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Who gets funded? Determinants of research funding among dentists affiliated with the Brazilian Society of Stomatology and Oral Pathology

Quem recebe financiamento? Determinantes do financiamento em pesquisa entre dentistas filiados à Sociedade Brasileira de Estomatologia e Patologia Oral

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ABSTRACT

Objective: This study aimed to examine whether the number of funded research projects is associated with publication output among Brazilian researchers in the fields of Oral Pathology and Oral Medicine. **Material and Methods:** The sample was composed of 178 dental professionals affiliated with the Brazilian Society of Stomatology and Oral Pathology. A negative binomial regression model was employed to assess the association between the number of funded research projects and bibliometric indicators of productivity. **Results:** The analysis revealed that each one-point increase in a researcher's h-index corresponded to a 3.9% rise in the expected number of funded projects (Exp(B) = 1.039; p = 0.001), and each additional last-author publication was associated with a 1.4% increase (Exp(B) = 1.014; p = 0.024). **Conclusion:** The findings suggest that funding allocation is more closely related to sustained scholarly impact and senior authorship than to publication volume alone. Further studies employing qualitative or longitudinal methods may clarify the determinants of funding allocation in Brazilian Oral Pathology and Oral Medicine.

KEYWORDS

h-index; Oral medicine; Oral pathology; Research funding; Scientific productivity.

RESUMO

Objetivo: Este estudo teve como objetivo investigar se o número de projetos de pesquisa financiados está associado à produção de publicações entre pesquisadores brasileiros nas áreas de Patologia Oral e Medicina Oral. **Material e Métodos:** A amostra foi composta por 178 profissionais de odontologia vinculados à Sociedade Brasileira de Estomatologia e Patologia Oral. Um modelo de regressão binomial negativa foi utilizado para avaliar a associação entre o número de projetos financiados e os indicadores bibliométricos de produtividade. **Resultados:** A análise revelou que cada aumento unitário no índice h de um pesquisador correspondeu a um crescimento de 3,9% no número esperado de projetos financiados (Exp(B) = 1,039; p = 0,001), e cada publicação adicional como último autor foi associada a um aumento de 1,4% (Exp(B) = 1,014; p = 0,024). **Conclusão:** Os resultados sugerem que a alocação de financiamento está mais relacionada ao impacto acadêmico sustentado e à autoria sênior do que apenas ao volume de publicações. Estudos futuros, empregando métodos qualitativos ou longitudinais, podem melhor esclarecer os determinantes da alocação de financiamento no Brasil em Patologia Oral e Medicina Oral.

PALAVRAS-CHAVE

Índice h; Medicina oral; Patologia oral; Financiamento em pesquisa; Produtividade científica.

INTRODUCTION

As research expenditure faces increasing scrutiny worldwide, the relationship between public funding and scientific productivity has become a major topic of debate. This is driven by growing pressure to justify research and development investments and evaluate the efficiency of resource allocation in scientific research [1-3].

Conventional wisdom holds that funding improves research infrastructure, data accessibility, study robustness, and collaboration [4]. Thereby driving higher publication rates, citations, and scientific influence [5-7]. Funding not only boosts research quantity but also elevates quality and reach. Studies with financial support have been published in high-impact journals [2,5], and garner more citations [8]. International or multi-source funding further amplifies these advantages, suggesting a strategic value in diversified investments [2].

In this context, research incentive policies have played a crucial role in advancing Brazilian scientific production. The National Council for Scientific and Technological Development (CNPq) has been instrumental in this effort, funding research projects, and awarding scholarships, most notably the Research Productivity Fellowship (PQ) [9]. Such support has significantly boosted both the growth and international visibility of Brazilian research [10,11].

Given the limited empirical evidence on how research funding affects individual scientific productivity, this study examines whether the number of funded projects correlates with publication output among Brazilian researchers in Oral Pathology and Oral Medicine (OP/M). We analysed this relationship independently of Journal Citation Reports (JCR) indexing while accounting for other potential confounding factors. By doing so, this research aims to provide a more nuanced understanding of the role of funding role in shaping scientific output in OP/M.

MATERIAL AND METHODS

We initially identified 231 dental professionals affiliated with the Brazilian Society of Stomatology and Oral Pathology (SOBEP) [12] whose primary specialty was Oral Pathology/Medicine (OP/M). To ensure at least ten years of potential academic activity for comparable assessment of both research productivity and funding history, we restricted inclusion to professionals who had completed their PhD by 2015. This selection criterion yielded a final sample of 178 dental professionals.

Data were extracted from the researchers' academic curricula available on the Lattes Platform [13]. The analysis considered the following variables: affiliated institutions; geographic region (South, Southeast, Central-West, Northeast, North); gender (male or female); number of scientific articles published in journals indexed by the JCR; total number of published articles; year of PhD completion; h-index, as provided by the SCOPUS Platform [14]; number of funded research projects; frequency of funding agencies (First, Second, or Third); and authorship prominence (First, Second, Last, Second-to-last, Corresponding author, and others). For the variables "Second author" and "Second-to-last author" in authorship prominence, only publications with more than nine authors were considered. Data were collected between February and June 2025, encompassing all publications and activities listed up to December 2024. All the extracted data were systematically organized into Microsoft Excel spreadsheets (Microsoft Corporation, 2025).

Statistical analyses were performed using SPSS version 20 for Windows (Chicago, Armonk, NY, USA®). Initially, the Mann–Whitney, Kruskal–Wallis, and Spearman tests were employed to identify variables with a significance level of ≤ 0.20. Subsequently, the identified variables were incorporated into a multiple negative binomial regression model, a method suitable for overdispersed count data. In all models, the number of funded research projects per researcher was used as the dependent variable. A stepwise elimination procedure was implemented by systematically removing the variable with the highest p-value at each iteration. Ultimately, only variables with p-values <0.05 were retained in the final model.

RESULTS

Among the 178 researchers, the majority were affiliated with institutions located in Southeast Brazil (51.1%), with a substantial concentration in the state of São Paulo (31.5%). The cohort was predominantly female (59.6%). The institutions with the highest representation were the Universidade de São Paulo (11.2%) and the Universidade Federal do Rio Grande do Norte (6.2%), followed by the Universidade

Federal de Minas Gerais, Universidade Estadual Paulista Júlio de Mesquita Filho (UNESP), and the Universidade Estadual de Campinas (4.5%).

The duration since the attainment of their PhDs ranged from 10 to 53 years, with a median of 17.5 years (IQR: 13–23). The h-index ranged from 1 to 53, with a median of 15 (IQR: 10–22). A significant yet weak positive correlation was identified between the number of funded research projects and the number of published scientific articles, both with and without Journal Citation Reports (JCR) indexing. Table I presents the outcomes of the negative binomial regression models.

For publications not indexed in JCR, each additional funded project was associated with a 6.2% increase in the expected number of published articles (Exp(B) = 1.062; $p < 0.05$). In the reverse model, each additional article predicted an 0.8% increase in the expected number of funded projects (Exp(B) = 1.008; $p < 0.001$). For JCR-indexed publications, the estimated effect was slightly higher. Each additional funded project was associated with a 7.5% increase in the number of publications (Exp(B) = 1.075; $p < 0.001$), whereas each additional publication was associated with a 1% increase in the number of funded projects (Exp(B) = 1.010; $p < 0.001$).

Among the funding agencies mentioned by the researchers, CNPq was the most consistently cited, appearing as the primary, secondary, or tertiary funder in a substantial proportion of cases. It was the most frequent agency in 31% of instances, second in 36.6%, and third in 26.2%, amounting to an overall frequency of 32%. The São Paulo Research Support Foundation (FAPESP) was also a major contributor, showing great first frequency (21.4%) and decent secondary (9.8%) and tertiary (9.5%) roles, resulting in an overall frequency of 15.6%. The Coordination for the Improvement of Higher Education Personnel (CAPES), on the other hand, was rarely the first cited agency (2,4%), but was more prominent in the third (19%) and second (7.3%) positions, contributing to an overall frequency of 6.8%. Other agencies, such as the Minas Gerais Research Support Foundation (FAPEMIG) and the Carlos Chagas Filho Foundation for Research Support of the State of Rio de Janeiro (FAPERJ), appeared in limited proportions. The results are presented in Table II.

Authorship position showed varying degrees of association with the number of funded research projects. In Table III, Spearman's correlation analysis shows that last authorship ($\rho = 0.386$; $p < 0.001$) and second-to-last authorship ($\rho = 0.340$; $p < 0.001$) were the positions most strongly associated with a higher number of

Table I - Associations between the number of funded projects with publication volume, with and without JCR indexing, as per 2015–2024

Variables	B	p	Exp(B)	95% CI	
				Minimum	Maximum
No JCR indexing	0.060	0.001	1.062	1.025	1.100
With JCR indexing	0.072	< 0.001	1.075	1.037	1.114

Note. B = unstandardized coefficient; p = significance level; Exp(B) = exponent of the unstandardized coefficient; 95% CI = 95th percentile confidence interval provided for Exp(B).

Table II - Frequency of research funding agencies cited as first, second, and third source of project funding, as per 2015–2024

Funding Agency	1st Position (%)	2nd Position (%)	3rd Position (%)	Overall Frequency
CNPq	31.0	36.6	26.2	32.0
FAPESP	21.4	9.8	9.5	15.6
CAPES	2.4	7.3	19.0	6.8
FAPERJ	7.9	-	-	4.0
FAPEMIG	5.6	4.9	-	4.4
Other FAPs*	11.2	10.8	9.6	10.8
Other**	20.5	30.6	35.7	26.4

Frequently cited funding agencies across three levels of project attribution. CNPq was the most cited agency across all funding positions (overall 32.0%), followed by FAPESP (15.6%) and CAPES (6.8%).
*Other State Funding Agencies (n=15).
**Compromises a variety of minor funding agencies (n=45).

funded research projects. Co-authorship in non-primary positions ("other") also demonstrated a moderate correlation ($\rho = 0.354$; $p < 0.001$), while second authorship showed a weaker but still significant association ($\rho = 0.175$; $p = 0.020$). No significant correlations were found for first authorship ($\rho = 0.048$; $p = 0.528$) or corresponding author ($\rho = 0.096$; $p = 0.204$).

A stepwise negative binomial regression analysis was conducted to identify the key predictors of research funding. Initially, several variables were included in the full model: authorship position, h-index, year of PhD completion, number of JCR-indexed scientific articles, and geographic region. Among the authorship variables, only the number of publications in which the researcher appeared as the last author remained statistically significant. Each additional last authorship was associated with a 2.1% increase in the expected number of funded projects ($p < 0.001$), whereas all other positions became statistically irrelevant when included in the same model.

In the final model, only the h-index and the last authorship remained significant. As shown in Table IV, each one-point increase in the h-index was associated with a 3.9% increase in the expected number of funded research projects (Exp(B) = 1.039; $p = 0.001$), while each additional last author publication predicted a 1.4% increase (Exp(B) = 1.014; $p = 0.024$), controlling for all other variables.

Table III - Spearman correlation between authorship position and number of funded research projects, as per 2015–2024

Authorship Position	Spearman's ρ	p-value
First	0.048	0.528
Second (n>9)*	0.175	0.020
Last	0.386	< 0.001
Second-to-last (n>9)*	0.340	< 0.001
Corresponding Author**	0.096	0.204
Other Co-Authorship	0.354	< 0.001

Strength and direction of associations between different authorship positions and the number of research projects funded. Statistically significant positive correlations were observed for last authorship, second-to-last authorship (in publications with more than nine authors), second authorship, and other co-authorship positions. No significant correlation was found for first or corresponding authorship roles. *Only publications with more than nine authors were considered for this position. **Not related to other primary positions.

DISCUSSION

This study examined the relationship between scientific output and research funding among Brazilian researchers in OP/M. A consistent, albeit weak, positive association was found between the number of funded research projects and the volume of publications, with slightly stronger effects on JCR-indexed scientific articles. Each additional funded project was associated with a 7.5% increase in JCR publications and 6.2% increase in non-indexed publications. Conversely, each additional publication predicted only a modest increase in the number of funded projects (1% for JCR and 0.8% for non-JCR articles). These findings reinforce the idea that, while scientific productivity may contribute to securing research grants, funding itself plays a more substantial role in boosting publication output, especially in high-impact journals.

Our results align with those of previous studies in other fields that have demonstrated the positive effects of funding on research performance. Pao [15] found that funded authors in parasitology published significantly more articles, were cited more often, and favored journals with higher impact factors. Similarly, Wang and Shapira [2] showed that funded papers on nanotechnology appeared more frequently in prestigious journals and accumulated more citations. Ebadi and Schiffauerova [4] further reported that greater funding amounts were associated not only with higher productivity and journal quality, but also with broader collaborative networks.

The distribution of funding sources also revealed important structural patterns in how research support has been allocated across Brazilian agencies. CNPq emerged as the most prominent funder and the most frequently cited agency across

Table IV - Associations between the number of funded projects with h-index and last authorship, as per 2015–2024

Variables	B	p	Exp(B)	95% CI	
				Minimum	Maximum
H-index	0.038	0.001	1.039	1.017	1.061
Last authorship	0.014	0.024	1.014	1.002	1.026

Note. B = unstandardized coefficient; p = significance level; Exp(B) = exponent of the unstandardized coefficient; 95% CI = 95th percentile confidence interval provided for Exp(B).

researchers' project histories. It appeared in nearly one-third of all reported instances. This reflects its long-standing role as the central federal institution responsible for research support in Brazil. For example, CNPq has already established itself as a foundational pillar for scientific development in the biomedical sciences [16], a role that now appears to extend to OP/M as well.

Authorship positions in the bylines also revealed meaningful associations with funding volume. Among the various roles, the last authorship and second-to-last authorship (in publications with more than nine authors) showed the strongest positive correlations with the number of funded projects. These positions are typically held by senior researchers, group leaders, or supervisors [17], who often oversee project coordination and grant acquisition [18], explaining their close link to funding. Given these associations, we further tested them using a stepwise negative binomial regression, which accounted for the overdispersed nature of funding count data.

The final regression model revealed that among all tested variables, only the h-index and the number of publications with last authorship remained significant predictors of research funding. The significance of the h-index suggests that long-term citation performance is a strong predictor of funding success. This aligns with the findings that funded researchers tend to have higher h-indices than their unfunded peers [19]. Meanwhile, the persistence of the last authorship as a predictor underscores the critical role of senior researchers in grant acquisition [18].

This study has several limitations that should be considered when interpreting its findings. First, although the h-index is a widely used measure of academic impact, it does not distinguish between author roles (e.g., lead vs. supporting contributions) and can be inflated by self-citation or team-authored papers [20]. Additionally, because prior funding may increase publication output and citations, the observed links between the h-index, the last authorship, and funding could reflect reverse causality.

Also, our sample included only researchers affiliated with SOBEP, and the group was predominantly female. This limitation precludes determining whether demographic or academic characteristics differ between this sample and the broader research community in Brazil. Race and ethnicity data were also not obtained for this cohort, preventing any analysis of how these factors may relate to research funding in this context.

Lastly, the study did not include an independent search of all OP/M projects funded nationally by CNPq or any other major agencies during the last decade. As a result, it is not possible to determine how the projects reported by participants compare to the total funding volume in the field or to assess the representativeness of the sample within the national funding landscape.

Despite these limitations, the findings provide meaningful, though provisional, insight into the bibliometric predictors of funding. Therefore, researchers and policymakers should interpret these associations as contextual nuances.

CONCLUSION

This study examined individual and structural factors associated with research funding among Brazilian researchers in OP/M. The stepwise negative binomial regression model revealed that only the h-index and last authorship remained statistically significant, suggesting that cumulative scientific influence and visible project leadership are the strongest predictors of funding acquisition in this field. However, these findings should be cautiously interpreted. In summary, research funding appears to be driven less by sheer output volume, and more by sustained scholarly impact and senior academic roles.

Given the inherent limitations of bibliometric indicators and the characteristics of the study sample, future research incorporating broader researcher profiles and nationwide project databases, as well as qualitative or longitudinal approaches, would strengthen external validity and support a more comprehensive understanding of the dynamics of research funding allocation.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author's Contributions

DDP, ÁADS, HMJ: Conceptualization. DDP, ÁADS, FESO, EAO, MPML, HMJ: Data Curation. DDP, ÁADS, HMJ: Formal Analysis. DDP, ÁADS, MPML, HMJ: Investigation. DDP, ÁADS, FESO,

EAO, MPML, HMJ: Methodology. ÁADS, HMJ: Project Administration. DDP, FESO, EAO, MPML: Software. ÁADS, HMJ: Supervision. DDP, ÁADS, FESO, EAO, HMJ: Validation. DDP, ÁADS, FESO, EAO, HMJ: Visualization. DDP, ÁADS, HMJ: Writing – Original Draft Preparation. DDP, ÁADS, FESO, EAO, HMJ: Writing – Review & Editing.

Conflict of Interest

No conflicts of interest declared concerning the publication of this article.

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Regulatory Statement

Not applicable.

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