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Dr. Nitin S Wani Associate Professor of Marketing, JDBIMS, SNDT Women's University, Mumbai, Maharashtra, India

Transcendental meditation: A bibliometric retrospection from years 1955-2022

Dr. Nitin S Wani

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Abstract

This study aims to provide a comprehensive overview of extant publications on transcendental meditation through an extensive bibliometric retrospection of the area of transcendental meditation based on a sample of 8776 articles extracted from Dimensions database spanning across the years ranging from 1955 to 2022 and further analysed using VOSviewer. The study analysed 8776 articles published in 3054 journals by 18133 authors from 3505 organisations which were extracted from Dimensions database using VOSviewer software. The research study has identified the most influential journals, authors, institutions, countries, and research papers focusing on the area of transcendental meditation. This study will be of immense help to researchers and practitioners working in the area of meditation and transcendental meditation.

Keywords: Meditation, transcendental meditation, bibliometric analysis, bibliographic coupling, dimensions database, VOSviewer

1. Introduction

The purpose of meditation is the elimination or reduction of thought processes, the deceleration of the inner dialog of the mind which could lead to a sense of physical and mental tranquillity (Mosini, *et al.*, 2019) [17]. The Transcendental Meditation technique has its roots in the ancient Vedic tradition of India and was introduced to the West in the 1950s by the Indian Maharishi Mahesh Yogi. During transcendental meditation, one sits comfortably for about twenty minutes and silently repeats a mantra or sound as taught by the teacher, which allows the mind to settle down to quieter levels and is usually practiced twice a day for 15-20 minutes. The transcendental meditation technique is described as an easily learned procedure that enables the mind to settle to a state of inner calm traditionally described as "pure consciousness" (Bandy, *et al.*, 2020) [2]. Transcendental Meditation involves transcending or going beyond the thinking level of the mind. The transcendental meditation mantras are ancient traditional sounds from the Vedic tradition of India which do not have a meaning. Other forms of meditations focus on the meaning of the mantras, chanting or breathing (Maharishi, 1969; Orme-Johnson, 2021) [16,21].

Positive effects on mental health and quality of life have been observed through training in mind and body techniques, such as meditation and mindfulness-based interventions (Goyal *et al.*, 2014) ^[9]. Transcendental Meditation became very popular in the 1960s and in the 1970s scientific research linking its practice with the physiological effects caused was presented for the first time (Mosini, *et al.*, 2019) ^[17]. Bonnie *et al.* (2020) ^[3] found that the repeated practice of transcendental meditation helps to establish optimal psychophysiological functions and promotes psychophysiological integration outside of the practice. A number of research studies have found a positive impact of transcendental meditation on anxiety, self-accomplishment, creativity, concentration, blood pressure, serotonin, dopamine, cortisol and norepinephrine plasma levels among the regular practitioners of transcendental meditation (Mosini, *et al.*, 2019; Tomljenovic *et al.*, 2016; Nidich *et al.*, 2009; Dillbeck, 1977; Nidich *et al.*, 1973; Orme-Johnson, 1973) ^[17, 25, 19, 8, 18, 20]. The literature review indicates that transcendental meditation is comparatively less studied and reported as compared to other mind and body techniques. The research studies on transcendental meditation have been

Corresponding Author:
Dr. Nitin S Wani
Associate Professor of
Marketing, JDBIMS, SNDT
Women's University, Mumbai,
Maharashtra, India

published in a wide variety of journals ranging from Medicine, Management, Psychology, Neurophysiology etc. Therefore, this study aims to provide a comprehensive overview of extant publications on transcendental meditation through an extensive bibliometric retrospection of the area of transcendental meditation based on a sample of 8776 articles extracted from Dimensions database spanning across the years ranging from 1955 to 2022 and further analysed using VOSviewer.

1.1 This study tries to address the following research question

RQ: What are the most influential journals, authors, countries and research papers on Transcendental Meditation?

2. Methodology

This study aims to identify, evaluate and analyse relevant studies from the literature on Transcendental Meditation ranging from the years 1955 to 2022 using bibliometric analysis.

2.1 Bibliometric Analysis

Traditional literature reviews may lack rigor and might be susceptible to bias by researchers. Bibliometric analysis can not only complement traditional qualitative literature reviews but also overcome the limits of the traditional literature reviews by describing, evaluating and monitoring a given subject or a specific journal using quantitative mathematical and statistical approaches (Rialti et al., 2019; Tartaglione et al., 2019) [22, 24]. Bibliometric analysis is one of the mature and effective statistical methods which examines secondary data acquired on digital database from a quantitative and objective perspective and offers researchers a comprehensive overview of a certain domain of research from a holistic perspective (Wang et al., 2021) [27]. The central focus of bibliometrics is to capture the state of a given field of knowledge through the analysis of old and recent works (Machado, 2022) [15] and accordingly bibliometric analysis of the area of Transcendental Meditation for a period ranging from 1955 to 2022 was undertaken using Dimensions database and VOSviewer as a research tool in this research study.

2.2 Dimensions database

Dimensions database is the world's largest linked research

information dataset which covers 133 million research publications from 104k journals, 63 preprint servers connected by more than 1.7 billion citations. Dimensions provides the most comprehensive view of the whole research landscape and is a database that offers the most comprehensive collection of linked data in a single platform; from grants, publications, datasets and clinical trials to patents and policy documents.

2.3 VOSviewer

VOSviewer developed at Leiden University is a software tool used to generate, visualize and analyse bibliometric networks. These networks include research authors, journals, institutions and individual publications. VOSviewer version 1.6.18 was used for the analysis in this study. It is a widely accepted software for performing bibliometric research for visualizing and constructing bibliometric networks (Costa *et al.*, 2017) ^[6].

2.4 Database search strategy

"Dimensions" database was used as a data source to extract "articles" which were "open access and others" in "English" published during the time frame of the year "1955-2022" for the keyword "Transcendental meditation".

Table 1: Database search strategy

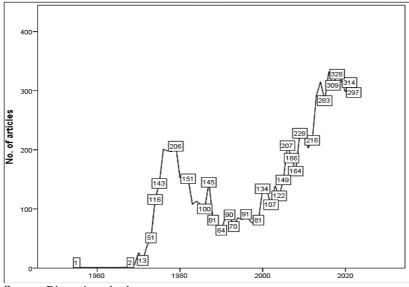
	Filtering Step	Criteria	Number of resultant filtered articles		
i)	Search using keyword	"Transcendental meditation"	20334		
ii)	Publication type	Article	8485		
iii)	Publication years	1955 - 2022	8478 Publications		

3. Results

The 8478 research articles extracted from Dimensions database were further analysed using VOSviewer software.

3.1 Number of publications on Transcendental meditation from years 1955-2022

Fig.1. shows the distribution of research articles on Transcendental meditation spanning over 67 years from 1 article in 1955 to 297 articles in 2022 in Dimensions database.



Source: Dimensions database

Fig 1: Number of articles over years

3.2 Top ten journals on transcendental meditationThe top ten journals out of the 3054 journals in Dimensions

database which published the maximum number of articles on Transcendental Meditation are given in Table 2.

Table 2: Top ten journals on Transcendental meditation

Rank	Journal	Number of Publications	Citations	Average citation per publication
1	Behavioral and Brain Sciences	131	6323	48.27
2	The BMJ	109	81	0.74
3	Journal Of alternative and Complementary Medicine	105	1478	14.08
4	JAMA	96	670	6.98
5	Mindfulness	76	2571	33.83
6	Frontiers in Psychology	72	1561	21.68
7	Applied Psychophysiology and Biofeedback	70	2359	33.70
8	Perceptual and Motor Skills	70	1702	24.31
9	Psychosomatic Medicine	66	864	13.09
10	The Lancet	63	261	4.14

Source: Dimensions database and software VOSviewer for Bibliometric Analysis

3.3 Top ten articles on transcendental meditation

The top ten research papers identified based on their citations received are given in Table 3. 5981(68%) of the

total of 8776 research papers in Dimensions database on Transcendental Meditation had received at least one citation.

Table 3: Top ten articles

Rank	Title of paper	Journal and doi	Year	Citation count
1.	Mindfulness training as a clinical intervention: A conceptual and empirical review.	Clinical Psychology: Science and Practice. https://doi.org/10.1093/clipsy.bpg015	2003	2845
2.	Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders.	The American Journal of Psychiatry https://doi.org/10.1176/ajp.149.7.936	1992	2583
3.	An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results.	General hospital psychiatry https://doi.org/10.1016/0163-8343(82)90026-3	1982	2583
4.	Mindfulness: Theoretical foundations and evidence for its salutary effects.	Psychological Inquiry https://doi.org/10.1080/10478400701598298	2007	2102
5.	Alterations in brain and immune function produced by mindfulness meditation.	Psychosomatic medicine https://doi.org/10.1097/01.psy.0000077505.67574.e3	2003	1844
6.	Mindfulness training as a clinical intervention: A conceptual and empirical review.	Clinical Psychology: Science and Practice https://doi.org/10.1093/clipsy.bpg015	2008	1759
7.	Salivary cortisol in psychoneuroendocrine research: recent developments and applications.	Psychoneuroendocrinology https://doi.org/10.1016/0306-4530(94)90013-2	1994	1584
8.	Effects of mindfulness on psychological health: a review of empirical studies.	Clinical psychology review https://doi.org/10.1016/j.cpr.2011.04.006	2011	1460
9.	Meditation programs for psychological stress and well-being: a systematic review and meta-analysis.	IAMA internal medicine	2014	1381
10.	Meditation states and traits: EEG, ERP and neuroimaging studies	Psychological Bulletin, https://doi.org/10.1037/0033-2909.132.2.180	2006	1044

Source: Dimensions database and software VOSviewer for Bibliometric Analysis

3.4 Top ten authors on Transcendental Meditation

Dimensions database indicated 18,133 authors had published at least one article on Transcendental Meditation.

The highly cited authors who had written on Transcendental Meditation are given in Table 4.

Table 4: Top ten authors

Rank	Author	Number of Publications	Citations	Average citation per publication
1.	Baer, Ruth A.	4	4660	1165
2.	Benson, Herbert	34	3581	105.32
3.	Kabat-Zinn, Jon	4	3433	858.25
4.	Davidson, Richard J.	13	2820	216.92
5.	Carlson, Linda E.	12	2522	210.17
6.	Schneider, Robert H	33	2483	75.24
7.	Brown, Kirk Warren	5	2393	478.6
8.	Creswell, J. David	2	2136	1068
9.	Ryan, Richard M.	1	2102	2102
10.	Shapiro, Shauna.	10	2029	202.9

3.5 Top fifteen institutions contributing to the research on transcendental meditation

Dimensions database indicated 3505 organisations which

have contributed to the research on Transcendental Meditation. The most influential institutions based on the maximum number of research papers on Transcendental Meditation are based in USA and are shown in Table 5.

Table 5: Top fifteen institutions

Rank	Institution	Country	Number of Publications	Citations	Average citation per publication
1.	Maharishi International University		184	7193	39.09
2.	Harvard University	USA	172	10748	62.49
3.	University of California, Los Angeles	USA	64	5183	80.98
4.	University of Pennsylvania	USA	56	3619	64.63
5.	Stanford University	USA	54	3378	62.56
6.	Swami Vivekananda Yoga Anusandhana Samsthana		54	1414	26.19
7.	University of California, San Diego		54	3378	62.56
8.	University of Washington		51	4544	89.10
9.	Columbia University		47	3668	78.04
10.	Yale University		47	1752	37.28
11.	University of Toronto	Canada	44	3680	83.64
12.	Massachusetts General Hospital	USA	43	2578	59.95
13.	University Of Michigan-Ann Arbor	USA	41	3192	77.85
14.	John Hopkins University	USA	40	3135	78.38
15.	University of Melbourne	Australia	39	4656	119.38

Source: Dimensions database and software VOSviewer for Bibliometric Analysis.

3.6 Top fifteen countries contributing to the research on transcendental meditation

The top fifteen countries which have contributed to the research domain on Transcendental Meditation extracted from Dimensions database are tabulated in Table 6. USA tops the list with 2818 publications which had garnered a cumulative citations of 128685.

Table 6: Top fifteen countries

Rank	Country	Number of Publications	Citations	Average citation per publication
1.	USA	2818	128685	45.67
2.	United Kingdom	493	18544	37.61
3.	Canada	326	16779	51.47
4.	India	325	7873	24.22
5.	Australia	270	10979	40.66
6.	Germany	184	8698	47.27
7.	China	139	3069	22.08
8.	Italy	128	7137	55.76
9.	Netherlands	99	7168	72.40
10.	Japan	76	1931	25.41
11.	South Korea	76	1144	15.05
12.	Israel	72	2519	34.99
13.	Spain	72	1315	18.26
14.	Brazil	69	1869	27.09
15.	Switzerland	57	3184	55.86

Source: Dimensions database and software VOSviewer for Bibliometric Analysis

3.7 Bibliographic coupling

The term bibliographic coupling was first introduced by Kessler. Two documents are bibliographically coupled when two works reference a common third work in their bibliographies. It is an indication that a probability exists that the two works focus on a related subject matter (Kessler, 1963a) [13]. According to Ruimin (2012) [23], the two articles which share an article or more than one article in their reference lists are called coupled articles and the relationship between them is called bibliographic coupling. Greater the two referring works have in common, greater is the coupling strength and the subject similarity of the two works. The more articles that two articles share in their reference lists, the more similar these two articles are in theme.

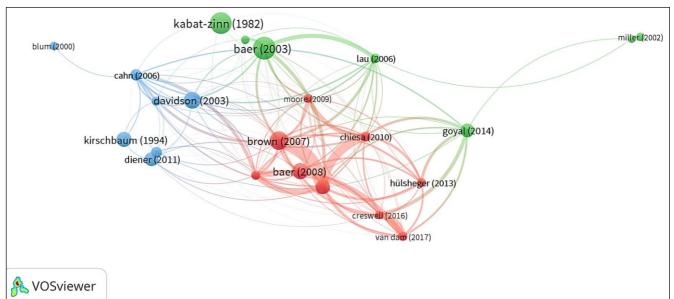
Bibliographic coupling can be used to measure the similarity between:

- Document-document relationships referred as document bibliographic coupling.
- ii) Author-author relationships referred as author bibliographic coupling.

iii) Journal-journal relationships referred as journal bibliographic coupling (Kessler, 1963a) [13].

3.7.1 Document bibliographic coupling

Documents meeting a threshold of minimum of 600 citations were chosen out of 8776 documents for the analysis in VOSviewer. Three clusters of documents emerged from the bibliographic coupling of documents (Fig.2). Cluster 1 indicated by red colour comprised of 9 documents which were bibliographically coupled and focused on theoretical research on Transcendental Meditation. Cluster 2 indicated by green colour comprised of 7 documents which were bibliographically coupled and focused on research on assessing the impact of Transcendental Meditation from the clinical perspective. Cluster 3 indicated by blue colour comprised of 7 documents which published research on assessing the of Transcendental Meditation impact from psychosomatic perspective.



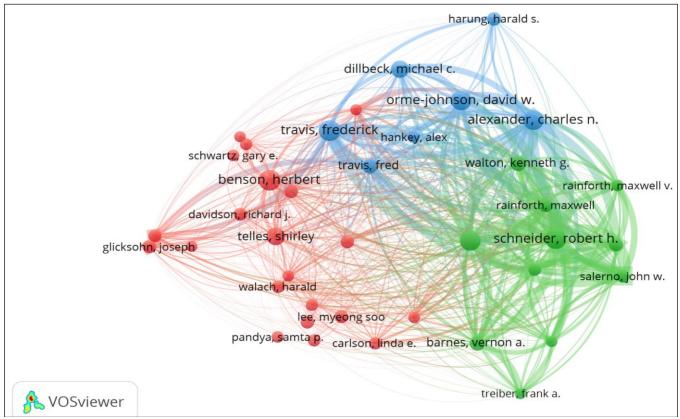
Source: Bibliometric Analysis using Dimensions database and VOSviewer software

Fig 2: Document bibliographic coupling

3.7.2 Author bibliographic coupling

Involves two authors cite the same article(s) in articles that these two authors have published. The more references two

authors have in common in their publication, higher the degree of similarity between their works.



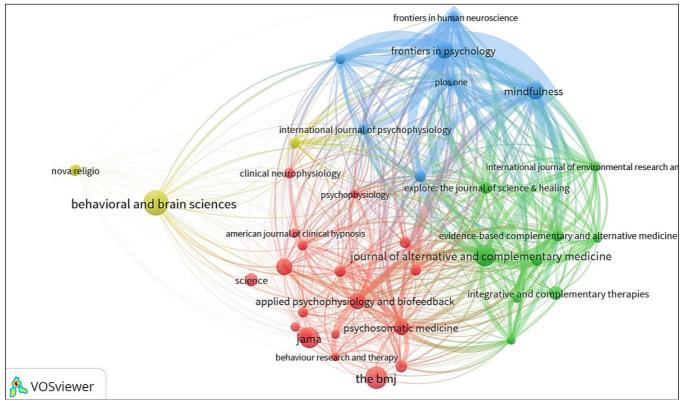
Source: Bibliometric Analysis using Dimensions database and VOSviewer software

Fig 3: Author bibliographic coupling

The circles indicate the number of publications. Larger circles represent authors having large number of publications. Closer the two authors are located to each other, higher the tendency of the authors to cite the same publications. Colours indicate clusters of researchers that are relatively strongly related to each other (Van & Waltman, 2014) [26]. Authors having a minimum of 10 publications with at least 10 citations were chosen out of 18133 authors for the analysis in VOSviewer. Three clusters of researchers emerged from the bibliographic coupling of authors (Fig.3). Cluster 1 indicated by red colour comprised of 21 bibliographically coupled authors working on similar theme with Dr. Herbert Benson having the maximum publications in the cluster. Cluster 2 indicated by green colour comprised of 11 bibliographically coupled authors working on similar theme with Dr. Robert Schneider having the maximum publications in the cluster. Cluster 3 indicated by blue colour comprised of 07 bibliographically coupled authors working on similar theme with Dr. Frederick Travis having the maximum publications in the cluster.

3.7.3 Journal bibliographic coupling

Journals which have published a minimum of 25 documents on Transcendental Meditation which received at least 50 citations were chosen out of 3054 journals for the analysis in VOSviewer. Four clusters of journals emerged from the bibliographic coupling of journals (Fig.4). Cluster 1 indicated by red colour comprised of 19 bibliographically coupled journals which published research Transcendental Meditation from the Clinical perspective. Cluster 2 indicated by green colour comprised of 9 bibliographically coupled journals which published research on Transcendental Meditation from the Alternative and complementary therapy perspective. Cluster 3 indicated by blue colour comprised of 7 bibliographically coupled journals which published research on Transcendental Meditation from the Psychology perspective. Cluster 4 indicated by yellow colour comprised of 5 bibliographically research coupled journals which published Transcendental Meditation from the Philosophy perspective.



Source: Bibliometric Analysis using Dimensions database and Vosviewer software

Fig 4: Journal bibliographic coupling

4. Discussion

This study aims to provide a bibliometric retrospection of research publications on transcendental meditation through an extensive bibliometric analysis of 8776 articles extracted from Dimensions database spanning across the years ranging from 1955 to 2022 and further analysed using VosViewer. This research is unique since the author did not find any research which involved a bibliometric analysis of the research transcendental meditation spanned across 67 years ranging from the years 1955-2022. This study has identified the most influential journals, research papers, authors, countries contributing to the research on Transcendental Meditation.

The journal titled "Behavioral and Brain Sciences" was found as the most impactful journal which published 131 research papers which gathered 6323 citations on the area of transcendental meditation. The research paper titled "Mindfulness training as a clinical intervention: A conceptual and empirical review" published in the journal Clinical Psychology: Science and Practice emerged as the most cited paper with 2845 citations. Dr. Ruth Baer currently a Professor at University of Oxford Mindfulness Research Centre is the most cited author in the area with 4 publications and 4660 citations followed by Dr. Herbert Benson with the maximum number of 34 publications garnering 3581 citations. Maharishi International University based in USA emerged as the most influential organisation with 184 publications and 7193 citations while Harvard University's 172 publications in the area garnered the highest citations of 10748. USA is the most influential country owing to the 2818 articles contributed by US authors gathering a total citation count of 128685. Three clusters of documents resulted from the bibliographic coupling of documents. Three clusters of researchers emerged from the bibliographic coupling of authors. Dr.

Herbert Benson had the maximum publications in the Cluster 1. Dr. Robert Schneider had the maximum publications in the cluster 2 and Dr. Frederick Travis had the maximum publications in the cluster 3. Four clusters of bibliographically coupled journals which published research on Transcendental Meditation were observed.

5. Declaration by Author

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5.2 Source of Funding: None.

5.3 Conflict of Interest: The author declares no conflict of interest.

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