in the following—in papers with nine annotations (2), in those with six annotations (8), in those with five annotations (14), in those with four annotations (14), in those with three annotations (54), and in those with two annotations (44). [a]The number of funding projects with improper time annotations refers to the ratio of the number of funding projects with improper time annotations to the total number of funding projects for that item (number of funding projects with improper time annotations/[number of *X* annotations × number of *X* annotation papers], *X*: [2–9]). [b]The number of NSFC funding projects with improper content annotations refers to the ratio of the number of improper content annotations to the number of the NSFC funding projects for that item (number of funding projects with improper content annotations/number of funding projects supported by the NSFC). NSFC, National Natural Science Foundation of China.

Scientific Research Integrity Management Measures (Trial),[28] and those who engage in scientific research dishonesty behaviors during the fund application process shall be dealt with in accordance with relevant regulations.

Regarding the third question, since the NSFC and the provincial natural science funds have not yet fully shared the application content, it is impossible to prohibit it at the application level. However, the rationality of fund applications can be inferred in reverse from the paper publication stage.

SUGGESTIONS

Scientific research management departments should strengthen the normative education from fund application to conclusion

Firstly, in earlier years, courses on thesis writing and fund application were not offered at the postgraduate level in medical colleges and universities. Postgraduates relied on the guidance and assistance of their research teams to write theses, resulting in uneven levels of thesis writing skills. After realizing this issue, medical colleges and universities have successively offered courses on academic paper writing,[29] and the overall level of paper writing among graduate students has improved. However, various institutions do not have systematic courses on grant application because most grant applications occur after employment rather than during graduate studies. Secondly, grant application and project completion have not yet formed a distinct academic discipline. Fund management departments and project leaders have different perspectives on application and completion, and the currently available fragmented lectures do not effectively integrate the standardized requirements of the entire process from grant application to completion. Lastly, not all future job positions for current graduate students will necessarily require applying for grants. It is recommended that scientific research management departments actively cooperate with the funding agencies to systematize issues related to grant writing, application, and project completion. These should be incorporated into continuing education for professional and technical personnel, as well as into onboarding training for new teachers and new employees.

Journal editorial offices should base the acceptance of papers on their innovativeness and academic quality

As domestic journal evaluation departments incorporate the proportion of funded papers into their assessment systems, journals have gradually begun to prioritize such papers, even adopting provincial/ministerial level or higher fund support as a criterion for manuscript acceptance. The proactive pursuit of funding projects by journal editorial offices, coupled with lax scrutiny of funding projects during the manuscript review process, has led to a certain proportion of improper labeling of the NSFC projects within the sample of this investigation. Similar mislabeling issues exist for non-NSFC funds as well. The problem of improper fund labeling originates from the authors' active designation. Multiple instances of academic misconduct involving fund labeling suggest that such behavior is difficult to resolve through persuasion and education alone. Knowing it is

inappropriate, authors still label unrelated funds in their papers for reasons such as fund project completion, enhancing the prestige of their papers for rapid publication, or increasing academic achievements credited to funds. This behavior cannot be avoided through persuasion and education, necessitating the exercise of editorial review authority. As gatekeepers of academia, journal editors should base manuscript acceptance primarily on innovation and academic quality.[30] They can inform authors that fund-supported papers are welcome, but funding status is irrelevant to the decision on publication. For papers with funding support, authors should be required to provide the funding project's name, number, participants, and abstract to enable a comprehensive review of the funding. This approach can address the issues of "fabricated labeling", "irrelevant content labeling", "author-irrelevant labeling", "premature labeling", and "overtime labeling" mentioned in *the Measures*[17] and *the Standards*.[15]

Fund management departments should curb repeated attribution at the fund project conclusion level

The achievements section of the final report for the NSFC projects is required to list all accomplishments of the projects, including journal papers, achievements transformation and application status, and personnel training situations. For journal papers, the approval numbers of the NSFC funding should be indicated. According to the current search situation on the NSFC website, there is no requirement during the finalization stage that journal papers be independently funded by the NSFC, nor is there a prohibition against a single paper being marked with multiple NSFC funds. This indirectly provides an environment for the phenomenon of multiple markings for one paper to breed. It is recommended that fund management departments clearly stipulate during the application stage that papers serving as final project achievements should be independently funded by the fund projects. If cooperation is indeed necessary and multiple funds need to be marked for one paper, it is assumed that the paper share will be equally divided according to the number of jointly marked fund projects.

CONCLUSION

In this study, 23 medical university journals were selected as research objects, and a systematic sampling method was employed to extract complete issues of academic papers 3 years before and after the first issue of each journal. By examining and counting the papers and funds, it is found that there are cases of improper annotation of fund time, irrelevant annotation of fund content, and irrelevant annotation of fund authors in the top medical university journals. At the same time, there are also cases of multiple annotations for one paper. Whether it is improper fund annotation or inappropriate multiple annotations for one paper, it has led to repeated funding of fund projects and multiple attributions of scientific research achievements. In order to curb this, it is recommended that scientific research management departments strengthen the normative education from fund application to finalization, journal editorial departments strengthen the fund review and consider the innovation and academic quality of papers as the basis for acceptance, and fund management departments curb multiple outcomes at the fund finalization level. It is of great significance for maintaining academic integrity, clarifying intellectual property ownership, standardizing fund use and improving fund funding effects.

DECLARATIONS

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None.

Author contributions

Yu J: Design research approaches, draft, revise the paper, finalize the paper. Wu JJ: Propose research directions, design research approaches, participate in paper review. Fang YC: Collect 2014 funding projects of 916 papers separately, analyze the data, create tables, and complete statistical analysis. Xu J, Gao GQ: Design research approaches and participate in paper writing, revision and review. All authors have read and approved the final version of the manuscript.

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Ethical approval

Not applicable.

Informed consent

Not applicable.

Conflict of interest

The authors have no conflicts of interest to declare.

Use of large language models, AI and machine learning tools

None declared.

Data availability statement

Data used to support the findings of this study are available from the corresponding author at wjj@organtranspl.com.

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