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REVIEW PAPER

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Stress in nurses: The 100 top-cited papers published in nursing journals

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Abstract

Aim: To identify and analyse the 100 most cited papers on stress in nurses published in nursing journals.

Background: The number of citations an article receives is an index of its impact on the scientific community. An analysis of the most cited articles on stress in nursing would allow us to identify the most important articles and to obtain information about this area of knowledge.

Design: A retrospective bibliometric analysis.

Data sources: In 2016, 111 journals belonging to the "nursing" category were identified in the Science and Social Science Citation Index. A search was performed of the Science Core Collection Website for articles on stress published in these journals.

Review methods: The topic, type of article, publishing journal, countries and institutions of origin and year of publication were extracted from the articles. The impact factor, immediacy index, journal country and publisher and *h* index were collected from the Institute for Scientific Information. The citation density, citation tendency and Bradford's law were calculated.

Results: They identified articles were mostly empirical quantitative studies with a transversal design, published from 1975 - 2011 in 23 journals. They were signed by 233 authors, most of whom are English-speaking from the USA and UK. The core distribution of the publications comprises a single journal, the *Journal of Advanced Nursing*.

Conclusion: The study of stress in nursing has shown increased visibility and recognition each decade. The most recent articles have the highest number of citations, are the highest in rank and have the higher citation densities.

KEYWORDS
bibliometric analysis, literature review, nursing, occupational health, stress, top 100

1 | INTRODUCTION

Research in nursing through evidence-based practice or critical evaluation is fundamental to understanding and improving patient care (Allen, Jacobs, & Levy, 2006; Oermann, Shaw-Kokot, Knafl, & Dowell, 2010; Oermann et al., 2008). However, other types of research, where the workers themselves are the focus of attention and the aim is to try and improve nurses' skills, health or well-being, are also important for advancements in this area of knowledge (Hunt, Happell, Chan, & Cleary, 2012).

Studies carried out in different countries have recognized that nursing is a stressful profession. As McVicar or Lim et al. conclude (Lim, Bogossian, & Ahern, 2010a; McVicar, 2003) in their review on stress in nursing, workload, leadership/management style, professional relationships, conflict at work, role ambiguity, emotional demands, experiences of aggression, pay and shift work schedules are the main sources of stress for nurses. They also conclude that the nursing work environment provides a large number of changeable sources of stress, which are also perceived differently according to the different areas of specialization and even between individuals in the same department. Therefore, there is a need to carry out research that will lead to an understanding of personal and workplace factors and of the interaction between both to determine and evaluate the stress experienced by nurses and thereby implement effective prevention strategies.

The basic premise is that the papers published in scientific journals are a fundamental channel of communication between research and nursing practice (Allen et al., 2006; Oermann et al., 2008). In his study of nursing journals more than 30 years ago, Garfield (1984) confirmed that stress was one of the most dominant subjects in articles cited in nursing journals.

Through an analysis of the most cited papers in a scientific field, it is possible to identify the most recognized international contributions in a certain field at a specific time.

1.1 | Background

There have been some attempts to identify and analyse the most cited articles in some areas of health care, such as surgery (Huo et al., 2015; Joyce, Kelly, & Carroll, 2014; Joyce et al., 2015; Kelly, Glynn, O'Briain, Felle, & McCabe, 2010; Paladugu, Schein, Gardezi, & Wise, 2002; Ponce & Lozano, 2010), cardiovascular disease (Shuaib, Khan, Shahid, Valdes, & Alweis, 2015), urology (Hennessey, Afshar, & MacNeily, 2009), digestive disease (Loomes & van Zanten, 2013), radiology (Pagni, Khan, Cohen, & Choudhri, 2014; Yoon et al., 2013), integrative and complementary medicine (Tam, Wong, Wong, & Cheung, 2012), emergency medicine (Shuaib, Acevedo, Khan, Santiago, & Gaeta, 2015) or oncology (Tas, 2014). These types of studies have also been performed in the specific area of nursing, such as the top 50 most frequently cited articles in nursing journals (Garfield, 1984; Wong, Tam, Wong, & Cheung, 2013), or nursing academics in Canada (Hack, Crooks, Plohman, & Kepron, 2010). However, to our knowledge, no study has examined the most cited papers regarding a subject of study, such as stress, in a specific area of knowledge, such as nursing, as proposed in this research.

Analysis of the citations is a very important indicator in bibliometric research, since articles that cite authors are a means of determining the underlying socio-cognitive structure of an area of knowledge (Cronin, 2001). The number of citations received affects the impact factor of the journal where the paper is published and it also indicates the acknowledgement, influence, quality or reputation of a paper and of the authors who have written it (Joyce et al., 2014; Moed, 2009; Paladugu et al., 2002; Shuaib, Khan, et al., 2015).

Why is this research or review needed?

- Through an analysis of the most cited papers in nursing journals, it is possible to determine the most recognized international contributions in this field.
- We have not found any studies about the most cited papers regarding a subject of study, such as stress in nursing, as proposed in this research.

What are the key findings?

- There is an evident preference for publishing empirical quantitative studies on stress in nurses, in English-speaking countries and in few journals.
- The *Journal of Advanced Nursing* is the most representative nursing journal with respect to publishing the most cited papers on stress in nurses.

How should the findings be used to influence policy/practice/research/education?

- They should allow readers to become familiar with the authors, countries, institutions and journals that have made a leading contribution to stress in nurses.
- They should provide valuable information to understand the history and development of the study of stress in nursing and to plan future research.

2 | THE REVIEW

2.1 | Aim

From a bibliometric perspective, our main objective was to identify and analyse the principal characteristics of the 100 most cited papers on stress in nurses published in the nursing category in the Web of Science database.

2.2 | Design and ethics

Our study was a retrospective bibliometric analysis that did not involve humans and was exempt from institutional review board approval. Bibliometric analysis is a field of scientific study that aims to construct research performance indicators based on a quantitative analysis of academic documents (Moed, 2009).

2.3 | Search methods

In Journal Citation Reports (JCR) for the year 2015, there were 115 journals and 109 journals in the subject category of "nursing" in the Science Citation Index (SCI) and Social Science Citation Index (SSCI), respectively. After excluding duplicate journals, 111 different journals were included in our investigation.

Later, a search of the most frequently cited articles on stress was performed using the Web of Science (WoS) Core Collection of the ISI Web of Science (Thomson Reuters, Philadelphia, Pennsylvania), as described in similar studies (Huo et al., 2015; Joyce et al., 2014; Kelly et al., 2010; Pagni et al., 2014; Paladugu et al., 2002; Ponce & Lozano, 2010; Shuaib, Acevedo, et al., 2015; Tam et al., 2012; Wong et al., 2013; Yoon et al., 2013).

Thus, in June 2016 (T1), all WoS indexed articles from the 111 nursing journals were combined in our search in the area of "publication name" linked the "OR" operator and the word "stress" in the area "title". We did not impose any restriction on the basis of time, study type or availability.

To study the citation tendency of the articles, in December of the same year (T2) and 6 months after the first search, another search was performed for the 100 most cited articles and the number of citations received were once again recorded. We anticipate that this longitudinal analysis of citations will provide information on which articles of the top 100 and which nursing journals, are currently the most visible.

2.4 | Search outcome

A total of 2027 articles were obtained using a modified approach to the method used by Lim et al. (2012) and other authors (Huo et al., 2015; Joyce et al., 2014; Kelly et al., 2010; Shuaib, Khan, et al., 2015) who investigated the most cited articles in different areas of health care. All articles were ordered though the option "times cited" and the 200 most cited were selected for evaluation by three researchers. For quality assurance, these researchers, with more than 10 years of experience in research on health care in nursing staff, reviewed the same 200 articles independently. The inclusion criterion was papers focusing on stress in nurses as the main topic. The exclusion criteria were (1) when the research participants were not nurses and (2) when the papers were not related to stress in people. No formal inter-observer reliability testing was conducted between the investigators. Disagreements were rare and were resolved in a meeting where the three decided on questionable cases by reaching a consensus (Figure 1).

2.5 | Quality appraisal

Given that a bibliometric analysis and not a systematic review was undertaken, evaluation of the quality of the bibliographic sample was not a component of this study and was not performed. As in other reviews, the eligibility of studies is based on rigour and relevance to the objective of the review, rather than on the quality established (Ball, McLoughlin, & Darvill, 2011; Pawson, Greenhalgh, Harvey, & Walshe, 2004; van Hooft, Been-Dahmen, Ista, van Staa, & Boeije, 2017).

Although the number of citations received is not a measure of its quality, it is used to measure the impact that the article has made on the scientific community, such that high-quality research will result in more citations than lower quality research (Bornmann & Daniel, 2008). In this review, objective indicators can be found in

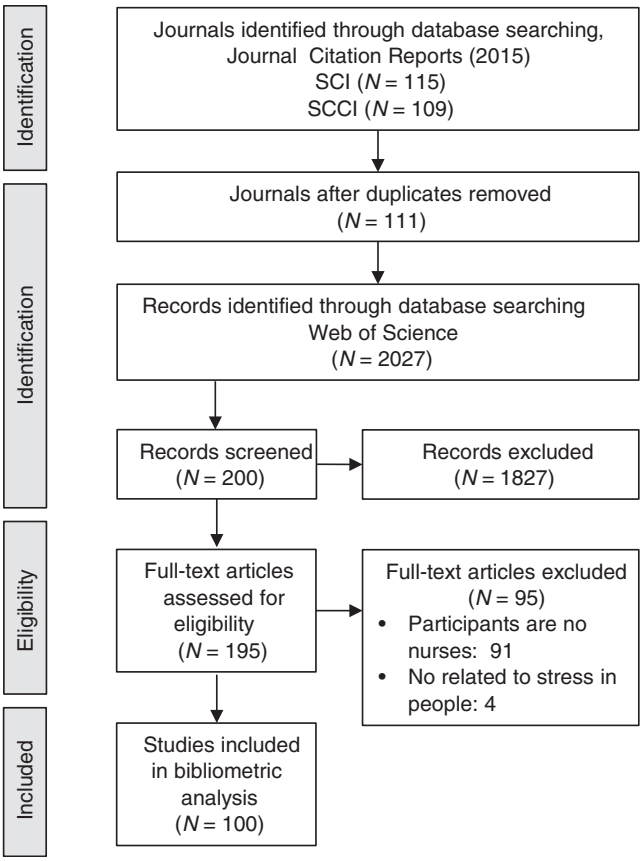

FIGURE 1 Flow of information through the different phases of the review

Table 1, such as the number of citations obtained by the 100 articles in the JCR -SCI and SSCI-, in two time periods, as well as their citation density.

2.6 | Data abstraction and synthesis

Information on the title, authors, topic, type of article, publishing journal, countries and institutions of origin and year of publication was extracted from the article. Following the classification proposed by Montero and León (2007), the type of article was divided into the following categories: (1) theoretical studies, including literature reviews, systematic reviews and meta-analyses; (2) empirical quantitative studies and (3) empirical qualitative studies. The data related to impact factor (IF), immediacy index, journal country, journal publisher and *h* index were collected from the Institute for Scientific Information JCR.

In addition, the citation density was calculated, citation tendency analysed and Bradford's law calculated. The citation density is determined by the number of citations over the number of years since publication (García-García, López-Muñoz, Callejo, Martín-Águeda, & Álamo, 2005; Huo et al., 2015; Pagni et al., 2014). This allows the determination of an index regarding the relative impact of an article regardless of its year of publication. Bradford's Law (Bradford, 1934; Brookes, 1969) proposes a model of information dispersion made up

TABLE 1 The 100 most cited papers about stress in nursing journals

T2[2]				T1[1]			
Rank	Cited	Citation density[3]	Author/s and year of publication	Rank	Cited	First author institution and country	Type of article[4]
1	306	23.54	McVicar (2003)	1	288	Anglia Polytechnic Univ., UK	1
2	123	8.20	Stordeur, D'hoore, and Vandenberghe (2001)	2	112	Univ. Catholique de Louvain, Belgium	2
3	107	6.69	Healy and McKay (2000)	3	102	Swinburne Univ., Australia	2
4	98	8.17	Beddoe and Murphy (2004)	5	92	San Jose State Univ., USA	2
5	96	7.38	Edwards and Burnard (2003)	4	93	Univ. of Wales, UK	1
6	96	6.86	Lo (2002)	6	89	Southern Cross Univ., Australia	2
7	87	7.91	Cohen-Katz, Wiley, Capuano, Baker, and Shapiro (2005)	10	80	Lehigh Valley Hospital and Health Network, USA	2
8	86	9.56	Glasberg, Eriksson, and Norberg (2007)	7	81	Umea Univ., Sweden	2
9	86	5.73	Yip (2001)	8	81	Hong Kong Polytechnic Univ., China	2
10	85	7.08	AbuAlRub (2004)	11	76	Jordan Univ. of Science and Technology, Jordan.	2
11	84	4.42	Jones and Johnston (1997)	9	81	Univ. of Dundee, UK	2
12	82	8.20	Mackenzie, Poulin, and Seidman-Carlson (2006)	12	74	Univ. of Toronto, Canada	2
13	79	6.08	McGrath et al. (2003)	13	74	Ulster Univ. at Coleraine, UK	2
14	75	5.77	Lutzen, Cronqvist, Magnusson, and Andersson (2003)	14	74	Karolinska Institute, Sweden	3
15	74	2.64	Topf and Dillon (1988)	16	71	Univ. of California Los Angeles, USA	2
16	74	6.73	Chang, Hancock, Johnson, Daly, and Jackson (2005)	17	70	Univ. of Western Sydney, Australia	1
17	74	6.73	Mann and Cowburn (2005)	21	65	Univ. of Central Lancashire, UK	2
18	73	8.11	Wu, Zhu, Wang, Wang, and Lan (2007)	18	68	Univ. of California Los Angeles, USA	2
19	71	4.73	Lambert and Lambert (2001)	15	71	Yamaguchi Univ. School of Medicine, Japan	1
20	69	4.93	Timmins and Kaliszer (2002)	22	64	Trinity College Dublin, Ireland	2
21	67	2.58	Foxall, Zimmerman, Standley, and Bene (1990)	19	67	Univ. of Nebraska Medical Center, USA	2
22	67	2.16	Keane, Ducette, and Adler (1985)	20	67	Univ. of Pennsylvania, USA	2
23	67	4.19	Edwards, Burnard, Coyle, Fothergill, and Hannigan (2000)	24	61	Univ. of Wales, UK	1
24	67	13.40	Gates et al. (2011)	30	57	Univ. of Cincinnati, USA	2
25	65	2.32	Coffey, Skipper, and Jung (1988)	23	62	Independent practice, USA	2
26	65	6.50	Sveinsdottir, Biering, and Ramel (2006)	25	60	Univ. of Iceland, Iceland	2
27	62	5.17	Tully (2004)	27	58	National Univ. of Ireland, Ireland	2
28	61	5.08	Fagin, Brown, Bartlett, Leary, and Carson (1995)	26	60	Univ. College Hospital of London, UK	2
29	61	2.10	McCranie, Lambert, and Lambert (1987)	28	58	Augusta Univ., USA	2
30	60	6.00	Gelsema et al. (2006)	32	56	Leiden Univ., The Netherlands	2
31	60	8.57	Dominguez-Gomez and Rutledge (2009)	52	44	Hemet Valley Medical Center, USA	2
32	58	1.87	Croninstubbs and Rooks (1985)	29	58	Rehabilitation Institute of Chicago, USA	2
33	58	3.63	Schmitz, Neumann, and Oppermann (2000)	31	57	Heinrich Heine Univ., Germany	2

(Continues)

TABLE 1 (Continued)

T2[2]				T1[1]			
Rank	Cited	Citation density[3]	Author/s and year of publication	Rank	Cited	First author institution and country	Type of article[4]
34	57	7.13	Watson, Deary, Thompson, and Li (2008)	35	53	Univ. of Sheffield, UK	2
35	56	3.73	Clegg (2001)	34	54	Univ. of Wales Swansea, UK	1
36	55	3.67	Coffey and Coleman (2001)	33	54	Univ. of Wales Swansea, UK	2
37	54	4.91	Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al. (2005)	38	50	Lehigh Valley Hospital and Health Network, USA	3
38	54	6.75	Hasson and Arnetz (2008)	46	47	Univ. of Cincinnati, USA	2
39	53	4.82	Murofuse, Abranches, and Napoleão (2005)	36	51	Univ. de São Paulo, Brazil	1
40	53	3.79	Owen, Keene, and Olson (2002)	39	50	Univ. of Winconsin-Madison, USA	2
41	53	8.83	Lim et al. (2010a)	43	48	Univ. of Queensland, Australia	1
42	53	4.42	Evans and Kelly (2004)	48	46	Institute of Technology, Ireland	2
43	52	2.26	Sullivan (1993)	40	50	Macclesfield Health Authority, UK	2
44	52	3.25	Rodney (2000)	41	49	Gippsland Psychiatric Services, Australia	2
45	51	4.25	Yip (2004)	37	51	The Hong Kong Polytechnic Univ., China	2
46	51	3.64	Sheu, Lin, and Hwang (2002)	47	47	Fooyin Institute of Technology, Taiwan	2
47	50	2.27	Tyler and Ellison (1994)	42	49	Univ. of Birmingham, UK	2
48	49	6.13	Norbeck (1985a)	45	48	Univ. of California San Francisco, USA	2
49	49	4.45	McNeely (2005)	53	43	Harvard Univ. School of Public Health, USA	1
50	49	9.80	Por et al. (2011)	91	32	King's College London, UK	2
51	48	1.78	McGrath et al. (1989)	44	48	Ulster Univ. at Coleraine, UK	2
52	48	3.43	Oermann and Garvin (2002)	49	46	Wayne State Univ., USA	2
53	48	2.82	Omdahl and O'Donnell (1999)	50	46	Univ. of Minnesota, USA	2
54	48	6.86	Kang, Choi, and Ryu (2009)	54	42	Gyeong-Sang National Univ., South Korea	2
55	48	9.60	Beck (2011)	67	38	Univ. of Connecticut., USA	1
56	47	4.70	Winwood and Lushington (2006)	55	42	Univ. of South Australia, Australia	2
57	46	1.59	Packard and Motowidlo (1987)	51	45	The Pennsylvania State Univ., USA	2
58	46	5.11	McGilton, McGillis, Wodchis, and Petroz (2007)	61	41	Ontario Ministry of Health and Long-term Care, Canada	2
59	45	4.50	Glasberg et al. (2006)	56	42	Umea Univ., Sweden	2
60	45	6.43	Pipe et al. (2009)	60	41	Mayo Clinic Arizona, USA	2
61	45	7.50	Edwards, Burnard, Bennett, and Hebden (2010)	78	35	Univ. of Wales, UK	2
62	44	4.40	Shirey (2006)	63	40	Univ. of Southern Indiana, USA	1
63	43	2.53	Lindop (1999)	58	42	Keele Univ., UK	2
64	43	1.72	Lindop (1991)	59	42	Keele Univ., UK	2
65	43	7.17	Lutzen et al. (2010)	84	34	Karolinska Institute, Sweden	2
66	42	2.80	Stacciarini and Tróccoli (2001)	57	42	Univ. Federal de Goiás, Brazil	2
67	42	3.00	Flanagan and Flanagan (2002)	64	40	State Univ. of New York, USA	2
68	41	1.95	Hamill (1995)	66	40	Southern Area College of Nursing, UK	3
69	41	3.15	Chang and Hancock (2003)	71	37	Univ. of Western Sydney, Australia	2
70	40	5.00	van den Tooren and de Jonge (2008)	62	40	Eindhoven Univ. of Technology, The Netherlands	2
71	40	2.22	Munro, Rodwell, and Harding (1998)	65	40	Queensland Univ. of Technology, Australia	2
72	40	8.00	Garrosa et al. (2011)	77	35	Autonomous Univ. of Madrid, Spain	2

(Continues)

TABLE 1 (Continued)

T2[2]				T1[1]			
Rank	Cited	Citation density[3]	Author/s and year of publication	Rank	Cited	First author institution and country	Type of article[4]
73	39	3.55	Morgan, Stewart, D'Arcy, Forbes, and Lawson (2005)	73	36	Univ. of Saskatchewan, Canada	2
74	39	2.44	Callaghan, Tak-Ying, and Wyatt (2000)	75	36	City Univ. of London, UK	2
75	38	1.23	Norbeck (1985b)	68	38	Univ. of California San Francisco, USA	2
76	38	1.09	Stehle (1981)	69	38	Indiana Univ., USA	1
77	38	3.17	Cohen-Katz, Wiley, Capuano, Baker, and Shapiro (2004)	70	37	Lehigh Valley Hospital and Health Network, USA	3
78	38	2.38	Jones and Johnston (2000)	72	37	Univ. of Dundee, UK	1
79	38	2.53	Humpel and Caputi (2001)	74	36	Univ. of Wollongong, Australia	2
80	38	6.33	Wu, Chi, Chen, Wang, and Jin (2010)	88	33	China Medical Univ., China	2
81	38	7.60	Xie et al. (2011)	99	31	Pudong Center for Disease Control and Prevention, China	2
82	37	3.08	Pafaro and De Martino (2004)	80	35	Univ. Estadual de Campinas, Brazil	2
83	37	2.06	Cornock (1998)	81	35	Univ. of the West of England, UK	2
84	37	6.17	Applebaum, Fowler, Fiedler, Osinubi, and Robson (2010)	92	32	Hunterdon Medical Center Flemington, USA	2
85	36	1.29	Haack (1988)	76	36	National Institute on Alcohol Abuse and Alcoholism, USA	2
86	36	4.00	Juthberg, Eriksson, Norberg, and Sundin (2007)	79	35	Umea Univ., Sweden	2
87	36	1.38	Lees and Ellis (1990)	82	35	Univ. College of North Wales, UK	2
88	36	4.50	Juthberg, Eriksson, Norberg, and Sundin (2008)	89	33	Umea Univ., Sweden	2
89	36	6.00	Lim, Bogossian, and Ahern (2010b)	93	32	Univ. of Queensland, Australia	1
90	36	4.50	Gibbons, Dempster, and Moutray (2008)	94	32	Queen's Univ. Belfast, UK	2
91	35	1.30	Topf (1989)	83	35	Univ. of California Los Angeles, USA	2
92	35	4.38	AbuAlRub and Al-Zaru (2008)	85	34	Jordan Univ. of Science and Technology, Jordan	2
93	35	2.69	Severinsson (2003)	86	34	Hedmark Univ. College, Norway	3
94	35	2.92	Camelo and Angeram (2004)	95	32	Univ. de São Paulo, Brazil	2
95	34	1.17	Jones, Janman, Payne, and Rick (1987)	87	34	Univ. of Sheffield, UK	2
96	34	2.13	Taormina and Law (2000)	90	33	Massey Univ., New Zealand	2
97	33	2.75	Tyson and Pongruengphant (2004)	100	31	Brock Univ., Canada	2
98	32	2.00	Hannigan, Edwards, Coyle, Fothergill, and Burnard (2000)	96	32	Univ. of Wales, UK	2
99	32	1.78	Snelgrove (1998)	97	32	Midwifery and Health Care, UK	2
100	32	0.78	Cassem and Hackett (1975)	98	32	Massachusetts General Hospital, USA	2

[1]T1: Time 1. Data obtained in June 2016.
[2]T2: Time 2. Data obtained in December 2016.
[3]Citation Density: mean number of citations per year.
[4]Type of Article: (1) Theoretical studies, including literature review, systematic review, and meta-analysis; (2) Empirical quantitative studies and (3) Empirical qualitative studies.

of three concentric zones of productivity (Bradford's zones) with a decreasing density of information. Each zone contains a similar number of articles, but a decreasing amount of journals in proportions of $1:n:n^2$, ... This model will allow us to determine the journals that are most used or have a greater specific weight in the study of stress in nursing journals.

Descriptive statistics were calculated as frequencies and percentages for the description of the articles' characteristics and the

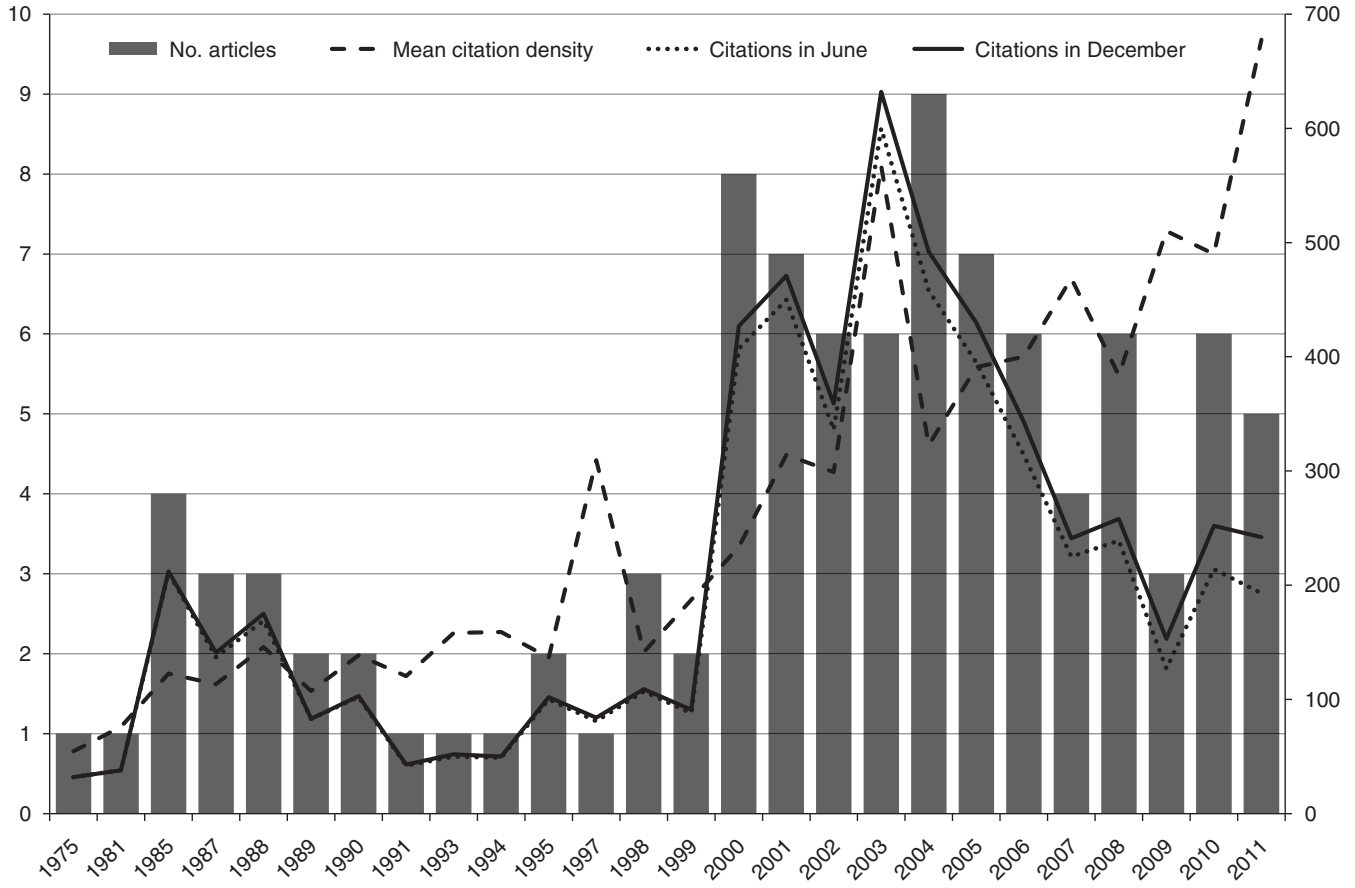

FIGURE 2 Number of articles, mean citation density and citations in two temporal moments

Spearman test was used to determine the correlation between variables, considering $p < .05$ as significant. Data analysis was performed using SPSS version 24 statistical software (SPSS Inc., Chicago, IL, USA).

3 | RESULTS

The results include: (1) a presentation of the top 100 articles on stress in nursing journals; (2) an analysis of the citation tendency; (3) the temporal dispersion of these papers and their citation density; (4) the type of article and topic; (5) the signatory authors and their affiliation (institutions and countries) and (6) the journals they have been published in, with data such as the JCR impact, citation density or most productive journals in this field by applying Bradford's law.

3.1 | The top-cited articles in stress published in nursing journals

Based on the total number of citations, the top 100 articles on stress in nursing journals are listed in Table 1 in descending order. The results to be discussed in this paper will be those obtained from T2, which are the most recent, unless specified otherwise.

In all 100 articles, we must consider that in terms of original content, there were 99 items, but if we consider the number of citations and publications, there were 100. This is because, as shown in Table 1, the item ranked 13th (McGrath, Reid, & Boore, 2003) has been republished from the one ranked 51 (McGrath, Reid, & Boore, 1989). We decided to consider them as separate items to give visibility to the original publication, to more objectively observe its evolution and to recognize its influence over the years, since it is also one of the 100 most cited articles on stress in nursing.

3.2 | Citations and citation tendency

The number of citations ranged from 306 to 332, with a mean number of 56.15 citations per article and a total of 5,615 citations. In T1, there was a total of 5,247 citations. The most cited article was titled "Workplace stress in nursing: A literature review" authored by McVicar (2003) and published in the *Journal of Advanced Nursing*, which received 306 citations in 13 years.

With respect to differences in citations received between T1 and T2: seven papers increased their number of citations by more than 10, 76 between one and nine and 17 none at all. This increase led to six articles rising 10 or more positions in the ranking, 28 increasing or decreasing between one and nine positions and 12 with no change.

The three papers with the greatest increased in citations in the last 6 months were by the following: McVicar (2003), who received the most citations ($N = 18$), maintaining his first place; Por, Barriball,

TABLE 2 Authors who have published the most articles in the top 100

Author	Country and Institution	H index	Number of articles		
			Total	Single/multiple	Primary/non-primary
Philip Burnard	Univ. of Wales College of Medicine, School of Nursing and Midwifery Studies, Cardiff, UK	11	4	0/4	0/4
Deborah Edwards	Cardiff Univ., Nursing, Health and Social Care Research Centre, Cardiff, UK/Univ. of Wales College of Medicine, School of Nursing and Midwifery Studies, Cardiff, UK	11	4	0/4	3/1
Sture Eriksson	Umea Univ., Department of Community Medicine and Rehabilitation, Geriatric Medicine, Umea, Sweden	8	4	0/4	0/4
Astrid Norberg	Umea Univ., Department of Nursing, Umea, Sweden	36	4	0/4	0/4
Debra M. Baker	Lehigh Valley Hospital, Department of Family Medicine, Allentown, Pennsylvania USA	3	3	0/3	0/3
Terry Capuano	Lehigh Valley Hospital, Department of Family Medicine, Allentown, Pennsylvania, USA	4	3	0/3	0/3
Joanne Cohen-Katz	Lehigh Valley Hospital, Department of Family Medicine, Allentown, Pennsylvania, USA	4	3	0/3	3/0
Shauna Shapiro	Santa Clara University, California, USA/Lehigh Valley Hospital, Department of Family Medicine, Allentown, Pennsylvania, USA	24	3	0/3	0/3
Susan D. Wiley	Lehigh Valley Hospital, Department of Family Medicine, Allentown, Pennsylvania, USA	9	3	0/3	0/3

Fitzpatrick, and Roberts (2011), who rose 41 positions with 17 citations, representing the greatest increase; Dominguez-Gomez and Rutledge (2009), who rose 21 places in the ranking, with an increase of 16 citations. Furthermore, we should highlight the papers by Lutzen, Blom, Ewalds-Kvist, and Winch (2010) and Xie, Wang, and Chen (2011), who experienced a slight increase in citations (nine and seven, respectively) and rose considerably in the ranking by 19 and 18 places, respectively.

3.3 | Temporal dispersion and citation density

In relation to temporal dispersion, the top 100 articles on stress in nursing journals were published from 1975 to 2011 (Figure 2). The oldest was ranked 100 and was published in 1975 (Cassem & Hackett, 1975) and five more recent articles were published in 2011 (Beck, 2011; Garrosa, Moreno-Jimenez, Rodriguez-Munoz, & Rodriguez-Carvajal, 2011; Gates, Gillespie, & Succop, 2011; Por et al., 2011; Xie et al., 2011). The decade from 2000 to 2009 show more published articles by far (N = 62) compared with the other decades, as well as more citations (N = 3916; 69.74%; citation density M = 5.29). However, 2010 and 2011, with 11 articles and 494 citations (8.81%), had the highest average citation density (M = 8.22).

The articles with a high citation density were as follows. The first, with 23.54 citations per year and number one in the ranking, is a literature review on workplace stress in nursing (McVicar, 2003). The following, at 24th place in the ranking and with 13.40 annual citations, is an experimental study that determines how violence in patients and visitors to the emergency department affects work productivity and the symptoms of posttraumatic stress disorder in nurses (Gates et al., 2011). The third, at 50th place in the ranking and with 9.80 citations per year, is also a systematic review on secondary traumatic stress in nurses in all clinical specialties (Beck, 2011).

3.4 | Publication type and topic

With respect to the types of articles on stress that have been most cited in nursing journals, 14 are theoretical studies (literature reviews and systematic reviews), 81 are empirical quantitative studies and five are empirical qualitative studies. We should highlight that 10 have a longitudinal design and the rest have a transversal design. The subject area most focused on is the study of factors that are inherent in workplace stress, job stress or occupational stress (N = 73) and their relationship to other variables, such as burnout (N = 20), coping strategies (N = 16), job satisfaction (N = 10) and stress management or reduction, with a special interest in mindfulness-based programmes (N = 10).

3.5 | Authors, countries and institutions

In addition, 233 different authors participated in these studies. The majority preferred to publish in multiple authorship mode (76 articles, 212 authors), while only a few preferred a single authorship mode (24 articles, 21 authors). Nine wrote more than two papers in this list (Table 2). The number of authors with the most

articles in the top 100 list is four, with four articles each: Philip Burnard and Deborah Edwards from the University of Wales and Cardiff University, with one empirical quantitative investigation, two literature reviews on stress management or burnout in the mental health of nurses and one empirical quantitative longitudinal study of stress and self-esteem in student nurses; Sture Eriksson and Astrid Norber from Umea University, with four empirical quantitative studies on different issues related to stress of conscience.

The addresses of the first authors were considered as the author affiliation. Seventy-six institutions from 19 countries were responsible for producing all 100 papers (Table 1, Figure 3), with the USA (*N* = 30) and the UK (*N* = 26) contributing the most, followed by Australia (*N* = 10) and Sweden (*N* = 6). Each of the other countries had fewer than five cited articles. Additionally, 26 articles were from countries where English is not the first language (Belgium, Brazil, China, Germany, Iceland, Japan, Jordan, Norway, Spain, South Korea, Sweden, Taiwan and the Netherlands), whereas the rest were from English-speaking countries (Australia, Canada, Ireland, New Zealand, the UK and the USA).

The institutions with more than one article cited were the University of California (USA) (*N* = 5), the University of Wales (UK) (*N* = 5), Umea University (Sweden) (*N* = 4), Lehigh Valley Hospital and Health Network (USA) (*N* = 3), the Jordan University of Science and Technology (*N* = 2), the Karolinska Institute (Sweden) (*N* = 2), Keele University (UK) (*N* = 2), Brock University (USA) (*N* = 2), the University of Sheffield (UK) (*N* = 2), Ulster University at Coleraine (UK) (*N* = 2) and the Universidade de São Paulo (Brazil) (*N* = 2).

3.6 | Journals where the top 100 have been published

Of the 111 journals on nursing in JCR, only 23 have published articles in this top 100. It is notable that 51.87% of the citations received and 47 of the documents considered were published in only three journals. As shown in Table 3, the majority were first published in the seventies onwards (69.56%) in journals originating from the USA or the UK (86.96%).

The impact factor of these journals ranged from 3.561-0.415, with a mean IF of 1.382. Only 12 of the most cited articles were published in two journals with an IF higher than 2. Most articles (*N* = 78) were published by nursing journals with an IF between 1 and 2. The other most cited articles (*N* = 10) were published in a total of five journals with an IF of less than 1.

After applying Bradford's Law (Bradford, 1934; Brookes, 1969), 23 journals were divided into three zones with each containing approximately one-third of the 100 articles. The core distribution consisted exclusively of the *Journal of Advanced Nursing*, with 29 documents. The second area of productivity (*N* = 39 documents) comprised six journals: *The International Journal of Nursing Studies*, *Nurse Education Today*, *Journal of Psychiatric and Mental Health Nursing*, *Journal of Nursing Management*, *Nursing & Health Sciences* and *Research in Nursing & Health*. The remaining 16 analysed journals fell into area three.

With respect to their citation density, all the journals, except for one (*Research in Nursing & Health*), from the two most productive Bradford zones were also those with the highest values, ranging between 147.68 (*Journal of Advanced Nursing*) and 18.01 (*Journal of Nursing Management*). There were significant correlations between

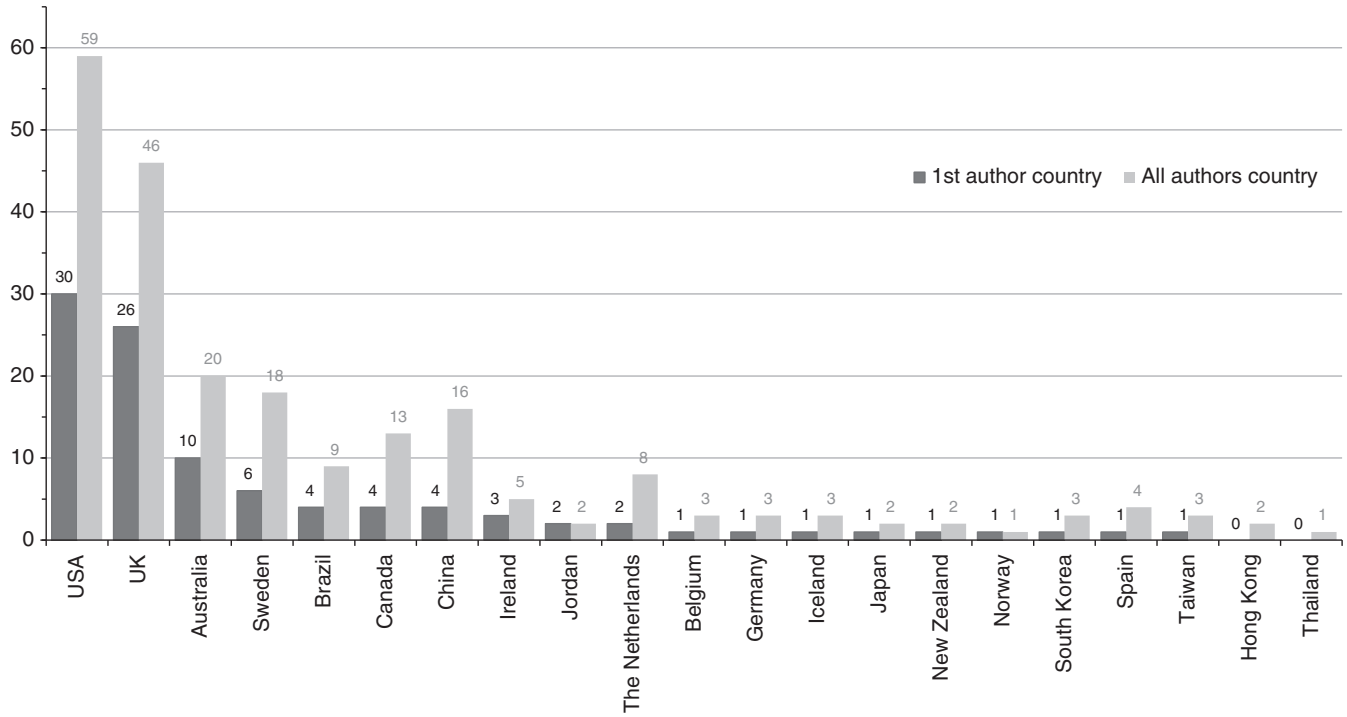

FIGURE 3 Countries or origin of authors of top 100 papers

TABLE 3 Journals where the 100 top-cited articles were published

Journal	N	No of cites		Citation density[3]	JCR 2015			Founding year
		T1[1]	T2[2]		IF[4]	Ranking SCI/SSCI[5]	Immediacy Index	
Journal of Advanced Nursing	29	1886	1991	147.68	1.917	10/8	0.286	1976
International Journal of Nursing Studies	11	529	558	46.68	3.561	1/1	0.671	1964
Nurse Education Today	7	307	355	38.65	1.591	25/22	0.319	1981
Journal of Psychiatric and Mental Health Nursing	6	288	312	24.16	1.055	59/56	0.239	1994
Journal of Nursing Management	5	209	217	18.01	1.721	18/16	0.223	1993
Nursing & Health Sciences	5	244	257	23.31	1.347	37/34	0.057	1999
Research in Nursing & Health	5	204	208	8.75	1.638	20/18	0.279	1978
Nursing Ethics	4	185	199	21.44	1.469	31/28	0.174	1994
Nursing Research	4	201	204	6.58	1.856	13/11	0.574	1952
Heart & lung: The Journal of Critical Care	3	161	164	5.29	1.332	41/–	0.648	1972
Holistic Nursing Practice	3	167	179	15.98	0.659	94/91	0.190	1986
Journal of Nursing Administration	3	114	128	17.71	1.140	49/46	0.276	1971
Revista Latino-Americana de Enfermagem	3	125	130	10.53	0.687	91/88	0.021	1993
Journal of Clinical Nursing	2	80	90	11.25	1.384	34/31	0.187	1992
Nursing Economics	2	97	111	17.80	0.934	73/70	0.375	1983
Applied Nursing Research	1	74	82	8.20	1.043	60/57	0.099	1988
Archives of Psychiatric Nursing	1	38	48	9.60	1.217	44/40	0.157	1987
International Nursing Review	1	48	53	8.83	1.073	57/54	0.121	1954
Journal of Emergency Nursing	1	44	60	8.57	0.872	78/75	0.193	1975
Journal of Nursing Education	1	92	98	8.17	1.060	58/55	0.093	1962
Journal of Nursing Scholarship	1	76	85	7.08	1.521	28/25	0.391	1967
Nursing Outlook	1	43	49	4.45	2.287	4/4	0.800	1953
Revista da Escola de Enfermagem da USP	1	35	37	3.08	0.415	107/114	0.050	1967

[1]T1: Time 1. Data obtained in June 2016.
[2]T2: Time 2. Data obtained in December 2016.
[3]Citation Density: mean number of citations per journal.
[4]IF: Impact factor according to the JCR SCI and SSCI.
[5]JCR ranking for Nursing in SCI (115 journals) and SSCI (109 journals).

the 2015 impact factor and the number of citations (r = .465; p = .02) and the immediacy index (r = .639; p = .001), but not between the impact factor and the citation density of the journal (r = .223; p = .306).

4 | DISCUSSION

In the analysis of the 111 journals included in the JCR in the nursing category, the articles on stress that were most cited in nursing journals will permit the identification of the study representation of, widely speaking, knowledge in this area, the types of research designs commonly used, the most important authors in the field and the main journals publishing in this theme. This information will help answer important questions to understand the history and development of the study of stress in nursing and to plan the future studies in scientific and professional fields of nursing.

Although citation analysis is not a measurement of scientific quality and should not express the overall historical importance of a paper, it reflects the impact that the article has made on the scientific community (Borgman, 1990; Cronin, 1984; Joyce et al., 2014; Narin, 1976). The 100 top-cited articles are those that have had the most impact on peers in this area of research.

In addition, the greater the number of times cited, the greater is the journal's impact factor, the more important is their work is assumed to be (De Groote & Raszewski, 2012; Garfield, 1972; Smith, 2010) and the better the quality of the individual authors' contributions in a particular area (Wolfram, 2003). Citation analysis is an objective measure of the performance, value and impact of research, which is important (1) for the academic and professional promotion of researchers; (2) for access to funding programmes; (3) for comparison of achievements among researchers and research centres and (4) to guide the work of professionals and academics towards the most recognized topics and methodologies (Thompson & Clark, 2015).

With respect to the number of citations received by the top 100 articles in the study of stress in nursing, we have confirmed that it is low in comparison to other fields of study. According to Hack et al.

(2010) in his study of the citations of 737 Canadian academics, an article published by nursing academics with 10 or more citations was considered a "good paper", while 50 or more citations was considered a "very good" paper, 100 or more citations an "excellent" paper and more than 159 an "exceptional" paper. Therefore, we can conclude that in this specific area of research, very few articles qualify as exceptional or excellent. The articles that are most recognized in nursing journals have at most 100 or fewer citations.

These articles were published between 1975 and 2011, with the 2000s representing the most productive decade ($N = 64$), demonstrating a gradual and significantly increase in recent decades (Smith, 2010). Therefore, it seems evident that research in nursing has developed quickly in recent years (Smith, 2010). As highlighted by Wong et al. (2013), this phenomenon is partly due to the advances in the nursing profession and the evolution of graduate and postgraduate programmes supporting a greater emphasis on research and scholarly activity.

The citations were expected to be accumulative over time, with the oldest articles being those with a greater number of citations (Joyce et al., 2014; Kelly et al., 2010; Loonen, Hage, & Kon, 2007; Paladugu et al., 2002; Ponce & Lozano, 2010). However, the articles that received the most citations, were highest in the ranking and had the highest citation density were the most recent ones, published from 2000 onwards, as observed in similar studies (Joyce et al., 2015; Paladugu et al., 2002; Shuaib, Khan, et al., 2015). These articles were also the ones with the most impact on researchers studying stress in the nursing environment. These results, however, contrast with those reported by Wong et al. (2013).

We believe that this tendency in the number of citations could be due to a group of factors that are outlined below. We agree with Joyce and colleagues (Joyce et al., 2014, 2015) that a greater number of citations of the most available papers is represented by those that are more recent and online, since older articles are either less accessible electronically or require more effort to retrieve them. In any case, access to the complete text will always be limited by factors such as database selection methods, researcher search skills or personal preferences, thereby skewing the references that are cited in any research results (Allen et al., 2006).

Furthermore, the lack of articles prior to 1981, with the exception of Cassem and Hackett (1975), suggests a limited use of older articles, which could imply the phenomenon called "obliteration by incorporation" (Garfield, 1987). This phenomenon indicates that over time, classic studies are progressively cited less frequently because their content has been incorporated in more recent articles, as also demonstrated in other studies (Joyce et al., 2015; Paladugu et al., 2002).

A longitudinal analysis of citations in two time periods (T1 and T2) with a difference of 6 months provides useful information about the citation tendencies of articles on stress in nursing journals. Generally, these papers have attracted citations unequally and the four journals with most publications and highest citation density are also those whose citations have most increased in the referenced 6 months.

Empirical quantitative studies with a transversal design can be considered as the most popular type of article in the top 100 cited articles, for precision about subjects related to workplace stress or stressors, burnout, coping strategies, job satisfaction and stress management or reduction. In addition, the tendency to cite review articles more frequently was also confirmed, with a total of 14 in this list, since they provide an abstract of the research about a topic or an area of knowledge. These results do not coincide with those from other studies carried out in the area of nursing (Wong et al., 2013), which showed a greater frequency of qualitative studies and the development and validation of psychometric tools.

With respect to randomized control trials (RCTs), there are only three in the top 100, confirming the results of other studies (McVicar, 2003; Wong et al., 2013). Knowledge of the type of article and methodology of the most cited papers could be of special interest to researchers and journal editors for selecting and evaluating articles in this area, as well as providing an awareness of the types of articles and methodologies that have not been taken into account (Shuaib, Khan, et al., 2015). This could be because RCT papers are being published in journals in related fields with higher impact factors.

Authors from a total of 19 countries were responsible for producing all 100 papers. The country that contributes the most articles was the US, as observed in similar studies (Huo et al., 2015; Joyce et al., 2014, 2015; Kelly et al., 2010; Lim et al., 2012; Pagni et al., 2014; Paladugu et al., 2002; Shuaib, Khan, et al., 2015). In addition, the majority of the authors of the most cited articles on stress in nursing journals are from English-speaking academic institutions, as in other studies about the top-cited articles in nursing (Wong et al., 2013) or occupational medicine (Gehanno, Takahashi, Darmoni, & Weber, 2007). These results indicate the provision of institutional and financial support from the USA for studies in this area and also demonstrate a tendency for authors to cite articles from their own countries (Campbell, 1990; Huo et al., 2015; Link, 1998; Paladugu et al., 2002), which not only increase the number of citations but also the number of articles produced in these countries.

Nevertheless, the number of citations received by an author also increases their *h* index. This index is frequently used as an outcome measure for an author's research, as well as its impact on an area of knowledge or on their department/University (De Groote & Raszewski, 2012; Hack et al., 2010; Hunt, Jackson, Watson, & Cleary, 2013; Hunt et al., 2012). In the specific area of nursing, Thompson and Watson (2010) analysed the *h* index from the WoS for a group of nursing professors in the UK and concluded that an *h* index of 10 in nursing is a fit indicator of success, although 10 is low in other disciplines. To be more specific, a value between 5 and 9 indicates a good level of publications, between 10 and 14 an excellent level and a value of 15 or more an exceptional level (Hack et al., 2010). According to the results of this study and taking only the most productive authors into account, we can see that having up to three articles among the top 100 most cited in an area of knowledge does not ensure an exceptional researcher outcome level or acknowledgement based on the *h* index—not even excellent.

If we now focus on the journals and their impact factor, as in other studies (Hennessey et al., 2009; Loomes & van Zanten, 2013; Shuaib, Khan, et al., 2015), the results confirm that the most cited articles on stress have not just been published in journals with the greatest impact in their JCR category of "nursing". Furthermore, compared with the results reported by Wong et al. (2013) concerning the 50 citation classics in nursing journals, our results show how they have been published in journals with a higher mean impact factor (1.382) within the same JCR category, to be exact an average of 1.382 in contrast to 0.970.

As in previous studies (Kelly et al., 2010; Paladugu et al., 2002; Tas, 2014), we confirmed herein the relationship between the impact factor of the journal and the number of citations received, as well as its relationship with the immediacy index or the number of citations received in a year according to the number of articles published that year, which would determine how fast an article is cited in a journal.

However, when choosing a journal where to publish, it is also important to identify the relevance of the topics treated in a journal for the nursing discipline itself (Thompson & Clark, 2015). In this work, the results obtained after application of the Bradford Law (Bradford, 1934), allowed us to clarify this question. Six journals accounted for 68 articles and these journals comprise the core group where articles on stress can be published. When researchers deviate from this small group, the frequency of citations and their impact on the scientific community decreases (Brookes, 1969). This law is also supported by classic studies, such as the one by Garfield (1984) focusing on the nursing literature.

Thus, in the top 100 articles on stress in nursing journals, a lower impact factor of the journals was confirmed in comparison with other areas of health, such as medicine (Smith, 2010). There was also an evident tendency to publish in journals that do not have a high impact factor, despite being in the "nursing" category. An example of this is the journal with the highest impact and number 1 in the JCR list, *International Journal of Nursing Studies*, which has published 11 of the papers in the list, the first of which is in 12th place.

As a consequence, researchers of stress in nursing face the dilemma of publishing in nursing journals or publishing in other journals with a greater impact (Smith & Hazelton, 2008). This work could help editors to establish the selection criteria to include or exclude articles with citation potential, which would lead to an increase in the journal impact factor. This increase would lead to a greater visibility of the nursing work, the creation of a research consumption culture within the nursing area and the configuration of a debate and development forum for research on nursing stress.

In addition, the results of this work can be used as a guide for professionals, policymakers and healthcare managers concerning the circumstances and factors that should be taken into account for the intervention and prediction of stress in nursing. They provide an international perspective that transcends the reduced level of the needs of a specific organization and the availability of resources, policies and procedures (O'Brien-Pallas & Hayes, 2008).

4.1 | Limitations

This study has some limitations. Although a well-defined method has been used to identify the 100 most cited articles in research on stress in nursing journals, we are certain that important articles with a great influence have not been included, which could be explained in several ways. For instance, the search was carried out in journals classified as "nursing" in the JCR, but it is possible that other important articles published in other nursing and general journals or journals from other specific areas of knowledge or in journals without an impact factor, or in non-English journals, were not been considered in this paper. As concluded by Dicenso, Cullum, Ciliska, and Marks (2000), nurses publish in non-nursing journals, or in general or specialty healthcare journals. Furthermore, many research studies written by non-nurses, but relevant to nursing professionals, also publish in general healthcare journals. However, in the present study, we decided to focus only on journals in the "nursing" area.

Additionally, different factors can affect the total number of received citations. We used only one database as an electronic means for our search for the most cited papers. This procedure conditioned our list and ranking, which would possibly be different if we had used Scopus or Google Scholar (Bakkalbasi, Bauer, Glover, & Wang, 2006). By contrast, in 2016, Thomson Reuters' JCR included 111 journals in the nursing category, Scopus listed 754 journals in the same category (Scopus, Title List) and Ulrich's listed more than 1,200 active nursing journals. Nevertheless, we chose this database because, although it does not provide complete coverage, it has been extensive and multi-disciplinary since 1900, with more than 12,000 journals with impacts throughout the world, including the open-access type and the majority are the most intra-nationally peer-reviewed journals (Moed, 2009). Consequently, the citations obtained exclusively from the Web of Science are limited to the sources selected using this database, which, for example, does not include citations from books and journals in languages other than English. Additionally, in this research, self-citation, citations in lectures and textbooks and web-based literature have not been considered (Dumont, 1989). The positive or negative citations received by the top 100 articles were not considered in this work and thus we were unable to determine the level of agreement, disagreement or criticism of the scientific community towards the topics covered in these articles (Catalini, Lacetera, & Oettl, 2015; Cavalcanti, Prudêncio, Pradhan, Shah, & Pietrobon, 2011).

5 | CONCLUSION

This study presents a list and analysis of the 100 top-cited articles published on stress in nursing journals. This procedure allowed us to acquire information about the authors, countries, institutions, reviews, topics and types of articles encompassing the history and development of the study of stress in nursing. Analysis of the citations has confirmed a significant increase in this area of research over time in terms of visibility and recognition, which is particularly

notable from 2000 onwards and outstanding from 2010. There is also an evident preference for publishing empirical quantitative studies in this area in English-speaking countries and in a few journals, the majority of which do not have the highest impact in their category. Bradford's Law is confirmed with a single journal forming part of the core group where these types of articles are published.

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/)]:

- substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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