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Application of Bibliometric Laws and Literature Mapping On "Stress"

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ABSTRACT

Today we are living in global ICT market, where technology, user perception, competition, International rivals, culture and social environment are increasingly changing day by day than our expectations. We have to prepare ourselves according to the rapid changes of ICT in fast changing environment. If we fail to face these challenges and demands, we would easily fall into the trap of stress. Stress is a negative consequence of modern living. People are stressed due to overwork, job insecurity, health related issues, multiple responsibilities and increase in pace of life. Pascal (1992) defined stress in terms of perceived environmental situation which threatens the gratification of needs. The present study is an attempt to explore the research productivity on stress during the time period of 2009-2018. The data was collected from Web of Science which is one of the largest citations and abstracting database, owned by Thomson Reuters. The main findings of the study revealed that there is a growing trend of publications during the time period of 2009-2018. Majority of the publication has been produced in the year 2018 (123,822; 13.61%) and the least number of publications recorded in the year 2009 (63,321; 6.95%). The leading document type in which research has been published consists of journal articles (793,868; 87.20%) and USA (248,695; 27.31%) being the most productive nation on stress research output worldwide. In language analysis, English is found to be the dominant language (887,350; 97.40%) in overall publications. The most prolific authors on stress research output are Wang (3,929; 0.43%), Zhang (3,658;0.40%) and Liu (3,276; 0.36%). The most commonly used journal in which maximum research output has been published is PLOS One. At last, the Chinese Academy of Science, Harvard University and the Russian Academy of Science are found to be the most productive institutions contributing to the stress related database.

Keywords: Stress, Growth, ICT, Document Type, Source Title, Database, Web of Science.

INTRODUCTION AND BACKGROUND OF THE STUDY

Stress is a common human phenomenon. As we know that stress in a human, results from a complex interaction between the events of life and perception of those events by an individual. The element of perception indicates the personality of an individual since the personalities of different individuals are distinctive. The reaction of stress is unique and personal to each of us. The response to stress varies with the individual's age, gender and also the genetic makeup. Stress is a much talked about word in today's time whether or not the seriousness with which to avoid it and to deal with it, is adequate in organizations. Stress today affects almost all in some way or the other. Organizations are group of people and therefore they cannot remain unaffected. The implications of stress are many and there have been many researches that have examined stress and its variables. In psychological sciences, stress is a feeling of mental press and tension. Low levels of stress might be desired, useful and even healthy. Stress, in its positive form, can improve biopsychosocial health and facilitate performance. Furthermore, positive stress is considered as an important factor to motivation, adaptation and reaction to surrounding environment. However, high levels of stress could result in biological, psychological and social problems and even serious harms to people **(Tucker et al, 2008).** Stress may be either external with environmental source or caused by internal perceptions of the individual. The latter form, in turn can produce anxiety, and/or other negative emotions and feelings such as press, pain, sadness, etc., and result in serious psychological disorders such as post-traumatic stress disorder **(Tse et. al, 2010).**Stress and anxiety are not separated from each other. The continuum of stress is widespread and ranges from biological to social psychological domains and is taken to account as an important antecedent of anxiety. It shall be noted that mild levels of anxiety are necessary to survive and protect individual against threatening dangers. The difference between anxiety and stress is in the triggering agent and the focus of the initiation. Initiation of stress needs an external factor (stressor) to disrupt homeostasis of the living being, while anxiety is a subjective feeling which can be present without any determined external factor and its nature is not related to its producing objective external factor. Exposing to stress, brain would be more sensitive to abdominal feelings. The stomach can react with butterfly in stomach or pain and even nausea. If stress is severe enough, individual may react with vomit. If stress becomes chronic with such severity, it can cause esophageal and gastric ulcers and/or severe abdominal pains without ulcers **(Cundall et al, 2014).** A number of stressors are experienced through formation of identity,

establishing interpersonal and intimate relationships, all while transitioning to the role of being a responsible adult. Life-changing decisions such as university, employment, changed living circumstances and financial obligations contribute to increased risk factors linked to these stressors **(American Psychological Association, 2014).** The remarkable phenomenon termed stress, experienced by human beings across their lifespan, is inevitable and is generally considered a physiological response to any stimulus **(Marcia, 2010).** However, positive stress is normal and beneficial for survival, providing increased creativity, higher productivity, improved self-esteem and positive physiological stimulation **(Middlebrooks & Audage,2008).** Negative stress reverses all the benefits of positive stress and quickly depletes the body's ability to cope, resulting in physical and mental exhaustion **(Lazarus, 2006).**

Bibliometrics has become a standard instrument of science policy and research management in the last few decades. All significant compilations of science indicators heavily rely on the publication and citation statistics and also on more sophisticated bibliometric techniques. Today, bibliometrics is one of the rare, truly interdisciplinary research fields to extend to almost all scientific fields and areas of study. Bibliometric methodology comprises components from Mathematics, Social Sciences, Natural Sciences, Engineering and even Life Sciences. The term bibliometrics was first coined by Pritchard in 1969. An initiating example of a bibliometric study was statistical analysis of the literature of comparative anatomy from 1543 to 1860, done by including book and journal titles and then grouping them by countries of origin and periods. Bibliometric studies are increasingly being used for research assessment nowadays. It basically refers to the implementation of statistical methods for evaluating the research productivity, for individuals, institutes and countries **(Wallin,2005).** Bibliometric methods are mainly quantitative and are also used to make declarations about qualitative pictures of scientific activities **(Bissar and Tadmouri,2009).** Bibliometric analysis is a useful and effective tool to obtain information about the current state of research in particular areas and allows researchers to identify and undertake new lines of research in a very easy and quick way**(Battisti and Salini,2013**). Such type of analyses also tends to provide information on the state of the scientific impact of universities and the domains therein, as that is also the main strength of bibliometrics **(Moed, et. al. 1985).** As we are aware that Web of Science is described as a unifying research tool which enables the user to acquire, analyze and disseminate database information in a timely manner.

This is accomplished because of the creation of a common vocabulary, called ontology, for varied search terms and varied data. Moreover, search terms generate related information across categories. Acceptable content for Web of Science is determined by an evaluation and selection process based on the following criteria: impact, influence, timeliness, peer review, and geographic representation. It gives access to multiple databases that reference cross-disciplinary research, which allows for in-depth exploration of specialized sub-fields within an academic or scientific discipline**(Drake, 2004).**

OBJECTIVES

➢ To find out year wise growth on research output on stress.
➢ To explore the top source titles on stress.
➢ To identify publications on the basis of document types on stress.
➢ To determine the geographic distribution and productive institutions on stress.
➢ To examine the prolific authors and linguistic analysis on stress.
➢ To identify the top research areas and nature of accesson stress.
➢ To find out the productive funding institutions on stress.

METHODOLOGY

This study is based on publications produced in the topic field "Stress". The data was extracted from Web of Science (WoS), one of the largest citations and abstract database. The records were retrieved by entering a search term "Stress", Time span 2009-2018, Database= Web of Science Core Collection. A total of 910, 403 records were collected for the study. The year of publications, journals, productive authors and countries, top research areas, nature of access, top funding institutions and document type wise distribution of publications were analyzed and displayed in the tables.

DATA ANALYSIS AND INTERPRETATION

1 Chronological Growth

A total of 910, 403 publications were retrieved on the term "Stress" during the period of 10 years (2009-2018) from Web of Science (WoS) database. There is a growing trend in the research output during the time period. Table 1 visualizes the year wise growth of the number of articles published.

Table 1: Year Wise Growth of Publications

S. No.	Year	Records	Percentage
1	2009	63,321	6.95
2	2010	67,683	7.43
3	2011	72,898	8.00
4	2012	78,391	8.61
5	2013	85,138	9.35
6	2014	89,686	9.85
7	2015	102,540	11.26
8	2016	110, 469	12.13
9	2017	116,356	12.78
10	2018	123,822	13.60

2 Document Types

A total of 24 document types on which research output is available were found. Data represented in table 2 shows that the majority of the research publications are in category of articles (87.20%), followed review (7.25%) and Meeting Abstract (3.84%) respectively. The rest of the document types like Proceeding Paper, Editorial Paper, Letter, Book Chapter, Correction, News item and Book Review accounts were below 2 percent of the total output.

Table 2: Document Types

S. No.	Document Types	Records	Percentage
1	Article	793,868	87.20
2	Review	66,056	7.25
3	Meeting Abstract	35,024	3.84
4	Proceeding Paper	17.325	1.90
5	Editorial Paper	9,881	1.08
6	Letter	3,071	0.33
7	Book Chapter	2,707	0.29
8	Correction	1,656	0.18
9	News item	409	0.04
10	Book Review	340	0.03

3 Geographic Distribution

Almost 199 countries are found contributing to the research output on stress. A country research output helps to assess its intellectual level to a greater extent. Table 3 shows the country wise research output where it is clearly shown that USA is leading with (248,695; 27.31%), followed by China (151,981; 16.69%) and Germany (57, 018; 6.26%). The countries that have contributed less than 6 percent to the total collection include England, Japan, France, Italy, Canada and Australia. India being spotted at 8th number contributing to the global research output on "Stress".

Table 3: Country wise Output

S. No.	Countries	Records	Percentage
1	USA	248,695	27.31
2	China	151,981	16.69
3	Germany	57,018	6.26
4	England	48,286	5.30
5	Japan	46,442	5.10
6	France	39,852	4.37
7	Italy	39,775	4.36

8	India	39,567	4.34
9	Canada	38,912	4.27
10	Australia	34,710	3.81

4 Language wise distribution

Table 4 shows that the maximum number of articles have been published in English language (887,350; 97.46%), followed by Chinese with (3,986;0.438%) articles, German with (3,957;0.435%) articles, Spanish (3,511;0.38) publications and rest of the languages are less than 0.245% publications.

Table 4: Language wise distribution

S. No.	Language	Records	Percentage
1	English	887,350	97.46
2	Chinese	3,986	0.438
3	German	3,957	0.435
4	Spanish	3,511	0.38
5	Russian	2,232	0.245
6	French	2,223	0.244
7	Portuguese	2,165	0.23
8	Polish	871	0.09
9	Japanese	733	0.08
10	Turkish	714	0.07

5 Prominent Authors

The below mentioned table reveals the author wise distribution of publications, the author Wang has published (3,929;0.43%) publications at rank first followed by Zhang (3,658;0.40%) publications at second spot and Liu (3,276;0.36%) records at 3rd spot respectively. The remaining authors have contributed less than 0.35 percent publications.

Table 5: Prominent Authors

S. No.	Authors	Records	Percentage
1	Wang, Y	3,929	0.43
2	Zhang, Y	3,658	0.40
3	Liu, Y	3,276	0.36
4	Li, Y	3,160	0.34
5	Li, J	3,061	0.33
6	Wang, J	2,913	0.32
7	Wang, L	2,831	0.31
8	Zhang, J	2,535	0.27
9	Zhang, L	2,444	0.26
10	Li, L	2,112	0.23

6 Leading Source Titles

Table 6 shows the top source titles according to their productivity with maximum number of publications. The journal namely PLOS One ranked first in order with (16,918; 1.85%) articles and Scientific Reports ranked second with (6,662; 0.73%) during the period of study. Material Science and Engineering ranked third in order published (4,476; 0.49%) articles and the remaining journals are ranked in the below table according to their number of publications.

Table 6: Leading Source Titles

S. No.	Sources	Records	Percentage
1	PLOS One	16,918	1.85
2	Scientific Reports	6,662	0.73
3	Material Science and Engineering	4,476	0.49
4	Free Radical Biology and Medicine	3,806	0.41
5	Journal of Biological Chemistry	3,356	0.36
6	Frontiers in Plant Science	3,147	0.34
7	FASEB journal	2,862	0.314

8	International Journal of Molecular Sciences	2,822	0.310
9	Biomedical and Bio physical Research	2,697	0.29
10	Proceedings of the National Academy of the Sciences of USA	2,632	0.28

7 Productive Institutions

Table7 shows the institution wise distribution according to their productivity with maximum number of publications. The institution namely Chinese Academy of Science ranked first in order with (15,123; 1.66%) publications and Harvard University ranked second with (7,371; 0.81%) during the period of study. Russian Academy of Science ranked third in order of publications (5,747; 0.631%) and the remaining journals are ranked in the below table according to their number of publications.

Table 7: Institution Wise Distribution of Publications

S. No.	Institutions	Records	Percentage
1	Chinese Academy of Science	15,123	1.66
2	Harvard University	7,371	0.81
3	Russian Academy of Science	5,747	0.631
4	University of Sao Paulo	5, 732	0.630
5	University of Michigan	5,534	0.608
6	Zhejiang University	5,110	0.56
7	University of Illinois	4,925	0.54
8	Shanghai Jiao Tong University	4,905	0.53
9	University of California, Los Angles	4,905	0.53
10	University of Toronto	4,869	0.535

8 Nature of Access

Open access (OA) refers to free, unrestricted online access to research outputs such as journals, articles and books. OA content is open to all, with no access fees. Table 8 provides us information about the openly accessible resources available in the world pertaining to stress. Majority of the articles on stress are published in subscription/closed access journals

607,054(66.7%) while as only 303,349 (33.3%) research articles are available in open access mode.

Table 8: Nature of Access

S. No.	Nature of Access	Records	Percentage
1	Open Access	303,349	33.3
2	Closed Access	607,054	66.7
	Total	910,403	100.00

9 Top Research Areas

Many research areas are contributing to "Stress" from different perspectives. The top contributing research areas include Science and Technology (11.47%), Biochemistry Molecular Biology (10.23%), Cell Biology (8.08%), Neuroscience Neurology (6.35%) and Plant Science (4.75%). Table 9 presents the number of research publications from different research areas indexed in Web of Science for the ten-year period from worldwide. As it is evident from the table that the highest number of research contributions are pertaining to the field of Science and Technology.

Table 9: Top Research Areas

S. No.	Research Areas	Records	Percentage
1	Science and Technology	34,809	11.47
2	Biochemistry Molecular Biology	31,044	10.23
3	Cell Biology	24,528	8.08
4	Neuroscience Neurology	19,286	6.35
5	Plant Science	14,417	4.75
6	Pharmacology Pharmacy	12,628	4.16
7	Cardiology	11,717	3.86
8	Engineering	11,378	3.75
9	Psychology	11,249	3.70
10	Research Experimental Medicine	11,050	3.64

10 Top Funding Institutions

Most of the research conducted at universities worldwide are performed with funds from sponsoring agencies that support research, training and service through various agreements. Researchers or Principal Investigators (PIs) submit proposals to sponsors, through their institutions, requesting funding for clearly defined sponsored activities. Table 10 reveals the list of top 10 funding institutions on stress along with their number of publications. The funding institution that published the highest number of articles is from National Natural Science Foundation of China with 18,111 (5.97%) publications followed by National Institution of Health with 15,183(5%) and National Science Foundation with 4,978 (1.64%) publications respectively.

Table 10: Top Funding Institutions

S. No.	Funding Institutions	Records	Percentage
1	National Natural Science Foundation of China	18,111	5.97
2	National Institution of Health	15,183	5.00
3	National Science Foundation	4,978	1.64
4	Medical Research Council	2,870	0.94
5	American Heart Association	2,656	0.87
6	Welcome Trust	2,101	0.69
7	NIHM, NIH, HHS	2,021	0.69
8	Fundamental Research Funds for the Central Universities	1,820	0.60
9	Biotechnology and Biological Sciences Research Council	1,814	0.59
10	National Institution of Mental Health	1,781	0.58

CONCLUSION

Stress is one the most important subjects of mental health research and one of the most complex areas in psychology and sociology in the current century. Stress is considered as the main threat of health **(Kinman and Jones, 2005).** The reason of such extent of stress in human societies, is complexity of social, personal, and ecological environments of human, multiple and simultaneous transactions of human with surrounding factors, as well as diversity of stress

expressions. Although stress is considered as a routine characteristic of the modern life, if stress becomes continuous and increasing, most of the individuals show problematic signs and symptoms which may endanger their heath and even their surrounding society (**Edwards et al, 2008**). The data for the present study was extracted from Web of Science, one of the largest citations and abstract database. A total of 910,403 publications were retrieved on the term "Stress" during the period of 10 years (2009-2018) from the database. It was observed that there is a growing trend in the research output during the time period. A total of 24 document types on which research output is available were found. Majority of the research publications are in category of articles (87.20%), followed by Reviews (7.25%) and Meeting Abstract (3.84%) respectively. Almost 199 countries are found contributing to the research output on stress where it is clearly observed that USA is leading with (248,695; 27.31%), followed by China (151,981; 16.69%) and Germany (57, 018; 6.26%). The countries that have contributed less than 6 percent to the total collection include England, Japan, France, Italy, Canada and Australia. India being spotted at 8th number contributing to the global research output on "Stress". English is the most important language found during the study undertaken with (887,350; 97.46%) articles, followed by Chinese with (3,986; 0.438%) and German with (3,957; 0.435%) publications. In terms of author wise distribution of publications, the author Wang has (3,929; 0.43%) publications at rank first followed by Zhang with (3,658; 0.40%) publications at second spot and Liu (3,276; 0.36%) at 3rd spot respectively. The journal namely PLOS One ranked first in order of source titles with (16,918; 1.85%) articles and Scientific Reports ranked second with (6,662; 0.73%) articles during the period of study. The institution wise distribution according to their productivity with maximum number of publications showed that the institution namely Chinese Academy of Science is leading with (15,123; 1.66%) publications followed by Harvard University with (7,371; 0.81%) publications during the period of study. Majority 607,054 (66.7%) of the articles on stress are published in subscription/closed access journals while as only 303,349 (33.3%) research articles are available in an open access mode. The top contributing research areas include Science and Technology (11.47%), Biochemistry Molecular Biology (10.23%), Cell Biology (8.08%), Neuroscience Neurology (6.35%) and Plant Science (4.75%). The funding institution that published the highest number of articles is National Natural Science Foundation of China with 18,111 (5.97%) publications followed by National Institution of Health with 15,183 (5%) and National Science Foundation with 4,978 (1.64%) publications respectively.

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