COVID-19 PANDEMIC'S INFLUENCE ON THE STUDY OF BURNOUT: A BIBLIOMETRIC ANALYSIS

A INFLUÊNCIA DA PANDEMIA DE COVID-19 NO ESTUDO DE BURNOUT: UMA ANÁLISE BIBLIOMÉTRICA

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ABSTRACT

Burnout affects physical and psychological health and is considered a major public health threat. The COVID-19 pandemic brought numerous social and economic challenges to organizations across the different work sectors, enhancing the risk of workers experiencing Burnout. However, the influence of the COVID-19 pandemic on the study of Burnout Syndrome remains unclear. To address this challenge, we analyzed pre-pandemic and post-COVID-19 outbreak research trends in this field. A comparative bibliometric analysis was conducted for the pre-pandemic period (01/2015 to 12/2019) and after the COVID-19 outbreak (01/2020 to 06/2021). Twelve thousand eighty-one publications were analyzed. Exponential growth in annual research activity on this subject was found since the COVID-19 outbreak. After 2020, the keyword "COVID-19" is often associated with "Burnout", showing a clear international focus on this field. Research output disparities among the most affected countries have been found, with increased publications in countries such as the United States of America, China, Spain and Italy, while others have understudied this subject (e.g., India, Brazil, France). Further bibliometric analyses in this scope are recommended.

Keywords: Bibliometric; Bibliometrix; Burnout; COVID-19; Pandemic.

RESUMO

O Burnout afeta a saúde física e psicológica e é considerado como uma grande ameaça para a saúde pública. A pandemia de COVID-19 trouxe inúmeros desafios sociais e económicos às organizações dos diferentes setores de trabalho, aumentando o risco de os trabalhadores sofrerem de Burnout. Contudo, a influência da pandemia de COVID-19 no estudo da Síndrome de Burnout permanece pouco clara. Para enfrentar este desafio, analisámos as tendências de investigação pré e pós-pandemia de COVID-19. Foi realizada uma análise bibliométrica comparativa para o período pré (01/2015 a 12/2019) e pós-pandémico (01/2020 a 06/2021). Foram analisadas doze mil e oitenta e uma publicações. Foi encontrado um crescimento exponencial na atividade anual de investigação sobre este assunto desde o surto da COVID-19. Após 2020, a palavra-chave "COVID-19" está frequentemente associada a "Burnout", mostrando um claro enfoque internacional neste campo. Foram encontradas disparidades na produção de investigação entre os países mais afetados, com o aumento de publicações em países como os Estados Unidos da América, China, Espanha e Itália, enquanto outros estudaram pouco este assunto (por exemplo, Índia, Brasil, França). Recomenda-se a realização de mais análises bibliométricas neste âmbito.

Palavras-Chave: Bibliometria; Bibliometrix; Burnout; COVID-19; Pandemia.

1. INTRODUCTION

Coronavirus Disease-2019 (COVID-19) refers to a life-threatening pandemic that challenged the world since January 2020, with unprecedented and long-lasting disruptive effects on a human, social and financial level (Chen et al., 2021; Kamps & Hoffman, 2020a, 2020b; Kloutsiniotis et al., 2022; World Health Organization [WHO], 2020). Since January 2020, several worldwide efforts were concentrated to manage the spread of the virus (e.g., restrictive social isolation, mandatory mask use), transforming work environments and exposing workers to previously unheard-of working conditions and scenarios (Chahrour et al., 2020; Fan et al., 2020; Ramaci et al., 2020; Sullivan et al., 2022). Most organizations felt pressured to restructure their activities (e.g., remote work, halt areas/departments) to cope with the global public health crisis and ensure workers' health and well-being (Ramaci et al., 2020).

Despite such efforts, current reports suggest that workers experience psychological problems (e.g., stress, depression, fear, anxiety) (Kloutsiniotis et al., 2022). COVID-19 has disrupted workers' daily lives, increasing their workload while undermining their sense of control and organizational reward/recognition. This can likely lead work personnel to experience Burnout Syndrome (Leiter, 2020; Maslach, 2020).

Burnout, discovered by Freudenberger (1974) and Maslach (1976), refers to a physical, emotional, and mental exhaustion state that can be a potential consequence of prolonged exposure to highly emotionally demanding situations in the workplace, typically caused by combining very high expectations and chronic situational stress levels (Maslach, 2020; Maslach et al., 2001; Maslach & Jackson, 1981; Queen & Harding, 2020). According to Maslach and Jackson (1981), Burnout Syndrome is composed of emotional exhaustion, depersonalization, and reduced personal accomplishment. Emotional exhaustion refers to the stress dimension, where the individual feels emotionally drained, fatigued, and with low energy and resilience levels to perform normal daily tasks or address changes (Maslach, 2006; Maslach & Leiter, 1997). Depersonalization represents Burnout's interpersonal dimension, where the individual's frustration is externalized as cynicism, coldness, and social/emotional detachment, mainly towards work settings and coworkers (Maslach, 2006; Maslach & Leiter, 1997, 2017). Reduced personal accomplishment represents Burnout's self-assessment indicator, where individuals experience feelings of incompetence and lower work achievement and productiveness (Maslach, 2006). Although this is mainly experienced for work-related tasks, individuals can also experience reduced personal accomplishments in their personal and private spheres. Each new task is felt too demanding, accompanied by apathy, low levels of creativity, concentration difficulties and negative self-image (Maslach & Leiter, 1997).

Burnout can pose significant threats to individuals' physical and psychological health, influencing their work performance (Maslach & Leiter, 2017). Over the years, studies have reported a link between Burnout and several diseases such as cardiovascular problems, type 2 diabetes, depression, anxiety and irritability, and recurrence to unhealthy behaviours (e.g., tobacco, alcohol, and drug use) (Ahola, 2007; Greenglass & Burke, 1990; M. P. Leiter et al., 2013; Melamed et al., 2006; Toker et al., 2005, 2012). In parallel, Burnout can cause people to have more negative reactions to work (e.g., job dissatisfaction, poor performance, absenteeism, turnover), impacting their personal and family lives (Maslach & Leiter, 2017).

Over time, the scientific community has shown an interest in defining the Burnout construct and studying its prevention, diagnosis, and treatment (Maslach & Leiter, 2017; Schaufeli et al., 2009). Since the initial COVID-19 reports worldwide, research activity on Burnout Syndrome has grown exponentially (Mohadab et al., 2020).

However, no prior study sought to comprehend the influence of the COVID-19 pandemic on the study of Burnout Syndrome, addressing possible theoretical and practical limitations. To address this challenge, we analyzed pre-

pandemic and post-COVID-19 outbreak research trends in this field.

2. METHODS

A bibliometric literature analysis was conducted, aiming to quantitatively analyze published data and to build bibliometric maps that describe how specific research disciplines, scientific domains, or fields are conceptually, intellectually, and socially structured (Araújo, 2018; Bakker et al., 2005; Chen et al., 2019). Morevover, we aimed to provide an overview of Burnout and discuss potential areas for further research (Bakker et al., 2005). This bibliometric review focused on five main areas: study design, data collection, data analysis, data visualization and interpretation (Aria & Cuccurullo, 2017; Zupic & Čater, 2015).

2.1. STUDY DESIGN

We analyzed the research activity on Burnout before and after the COVID-19 outbreak. Articles on this subject were categorized as pre-pandemic (between January 1, 2015, to December 31, 2019) and after the outbreak (January 1, 2020, to June 25, 2021). The pre-pandemic period was confined to five years, reporting the most recent publications on Burnout Syndrome.

2.2. DATA COLLECTION

Data collection was performed in three steps: data retrieval, data loading and converting, and data cleaning (Aria & Cuccurullo, 2017). Data retrieval selects datasets, filtering and targeting documents for a constantly evolving search (Aria & Cuccurullo, 2017). Only English-language articles indexed in the Scopus database and containing the word “Burnout” in the title, abstract, or keywords were considered.

Data loading and converting were conducted through Bibliometrix, where essential data was retrieved (e.g., authors, citations, production country or keywords) (Zupic & Čater, 2015) and converted into a suitable format for posterior analysis (Aria & Cuccurullo, 2017). Data cleaning was performed to remove duplicates and misleading elements (e.g., overlapping authors’ names, journals) (Aria & Cuccurullo, 2017).

2.3. DATA ANALYSIS

Data analysis was performed using R software, specifically Bibliometrix codes and Biblioshiny. R Software is a highly capable statistical programming language that provides a free, flexible and extensible environment for research and analysis (Aria & Cuccurullo, 2017). Bibliometrix is the most popular R package tool, allowing descriptive and interactive analyses (Aria & Cuccurullo, 2017). It has simple functions enabling descriptive analyses (e.g., the most relevant authors by publication number or creating a co-citation network) (Aria & Cuccurullo, 2017; Campra et al., 2021; Linnenluecke et al., 2020). Biblioshiny is a web interface for bibliometrix that creates conceptual maps, subject dendrograms and thematic trend figures, and analyses the most active geographic areas (Campra et al., 2021).

2.4. DATA VISUALIZATION AND INTERPRETATION

During this step, we extracted relevant information through analytical methods (Aria & Cuccurullo, 2017). Result analysis was conducted through visual data reporting (e.g., proximity maps, temporal analysis maps, or thematic networks), as well as analyzing a subject’s conceptual, intellectual, or social evolution and determining patterns, trends, or outliers (Aria & Cuccurullo, 2017; Campra et al., 2021).

3. RESULTS

Twelve thousand and eighty-one records were retrieved from Scopus during data collection, of which 7373 (61%) were published during the pre-pandemic period. We identified 3343 publishing sources, with 17220 keywords used to describe the published records, where the keywords plus are higher than articles found (Table 1).

Table 1 – Key information from the total sample of publications (*n* = 12081)

Description	Results
Documents	12,081
Time period	2015–2021
Sources (journals, books, etc.)	3,343
Keywords plus (ID)	16,875
Authors keywords (DE)	17,220
Average citations per document	8,475
Authors	37,321
Authors' manifestations	52,879
Authors of single-authored documents	1,078
Authors of co-authored documents	36,243
Individual authorship documents	1,218
Documents per author	0.324
Authors per document	3.09
Co-authors per document	4.38
Collaboration index	3.34

In total, 37321 authors were involved in the global research output found, with each article averaging four authors (4.38), with a collaboration index of 3.34 (Köseoglu et al., 2018).

The analysis period covers almost seven years of research activity, with the last three years coinciding with the most substantial growth in subject-related publications (Table 2). The number of publications on Burnout Syndrome was constant during the pre-pandemic period, with a yearly increase in studies ranging from 17.5% (2015 to 2016) to 26.5% (2018–2019). However, after the COVID-19 outbreak, a 36.2% increase in publications on Burnout Syndrome was identified from 2019 to 2020. More impressively, the number of publications that focus on Burnout Syndrome was bigger in the first semester of 2021 than in 2018.

Table 2 – Annual research activity on Burnout between January 2015 and June 2021

	Year	Papers
Pre-pandemic	2015	1,009
	2016	1,186
	2017	1,371
	2018	1,681

	2019	2,126
After the COVID-19 outbreak	2020	2,895
	2021	1,813

Before COVID-19, Zhang Y was the leading author on Burnout (*n* = 49), followed by Wang Y (*n* = 45), while after COVID-19, Wang Y became the most-published author on the topic (*n* = 28), followed by Li X (*n* = 25) (Table 3).

Table 3 – The number of papers per author before and after the COVID-19 outbreak

Pre-pandemic			**After the COVID-19 outbreak**		
Ranking	**Authors**	**Papers**	**Ranking**	**Authors**	**Papers**
1	Zhang Y	49	**1**	Wang Y	28
2	Wang Y	45	**2**	Li X	25
3	Liu J	35	**3**	Wang J	24
	Liu Y	35			
4	Li Y	34	**4**	Wang X	23
				Zhang L	23
5	Wang Z	33	**5**	Liu J	22
				Liu Y	22
6	Li X	29	**6**	Li J	21
				Zhang X	21
7	Shanafelt Td	28	**7**	Li Y	20
				Liu X	20
	Zhang J	28		Wang C	20
				Wang H	20
8	Li J	26	**8**	Shanafelt Td	18
	Li Z	26		West Cp	18
9	Bianchi R	25	**9**	Liu H	17
	Wang L	25			
10	Wang X	23	**10**	Dyrbye Ln	16
				Roskam I	16
				Wang L	16
				Zhang Y	16

Authors' keywords are essential to determine research trends, identify possible gaps in the subject study, and identify fields that may require further investment (Campra et al., 2021). In the pre-pandemic period (Table 4), "Burnout" appears to be the most used keyword in published articles (*n* = 2538), followed by "stress" (*n* = 477). After the pandemic outbreak, the keyword "COVID-19" (*n* = 301) immediately follows "Burnout" (*n* =

1755) in published articles. From 2015 to date, “stress” (*n* = 765), “job satisfaction” (*n* = 445), and “mental health” (*n* = 394) are the three terms that most closely follow “Burnout” (*n* = 4293), placing “COVID-19” (*n* = 301) in a less prominent, though significant and influential position since the initial outbreak reports.

Table 4 – Keywords most used by the authors between January 2015 and June 2021: a) In total; b) Comparative analysis for both periods

a) In total	
Keyword	**Frequency**
Burnout	4,293
Stress	765
Job Satisfaction	445
Mental Health	394
Resilience	378
Depression	353
Nurses	343
Compassion Fatigue	303
COVID-19	301
Well-being	282

b) Comparative analysis in both periods			
Pre-pandemic		**After the COVID-19 outbreak**	
Keyword	**Frequency**	**Keyword**	**Frequency**
Burnout	2,538	Burnout	1,755
Stress	477	COVID-19	301
Job satisfaction	295	Stress	288
Depression	213	Mental health	213
Nurses	211	Resilience	178
Resilience	200	Job satisfaction	150
Compassion fatigue	187	Well-being	146
Mental health	181	Depression	140
Emotional exhaustion	167	Nurses	132
Job burnout	163	Compassion fatigue	116

Analyzing the study of Burnout by geographic area requires the understanding of essential variables such as the number of publications, citation rates, and networking. As Table 5 shows, Burnout Syndrome was most studied in the United States of America (USA) (*n* = 6292 publications in the pre-pandemic period; *n* = 4670 after the COVID-19 outbreak), followed by China (*n* = 1640 publications in the pre pandemic period; *n* = 1228 after the COVID-19 outbreak).

Table 5 – Countries with the highest research activity compared the ten countries with the most confirmed COVID-19 cases on June 25, 2021 (WHO, 2022)

a) Before COVID-19

Ranking	Country	Publications
1	USA	6292
2	China	1640
3	UK	1027
4	Canada	904
5	Australia	835
6	Spain	708
7	Germany	526
8	France	495
9	Netherlands	477
10	Brazil	462

b) After the COVID-19 outbreak, compared to the ten countries with the most confirmed cases on June 25, 2021 (WHO, 2022)

Ranking	Country	Publications	Ranking	Country	Confirmed cases
1	USA	4670	**1**	USA	33,245,165
2	China	1228	**2**	India	30,134,445
3	Spain	647	**3**	Brazil	18,169,881
4	UK	637	**4**	France	5,656,376
5	Canada	534	**5**	Russia	5,409,088
6	Australia	467	**6**	Turkey	5,393,248
7	Italy	450	**7**	UK	4,794,629
8	France	380	**8**	Argentina	4,492,092
9	Turkey	282	**9**	Italy	4,255,700
10	Iran	276	**10**	Colombia	4,027,016

Several of the countries deeply affected during the first wave of COVID-19 also showed a greater volume of scientific production. Spain moved from sixth place before the pandemic (*n* = 708 publications) to third place after the COVID-19 outbreak (*n* = 647). Other countries such as Italy (*n* = 450 publications), Turkey (*n* = 282) and Iran (*n* = 275) only emerged in the ranking of countries with the highest scientific production on this topic after the COVID-19 outbreak. Conversely, countries such as India and Brazil [second and third countries with the highest rate of confirmed COVID-19 cases until June 25, 2021 (WHO, 2022) did not appear in this ranking.

Concerning the number of citations per country (Table 6), during the pre-pandemic period, studies conducted in the USA (*n* = 25774), China (*n* = 8359), and the United Kingdom (UK; *n* = 3940) received the highest number of

citations (Table 6). Despite their population number, studies conducted in countries such as Belgium (27.98), the Netherlands (21.59), and Finland (17.62) showed a significant citation average. After the COVID-19 outbreak, China became the country with the highest citation number (*n* = 2570), followed by the USA (*n* = 2256) and Italy (*n* = 610). Additionally, countries such as China (6.47), Singapore (5.87), and India (5.65) displayed the highest citation averages.

Table 6 – Most frequently cited countries in the Burnout study before and after the COVID-19 outbreak

a) Pre-pandemic

Ranking	**Country**	**Total citations**	**Average citations per article**
1	USA	25744	15.85
2	China	8359	13.66
3	UK	3940	13.87
4	Australia	3508	13.70
5	Canada	2810	12.60
6	Spain	2705	13.66
7	Netherlands	2569	21.59
8	Germany	2420	13.52
9	Korea	1692	9.51
10	Sweden	1605	15.58
11	Italy	1581	11.80
12	Belgium	1287	27.98
13	France	1262	9.63
14	Finland	1110	17.62
15	Brazil	1025	8.99
16	South Africa	926	13.23
17	Turkey	901	7.90
18	Switzerland	867	12.39
19	Israel	816	9.71
20	Portugal	793	14.16

b) After the COVID-19 outbreak, compared to the ten countries with the most confirmed cases on June 25, 2021 (WHO, 2022)

Ranking	Country	Total citations	Average citations per article
1	China	2570	6.47
2	USA	2256	2.08
3	Italy	610	5.00

4	Spain	411	2.32
5	UK	358	2.14
6	India	339	5.65
7	France	246	3.24
8	Korea	231	2.27
9	Iran	217	2.71
10	Australia	196	1.59
11	Singapore	182	5.87
12	Germany	157	1.94
13	Canada	154	1.18
14	Finland	117	3.00
15	Turkey	115	1.25
16	Belgium	113	2.90
17	Switzerland	97	2.62
18	Netherlands	91	1.94
19	Poland	73	1.28
20	Portugal	70	1.67

It is worth noting that there were countries that published considerably on this subject in the pre-pandemic period but developed their studies at a slower pace in the following period, namely Sweden (*n* = 1605 publications), Brazil (*n* = 1025), South Africa (*n* = 926), and Israel (*n* = 816). Contrasting, countries such as India (*n* = 339), Iran (*n* = 217), Singapore (*n* = 182), and Poland (*n* = 73) emerged in this thematic study.

Table 7 – Major affiliations related to the burnout study before and after the COVID-19 outbreak

a) Pre-pandemic

Ranking	**Affiliations**	**Papers**
1	University of California	123
2	Mayo Clinic	116
3	Harvard Medical School	99
4	University of Toronto	94
5	Stanford University School of Medicine	60
6	University of Pennsylvania	57
7	University of Alberta	55
8	University of Helsinki	55
9	University of Michigan	52

10	University of Minnesota	50

b) After the COVID-19 outbreak

Ranking	**Affiliations**	**Papers**
1	University of California	94
2	Harvard Medical School	91
3	Mayo Clinic	62
4	Stanford University	57
5	Stanford University School of Medicine	53
6	University of Toronto	51
7	University of Pennsylvania	44
8	University of Calgary	41
9	Vanderbilt University Medical Center	40
10	University of Washington	39

Table 7 presents the authors' institutional affiliations for publications considered in both analysis periods. During the pre-pandemic period, authors from the University of California (*n* = 123) and the Mayo Clinic (*n* = 116) published the most on Burnout Syndrome. After the COVID-19 outbreak, this was accomplished by authors from the University of California (*n* = 94) and Harvard Medical School (*n* = 91). Regarding the journals in which these articles were published (**Table 8**), the International Journal of Environmental Research and Public Health was one of the lead publications in both periods, being the second journal that published the most on Burnout during the pre-pandemic period (*n* = 86 articles), assuming the leading position after the COVID-19 outbreak (*n* = 220).

Table 8 – Top journals published before and after the COVID-19 outbreak

a) Pre-pandemic

Ranking	**Sources**	**Papers**
1	Frontiers in Psychology	87
2	International Journal of Environmental Research and Public Health	86
3	Plos One	85
4	Bmj Open	64
5	Journal of Nursing Management	61
6	Energy and Fuels	56
7	Fuel	56
8	Journal of General Internal Medicine	56
9	Bmc Medical Education	42
10	Academic Psychiatry	37

b) After the COVID-19 outbreak		
Ranking	**Affiliations**	**Papers**
1	International Journal of Environmental Research and Public Health	220
2	Frontiers in Psychology	90
3	Fuel	49
4	Plos One	46
5	Current Psychology	36
6	Bmc Medical Education	34
7	Journal of Surgical Education	34
8	Journal of Nursing Management	30
9	Bmj Open	29
10	Journal of General Internal Medicine	29

4. DISCUSSION

The COVID-19 outbreak is considered a major public health threat worldwide, with a tremendous impact on every form of social order (Sohrabi et al., 2020). After the COVID-19 global outbreak, every sector of the economy has been hit by a severe economic slump, causing widespread internal and external organizational pressure, which can lead to the experience of Burnout Syndrome across the workforce (Maslach, 2020; López-López et al., 2020). Given the large increase in research activity following the COVID-19 pandemic, our data confirm this notion.

The COVID-19 pandemic has created unique challenges for organizations worldwide, contributing to workforce attrition while caring for employees' health and well-being (ElHawary et al., 2020; Quintero & Gutiérrez-Carvajal, 2021). Other challenges were larger than the organizations, prompting debates about social equality between workers from different sectors. For example, while many employees were mandated to work remotely, others were forced to remain on the front line, with increasing reports of insufficient personal protective equipment or adequate training. Moreover, financial anxiety was also high due to mass layoffs across different sectors (ElHawary et al., 2020; Iorio et al., 2020; Seleiman et al., 2020).

When work demands increase, and in certain circumstances, there can be an imbalance, whether caused by excessive workload, low hierarchical support, job instability, or even future uncertainty (Schaufeli et al., 2009). Excessive work demands, work-related ambiguities and conflicts, and insufficient family and social support can result in Burnout Syndrome (Maslach, 2020; Maslach et al., 2001).

Despite being a worldwide public health issue, the USA and China emerged as the top two contributors to the study of Burnout Syndrome in both periods. Only one of the ten most prolific institutes in the study of Burnout Syndrome during the pre-pandemic period was not headquartered in the United States. The University of California, Harvard Medical School, and the Mayo Clinic are the three institutions that dominate this analysis, and their research activity has not reduced with COVID-19, on the contrary.

Other countries with a high number of confirmed cases of COVID-19 (e.g., India and Brazil) (WHO, 2022) did not contribute as vastly to the study of their communities' physical and emotional exhaustion during the pandemic. Conversely, researchers from countries like Italy and Turkey focused their attention and resources on studying Burnout Syndrome after the COVID-19 outbreak.

Interestingly, countries with high research activity on Burnout Syndrome have strong scientific partnership agreements (Eurofound, 2018), indicating a desire to collaborate and share data to establish the scientific significance of their study findings on a macro level.

Some international scientific publication groups and journals immediately embraced the need for open-source, fast-track dissemination of research activity related to the COVID-19 pandemic. This may explain why after the COVID-19 outbreak, new publication sources rose to the top ten, focusing on several health-related disciplines such as public health, psychology, medicine and nursing.

Our findings must be analyzed with some limitations. First, most research on Burnout Syndrome was focused on the healthcare sector (e.g., physicians, nurses, psychologists). Although healthcare professionals were at risk of experiencing Burnout Syndrome even before the COVID-19 outbreak, other work sectors require the same amount of attention internationally. Comprehensive and reliable data on the effect of the COVID-19 pandemic on other workforces' experience of Burnout Syndrome (e.g., first responders, retail, tourism and hospitality) is urgently needed to increase organizational awareness and implement preventive strategies. Second, our results mirror the research activity indexed in the Scopus database. Although Scopus is a well-renowned and comprehensive scientific database, including records from other international databases would further refine our analysis.

Research constraints (e.g., time, resources, access to study population) on studying COVID-19 effects are increasingly less significant, and international collaborative efforts are emerging. Similar to social withdrawal effects on the individuals' emotional exhaustion (Fontanari, 2021; Mosolova et al., 2021), models must be developed to investigate, analyze, and combat Burnout Syndrome in a variety of work sectors, tailoring them to specific job demands, situations, and patterns.

5. CONCLUSIONS

Understanding the psychosocial impact that COVID-19 seems to have on workers' lives is essential, given that it can cause anxiety, depression, distress and insomnia, as well as Burnout symptoms (Duarte et al., 2020; Lai et al., 2020; Magnavita et al., 2020). In light of the continued economic and social challenges of the COVID-19 pandemic, future research should focus on the long-term effects of Burnout Syndrome on workers' quality of life and well-being.

DECLARATION OF INTEREST STATEMENT

The authors reported no potential conflict of interest.

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PROCEDIMENTOS ÉTICOS

Conflito de interesses: Nada a declarar. **Financiamento**: Nada a declarar. **Revisão por pares**: Dupla revisão anónima por pares.