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An Evaluation of Psychological Research in India (1989-2020)

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Abstract
The current Web of Science-based paper provides a scientometrics analysis of research publications in Psychology in India from 1989 to 2020. The data analysis was done using bibliometric software, including VOS viewer, Biblioshiny (R Studio), and MS Excel. The publications and citation structures are analyzed first, followed by the most cited papers and most favored journals. Further, top authors and institutions are analyzed as significant research areas. The results show that Andrade C from the National Institute of Mental Health & Neurosciences, Bangalore is the most productive author. At the same time, Patel V from Sangath, Goa, is the most influential author. The National Institute of Mental Health and Neurosciences is most productive among the institutions, while the Indian Institute of Management, Ahmedabad, is the most influential. The results indicate that the International Journal of Psychology is a key journal in publishing India's scientific production in Psychology. The results also show that culture, HIV, depression, anxiety, attention, cross-culture, gender, and mental health are significant research topics.

Keywords: Psychology, India, Bibliometrics, Scientometrics, Web of Science, Mental Health, VOS viewer, Biblioshiny

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I. Introduction

Psychology is a science of in-depth study of human behavior and mental processes through different methods (Sott et al. 2020). The word 'Psychology' first appeared in the English press in 1853. However, as a subject, it was not considered a science before 19th century (Schacter et al. 2016). It is widely believed that the evolution of psychology as a separate discipline came from both Biology and Philosophy. Applications of Psychology comprise developing academic programs, mental health therapy, understanding child development, stress management, personal health and well-being, performance enhancement, social program design, and other areas directly related to human health and behavior (Biglu et al. 2013; Cherry 2020). There are several job opportunities in the field of Psychology. Depending on the specialization, a Psychology degree holder can work as a teacher, psychologist, counselor, etc.

For the development of a country in any field, research plays a significant role as it identifies solutions to many problems. Disciplinary development in a specific region or county can be seen in numerous professional associations, peer-reviewed index publications, and the availability of undergraduate and postgraduate programs. Apart from this, other indicators of the development of the discipline include academic and research infrastructure, impact (authors' prominence), number of specialized journals in the field, an international collaboration of publications, and the number of conferences held every year.

The quality of the research publications in a specific discipline can be assessed through different indicators (e.g., Taylor 2011; Joshi 2014; Salimi 2017; Villar and Santos 2021), and one of the indicators that are widely accepted to measure the quality of research is published in journals indexed by Web of Science (Clarivate Analytics). Another significant indicator is the impact of the publications, which can be examined by analysis of citations, h-index, and journal impact factor (Barrios et al. 2012).

The current scientometrics analysis aims to assess how well India performs in research in the field of Psychology. The study is based on an analysis of publications indexed in the Web of Science database. We chose Psychology

because little is known about the Scientometrics of Indian publications in this discipline. Such a study may be beneficial to map the research growth, quality, profile and research contribution of a nation in a specific domain. In addition, such a study will also help to understand the discipline's strengths and weaknesses.

Nowadays, scientometrics methods are quite popular for analyzing the quantity and quality of published literature, i.e., books, articles, etc., in numerous research areas (Cortes et al. 2010). In addition, scientometrics indicators are handy and most straightforward for analyzing innovation and research in a country (Pouris and Pouris 2009; Gouveia and Lotz 2021). Moreover, the results of these scientometrics studies can be a handy tool for a country to formulate policy on Science and Technology (Erfanmanesh et al. 2013).

Several subject-specific studies have been conducted to map the scientometrics spread of Psychology research. For example, Kliegl and Bates (2010) studied international collaboration in Psychology research. Zafrunnish and Pullareddy (2009) analyzed authorship patterns, and degree of collaboration in Psychology, Goel (2002) investigated gender differences in publication productivity in Psychology, and Wieczorek et al. (2021) examined research trends in Psychology. Vogl, Scherndl, and Kuhberger (2018) conducted a bibliometric analysis of the psychological research of online media, Nederhof et al. (2009) examined the highly cited non-journal publications in Psychology, and Hartley and Ho (2017) examined the decline of book reviews in Psychology. Several area-specific studies have also been conducted to map psychological research in specific geographic areas. For example, Vinluan (2012) analyzed psychological research in the Philippines. Erfanmanesh, Gholamhosseinzadeh, and Jahromi (2013) studied the performance of psychological researchers in Iran, Biglu, Chakmachi, and Biglu (2013) conducted a bibliometric analysis of psychological studies in Middle East countries, and Moghaddam (2019) studied the collaboration network among Iranian researchers in Psychology. The literature suggests that a bibliometric evaluation of the Psychology literature in

India is missing. There is a need to fill the research gap considering the significance of the research area.

II. Objectives

The specific objectives of the present study are : (i) to determine the Indian Psychology publications and citation structure; (ii) to determine the Indian Psychology publications' growth rate; (iii) to determine the most productive and influential Indian authors in Psychology; (iv) to determine the most productive and influential Indian institutes in Psychology; (v) to determine the top citied publications of Indian authors in Psychology; (vi) to determine the most preferred journals for Indian Psychology papers; (vii) to determine the discipline's most prevalent research topics.

III. Data and Methods

In this study, we selected Psychology publications indexed in the Web of Science Database's Core Collection-comprising Science Citation Index Expanded (SCI-Expanded), Social Sciences Citation Index (SSCI), and Arts and Humanities Citation Index (A& HCI). We have selected the Web of Science database because it is one of the most reputed, comprehensive, and commonly used databases for bibliometric or Scientometrics research.

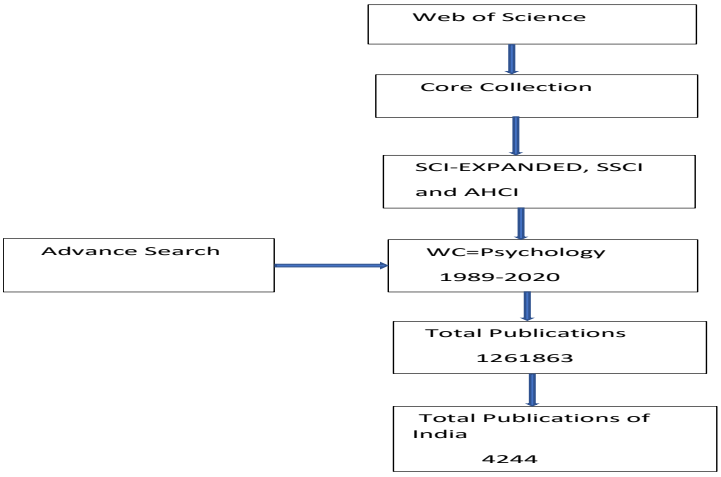

Figure 1. Search strategy

We selected "WC=Psychology" under advance search in the Web of Science database as a Web of Science category from 1989 to 2020. After that, India was selected from the list of countries to extract the publications of Indian authors. No other filter was applied, i.e., type of publication or language of the publications. Subsequently, 4,244 publications were reported for India during the above-mentioned search, which were downloaded and analysed in the present study. The software, i.e., VOSviewer, R-Studio, and MS Excel, was applied for data analysis, interpretation, and visualization. For data analysis, certain variables were used, such as TP=Total Publications, TC=Total Citations, CPP=Citations Per Paper, CPY=Citations Per Year, and ACPP=Average Citations Per Paper.

IV. Publication Share and Rank

Table 1 shows the top research areas of Psychology publications and the total publications for each category. It can be seen that Clinical Psychology, Experimental Psychology, Psychiatry, Developmental Psychology, Neuroscience, and Applied Psychology are the leading fields of Psychology research. Interdisciplinary research areas of Psychology can also be seen in

Table 1. Management, Sports Science, Physiology, Hospitality Leisure Sport Tourism, and Social Sciences interdisciplinary are part of ongoing research in Psychology.

Table 1. Top 25 Research areas of Psychology

Rank	**Research Area**	**TP**
1	Psychology Clinical	2,28,510
2	Psychology Experimental	2,18,864
3	Psychiatry	1,50,564
4	Psychology Developmental	1,41,964
5	Neurosciences	1,16,887
6	Psychology Applied	1,14,630
7	Psychology Social	99,923
8	Behaviour Sciences	77,376
9	Psychology Biological	75,084
10	Psychology Educational	62,412
11	Paediatrics	38,560
12	Psychology Psychoanalysis	31,700
13	Family Studies	31,619
14	Public Environmental Occupational Health	30,887
15	Ophthalmology	30,836
16	Management	28,547
17	Physiology	27,789
18	Sport Sciences	27,693
19	Social Sciences Biomedical	26,971
20	Substance Abuse	25,041
21	Hospitality Leisure Sport Tourism	24,955
22	Education Educational Research	22,200
23	Psychology Mathematical	21,386
24	Clinical Neurology	19,143
25	Social Sciences interdisciplinary	18,832

Between 1989 and 2020, 12,61,863 psychology publications were published worldwide. The year-by-year global distribution of publications is shown in Figure 2. The highest number of publications, 66,982, were reported in 2019. 1991 was the year with the lowest number of publications (23,895). As can be seen, publications have grown slowly, with ups and downs.

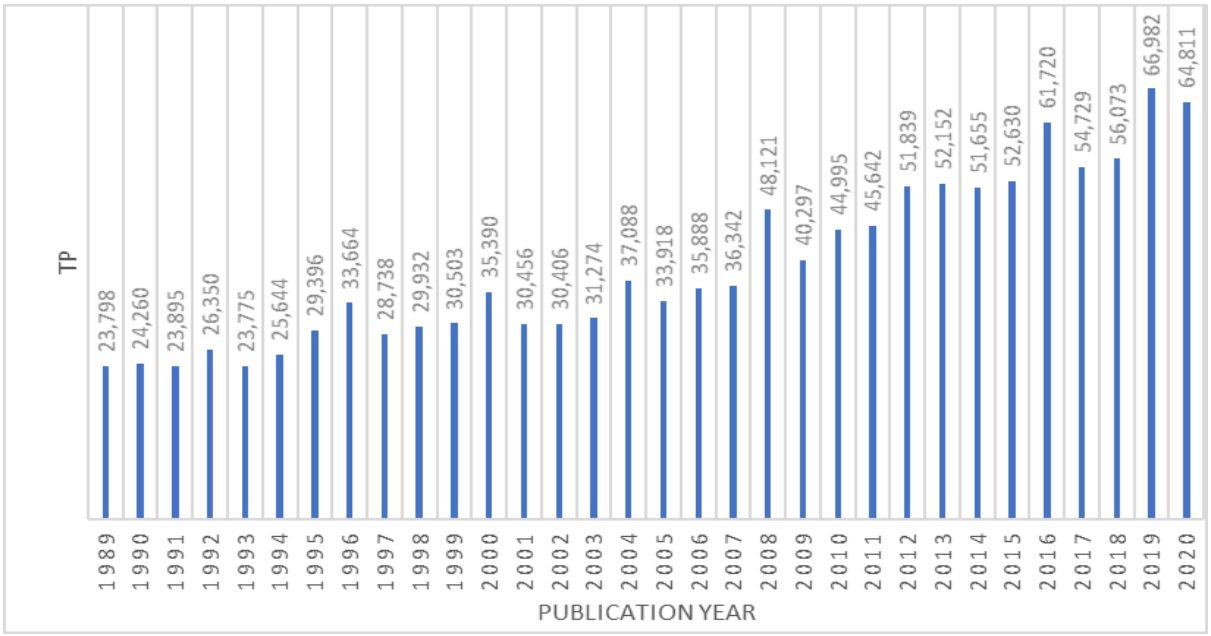

Figure 2. Global publications by years

Table 2 lists the 25 countries with the most psychology research globally, total publications, and percentage of global publications share. Thirteen European countries, six Asian countries, three American countries, one African country, and one Oceania country appeared in the list of most productive countries in Psychology research. The United States grabbed the first rank with 5,94,093 (47.08%) publications, followed far behind are England, Canada, Germany, Australia, Netherlands, France, and Spain. India holds 34th rank globally with a 0.33% global publication share and total publications of 4,244

Table 2. Global standing of countries in terms of Psychology publications

Rank	Country	TP	Percentage (%)
1	USA	5,94,093	47.08%
2	England	1,15,864	9.18
3	Canada	88,283	6.99
4	Germany	84,646	6.71
5	Australia	58,616	4.65
6	Netherlands	49,791	3.95
7	France	31,782	2.52

8	Spain	30,427	2.41
9	Peoples R China	30,302	2.40
10	Italy	28,896	2.29
11	Japan	25,610	2.03
12	Israel	18,041	1.43
13	Switzerland	17,809	1.41
14	Belgium	17,440	1.38
15	Sweden	15,550	1.23
16	Scotland	15,019	1.19
17	New Zealand	10,276	0.81
18	Norway	10,014	0.79
19	Finland	9,164	0.73
20	Brazil	8,930	0.71
21	South Africa	8,152	0.65
22	Taiwan	8,065	0.64
23	Russia	8,056	0.64
24	South Korea	7926	0.63
25	Wales	7,741	0.61
34	**India**	**4,214**	**0.33**

The annual distribution of Indian Psychology publications is shown in Figure 3. During the first ten years (1989-1998), only 623 publications were recorded, while in the next ten years (1999-2008), 861 publications were recorded. The past ten years (2011-2020) have the highest number of publications at 2561. The lowest number of publications, 32, was observed in 1997, while a maximum number of publications, 396, was followed in 2016. It can be seen that, like the global publication growth trend, Indian publications are also increasing slowly and with ups and downtrends.

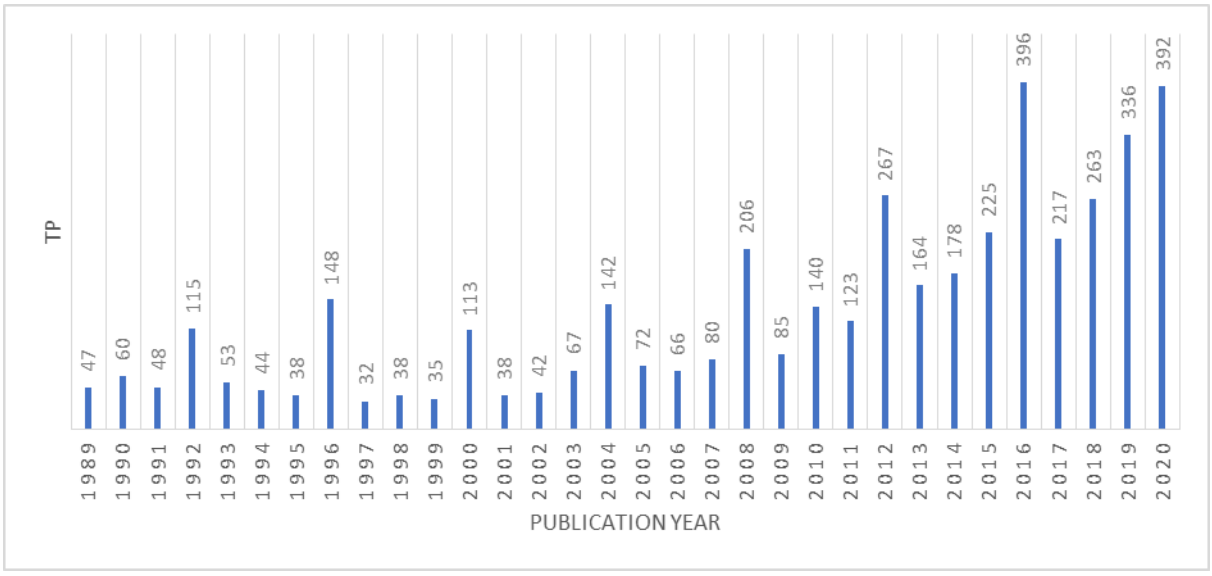

Figure 3. India's publications by years

V. Citation Structure

Figure 4 shows an annual comparison of cited verses uncited publications. The initial years' publications achieved a smaller number of citations, but citations are increasing over the years. The increasing number of cited publications over the years is a positive sign for Indian psychology research, which means that the quality and popularity of Indian psychology publications continues to increase among research fraternities.

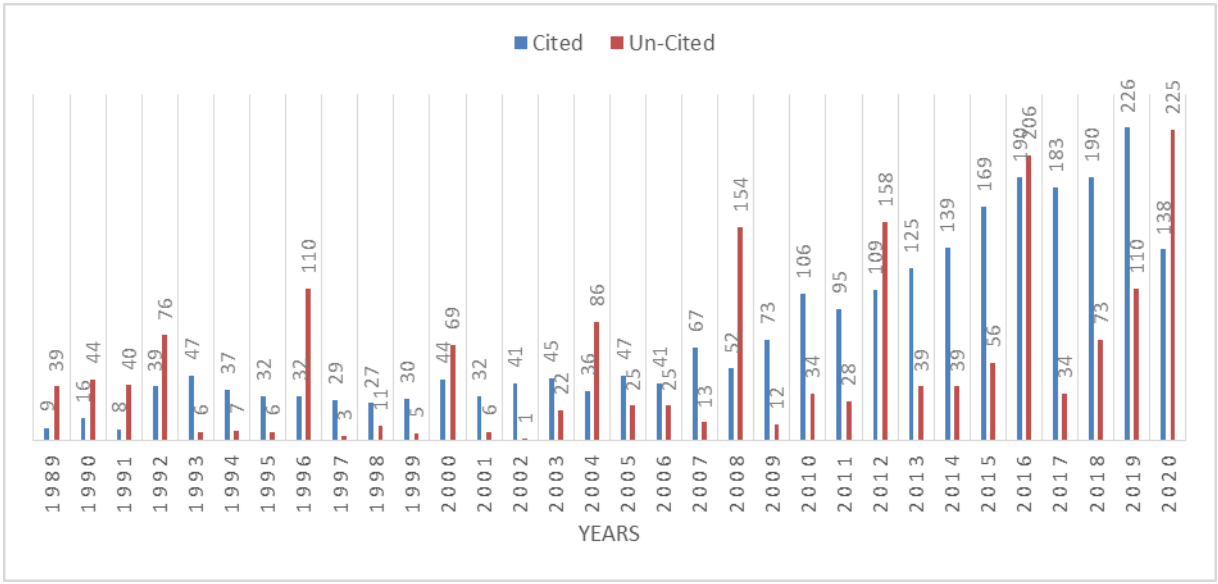

Figure 4. Cited vs. Uncited publications

Table 3 shows the citation structure for all years (1989-2020) and several citation thresholds, total publications, and citations per paper. A more detailed analysis revealed that 20 publications were cited more than 200 times, accounting for 0.47% of the total number of publications. Among them, 40 articles were cited more than 100 times, accounting for 0.94% of the total publications, 147 articles were cited more than 50 times, accounting for 3.47% of the total publications, and 406 articles were cited more than 20 times, accounting for 9.57% of the total publications. Analysis shows that 40.10% of publications are not cited even once. Publications belonging to the year 2010 received the highest 3689 citations, followed by 2014 (2801 citations) and 2016 (2388 citations). The 1997 publications had the least citations at 337. The 1999 publications had the highest average number of citations per paper at 48.17.

Table 3. General citation structure

Year	≥200	≥100	≥50	≥20	≥10	≥5	≥1	0	TP	TC	CPP
1989	0	0	4	5	4	13	12	9	47	566	12.04
1990	0	0	3	6	8	9	18	16	60	601	10.02
1991	0	0	3	4	8	7	18	8	48	538	11.21
1992	0	0	2	1	9	11	16	76	115	416	3.32
1993	0	1	3	9	13	10	11	6	53	899	16.96
1994	0	0	2	7	8	7	13	7	44	521	11.84
1995	0	1	3	8	7	1	12	6	38	702	18.47
1996	0	1	1	6	8	7	9	110	142	557	3.92
1997	0	0	1	3	7	8	10	3	32	337	10.53
1998	0	1	5	7	6	2	6	11	38	809	21.29
1999	2	0	4	5	7	5	7	5	35	1686	48.17
2000	1	0	6	11	13	6	7	69	113	1542	13.65
2001	0	1	3	8	7	6	7	6	38	716	18.84
2002	1	1	5	13	7	6	8	1	42	1804	42.95
2003	1	3	3	9	12	7	10	22	67	1253	18.70
2004	1	2	5	6	4	8	10	86	122	1192	9.77
2005	4	3	7	14	6	3	10	25	72	2831	39.32
2006	0	2	2	9	12	8	8	25	66	906	13.73
2007	0	3	5	15	17	15	12	13	80	1476	18.45
2008	2	4	8	11	11	3	15	154	206	2187	10.61
2009	0	5	9	18	19	17	5	12	85	2237	26.32
2010	3	4	16	24	25	21	13	34	140	3689	26.35
201	2	1	6	26	18	19	23	28	12	226	18.4

1									3	6	2
2012	1	1	5	24	30	21	27	158	267	2098	7.86
2013	0	2	9	29	26	30	29	39	164	2369	14.46
2014	1	2	8	30	35	31	32	39	178	2801	15.74
2015	0	0	4	37	48	34	46	56	225	2340	10.4
2016	0	1	6	23	54	46	60	206	396	2388	6.03
2017	0	1	2	22	51	49	58	34	217	2152	9.92
2018	1	0	6	10	33	51	89	73	263	2377	9.04
2019	0	0	1	5	21	42	157	110	336	1056	3.14
2020	0	0	0	1	5	2	119	255	392	393	1.00
Total %	20 0.47	40 0.94	147 3.46	406 9.57	491 11.57	539 12.70	877 20.67	1702 40.10			

Table 4 presents the list of the 25 most influential publications. These 25 papers accounted for 8328 citations (17.46% of 47705 citations). Among the top-cited papers, four were published in the Journal of Cross-Cultural Psychology and three in Applied Psychology and Psychological Medicine. In contrast, the other 15 papers were published in 15 different journals. The paper that received the maximum number of citations is “Is general self-efficacy a universal construct? Psychometric findings from 25 countries” (Scholz U 2002) with a total of 721 citations, published in the journal “European Journal of Psychological Assessment.” The paper titled “Bayesian inference for psychology. Part II: Example applications with JASP” (Wagenmakers EJ 2018), published in the journal “Psychonomic Bulletin & Review,” is the second most cited and recent article with 710 citations. Another paper, the third most cited article with 635 citations, is titled “How children and adolescents spend time worldwide: Work, play, and developmental opportunities.” It is authored by Larson RW and published in the journal “Psychological Bulletin” (1999). Among the top 25 cited papers, 21 papers were published after 2000.

Table 4. 25 Top cited papers

Rank	Publication	Source	First Author	Publication Year	TC	CPY
1	Is general self-efficacy a universal construct? Psychometric findings from 25 countries	European Journal of Psychological Assessment	Scholz U	2002	721	37.95
2	Bayesian inference for psychology. Part II: Example applications with JASP	Psychonomic Bulletin & Review	Wagenmakers EJ	2018	710	236.67
3	How children and adolescents spend time across the world: Work, play, and developmental opportunities	Psychological Bulletin	Larson RW	1999	635	28.86
4	Effects of brand local and nonlocal origin on consumer attitudes in developing countries	Journal of Consumer Psychology	Batra R	2000	576	27.43
5	Culture-specific and cross-culturally generalizable implicit leadership theories: Are charismatic/transformational leadership attributes universally endorsed?	Leadership Quarterly	Den Hartog DN	1999	532	24.18
6	Values and their relationship to environmental concern and conservation behavior	Journal of Cross-Cultural Psychology	Schultz PW	2005	441	27.56
7	Rhythms of life: Antecedents and outcomes of work-family balance in employed parents	Journal of Applied Psychology	Aryee S	2005	382	23.88
8	Twelve-Month Prevalence of and Risk Factors for Suicide	Journal of Clinical Psychiatry	Borges G	2010	339	30.82

	Attempts in the World Health Organization World Mental Health Surveys					
9	Mapping expressive differences around the world - The relationship between emotional display rules and individualism versus collectivism	Journal of Cross-Cultural Psychology	Matsumoto D	2008	331	25.46
10	Barriers to mental health treatment: results from the WHO World Mental Health surveys	Psychological Medicine	Andrade LH	2014	325	46.42
11	Physical discipline and children's adjustment: Cultural normativeness as a moderator	Child Development	Lansford JE	2005	299	18.69
12	Explaining Radical Group Behaviour: Developing Emotion and Efficacy Routes to Normative and Nonnormative Collective Action	Journal of Personality and Social Psychology	Tausch N	2011	256	25.6
13	Bayesian hypothesis testing for psychologists: A tutorial on the Savage-Dickey method	Cognitive Psychology	Wagenmaker EJ	2010	247	22.45
14	Culture-level dimensions of social axioms and their correlates across 41 cultures	Journal of Cross-Cultural Psychology	Bond MH	2004	247	17.64
15	Mobile payment services adoption across time: An empirical study of the effects of behavioral beliefs, social influences, and personal traits	Computers in Human Behaviour	Yang SQ	2012	239	26.56

16	Suicide attempts, plans, and ideation in culturally diverse sites: the WHOSUPRE-MISS community survey	Psychological Medicine	Bertolote JM	2005	231	14.43
17	Age differences in the prevalence and co-morbidity of DSM-iv major depressive episodes: results from the world mental health survey initiative	Depression and Anxiety	Kessler RC	2010	229	20.82
18	Speaking Up in Groups: A Cross-Level Study of Group Voice Climate and Voice	Journal of Applied Psychology	Morrison EW	2011	224	22.4
19	Internet addiction in students: A cause of concern	Cyber psychology & Behaviour	Nalwa K	2003	214	11.89
20	Promoting child and adolescent mental health in low and middle-income countries	Journal of Child Psychology and Psychiatry	Patel V	2008	209	16.08
21	Detecting common mental disorders in primary care in India: a comparison of five screening questionnaires	Psychological Medicine	Patel V	2008	195	15
22	A world of lies	Journal of Cross-Cultural Psychology	Aavik T	2006	192	12.8
23	In-Role Perceptions Buffer the Negative Impact of Low LMX on Helping and Enhance the Positive Impact of High LMX	Journal of Applied Psychology	Van Dyne L	2008	188	13

	on Voice					
24	To Belong Is to Matter: Sense of Belonging Enhances Meaning in Life	Personality and Social Psychology Bulletin	Lambert NM	2013	184	23
25	Psychological science in cultural context	American Psychologist	Gergen KJ	1996	182	22.75

Table 5 lists the top 25 journals most preferred by Indian authors along with total publications, total citation, average citation per paper, and h-index. These 25 journals published 2222 papers (52.36% of 4244 papers). The journal "International Journal of Psychology," published by Wiley-Blackwell, has the highest number of papers. It accounts for 770 papers (18.14% of the total publications). It is followed by Psycho-Oncology (151 papers), Journal of Clinical Psychiatry (136 papers), Aids Care-Psychological and Socio-Medical Aspects of Aids/HIV (134 papers), Frontiers in Psychology (121 papers), and Physiology & Behavior (103 papers). Of the 25 journals on the list, seven are published by Elsevier, SAGE publishes five, Routledge publishes three, and ten different publishers publish ten. However, in terms of citations, the journal "Journal of Cross-Cultural Psychology" published by SAGE received the highest 2332 total citations and the highest average citations (55.52) per paper. The journal "Aids Care-Psychological and Socio-Medical Aspects of Aids/HIV" has the highest (25) h-index.

Table. 5 25 Most favoured journals

Rank	**Journals**	**Publisher**	**TP**	**TC**	**ACPP**	**h-index**
1	International Journal of Psychology	Wiley-Blackwell	770	920	1.19	17
2	Psycho-Oncology	John Wiley and Sons Ltd	151	173	1.46	7
3	Journal of Clinical Psychiatry	Physicians Postgraduate Press Inc.	136	1905	14.01	22
4	Aids Care-Psychological and	Routledge	134	2060	15.37	25

	Socio-Medical Aspects of Aids/HIV					
5	Frontiers in Psychology	Frontiers Media S.A.	121	702	5.80	14
6	Physiology & Behaviour	Elsevier Inc.	103	1534	14.89	22
7	International Psychogeriatrics	Cambridge University Press	81	527	6.51	11
8	Cognitive Systems Research	Elsevier	64	583	9.11	14
9	International Journal of Behavioural Medicine	Routledge	64	31	0.48	2
10	Personnel Review	Emerald Group Publishing Ltd.	57	519	9.11	14
11	Journal of social Psychology	Routledge	50	413	8.26	10
12	Journal of Adolescent Health	Elsevier USA	47	766	16.30	15
13	Psychologia	Psychologia Society	44	76	1.73	5
14	Journal of Cross-Cultural Psychology	SAGE Publications Inc.	42	2332	55.52	20
15	Perception	SAGE Publications Inc.	39	29	0.74	3
16	Personality and Individual Differences	Elsevier BV	39	573	14.69	13
17	Clinical EEG and Neuroscience	SAGE Publications Inc.	33	183	5.55	7
18	Computers in Human Behaviour	Elsevier Ltd.	33	762	23.09	14
19	Perceptual and Motor skills	SAGE Publications Inc.	33	329	9.97	12
20	Psychological Reports	SAGE Publications Inc.	33	288	8.73	7
21	Applied Ergonomics	Elsevier Ltd.	31	395	12.74	13
22	Journal of Interpersonal Violence	SAGE Publications Inc.	31	308	9.94	11
23	Substance Use & Misuse	Informa Healthcare	30	275	9.17	10
24	Annals of Behavioral Medicine	Springer New York	28	0	00	0
25	Transportation Research Part F-Traffic Psychology and Behaviour	Elsevier Ltd.	28	515	18.39	12

VI. Authors and Institutions Analysis

Table 6 lists the 25 most productive and influential Indian authors in Psychology research. The list is sorted based on the number of publications. These top 25 authors together contributed 831 publications (19.58% of the total number of papers) and were cited 10860 times (22.76% of the total number of citations). Andrade C, affiliated with the National Institute of Mental Health & Neurosciences, Bangalore, is a leading Indian author in Psychology research with 112 publications. He acquired a TC of 1103, a CPP of 9.08, an h-index of 18, and one study with over 100 citations. He is followed by Srinivasan N, affiliated with the University of Allahabad, Allahabad, with 58 publications (TC of 871), Mandal MK, affiliated with Vidyasagar University, Midnapore, with 43 publications (TC of 725) and Kanekar S, affiliated with Yeshwantrao Chavan College of Engineering, Nagpur with 39 publications (TC of 227). Patel V (ranked 16th most productive author), affiliated with Sangath, Goa, is the most influential author with a TC of 1452(CPP 60.5) for his 24 papers. His seven papers acquired more than 100 citations. Kulkarni (ranked 25 as the most productive author), affiliated with the Indian Institute of Technology, Mumbai, has two papers with more than 100 citations.

Figure 5 shows the co-authorship network of authors. Only the authors with five publications strongly linked to each other are shown in the network map. In the network map, each circle represents an author, and the size of the circle indicates the number of publications. In general, if the size of the circle is large, it means the author has a greater number of publications. The distance between the circles in the network graph represents the association between authors. If two circles are close to each other, these two have more collaborative publications. Figure 6 shows the productivity of top authors over time. Mandal MK, Kanekar S, Singh P, Kumar S, Misra G, Singh R, Singh S, Pandey J, and Ittyerah M are among the authors who have started research in the initial years. Authors like Andrade C, Srinivasan N, Kamble SV, Singh S, Patel V, Gupta R, Kumar A, and Kumar D have been more active in research in recent years.

Table 6. Most productive and influential authors

Rank	Authors	Affiliation	TP	TC	CPP	h-index	≥100	≥50	≥20
1	Andrade C	National Institute of Mental Health & Neurosciences, Bangalore	112	1103	9.8	18	1	1	15
2	Srinivasan N	University of Allahabad, Allahabad	58	871	15.0	18	0	3	13
3	Mandal MK	Vidyasagar University, Midnapore	43	725	16.9	16	0	4	8
4	Kanekar S	Yeshwantrao Chavan College of Engineering, Nagpur	39	227	5.8	9	0	0	1
5	Chaudhary N	University of Delhi, Delhi	38	1160	30.5	15	1	3	7
6	Telles S	Patanjali Res Fdn, Haridwar	36	606	16.8	15	0	2	9
7	Singh P	Lucknow University, Lucknow	36	417	11.9	10	1	0	11
8	Kumar S	Malaviya National Institute of Technology, Jaipur	36	377	10.5	11	0	11	4
9	Kamble SV	Karnataka University, Dharwad	35	272	7.8	10	0	0	5
10	Misra G	University of Delhi, Delhi	32	425	13.3	7	1	2	1
11	Singh R	Ahmedabad University	31	246	7.9	9	0	1	3
12	Singh S	Indian Institute of Management, Ranchi	29	298	10.3	8	1	0	2
13	Sharma S	Kalpana Chawla Govt Medical College,	27	290	10.7	8	0	2	1

		Karnal							
14	Mishra RK	University of Hyderabad, Hyderabad	27	217	8.0	8	0	0	4
15	Pandey J	Indian Institute of Management, Indore	26	142	5.5	8	0	0	1
16	Patel V	Sangath,Goa	24	1452	60.5	15	7	2	4
17	Kumar A	Xavier Inst Social Serv, Ranchi	24	209	8.7	10	0	12	
18	Suar D	Indian Institute of Technology (IIT) - Kharagpur	24	200	8.3	7	0	1	2
19	Gupta S	Natl Inst Adv Studies	23	435	18.9	9	1	0	5
20	Gupta R	Indian Institute of Technology (IIT) - Mumbai	23	268	11.6	9	0	0	6
21	Khan A	Indian Institute of Technology (IIT), Bombay	23	84	3.65	5	0	0	2
22	Ittyerah M	University of Delhi, Delhi	22	107	4.9	7	0	0	1
23	Singh T	Banaras Hindu University, Varanasi	22	20	0.9	2	0	0	0
24	Kumar D	National Institute of Mental Health & Neurosciences, Bengaluru	21	199	9.5	8	0	0	4
25	Kulkarni M	Indian Institute of Technology (IIT), Mumbai	20	510	25.5	10	2	1	4

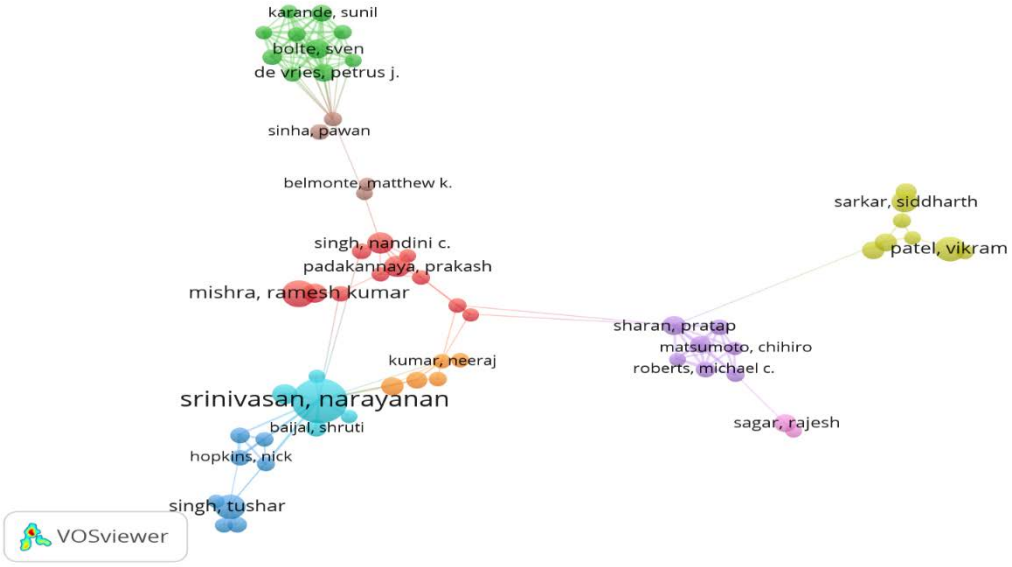

Figure 5. Co-authorship network of authors with a threshold of 5 publications

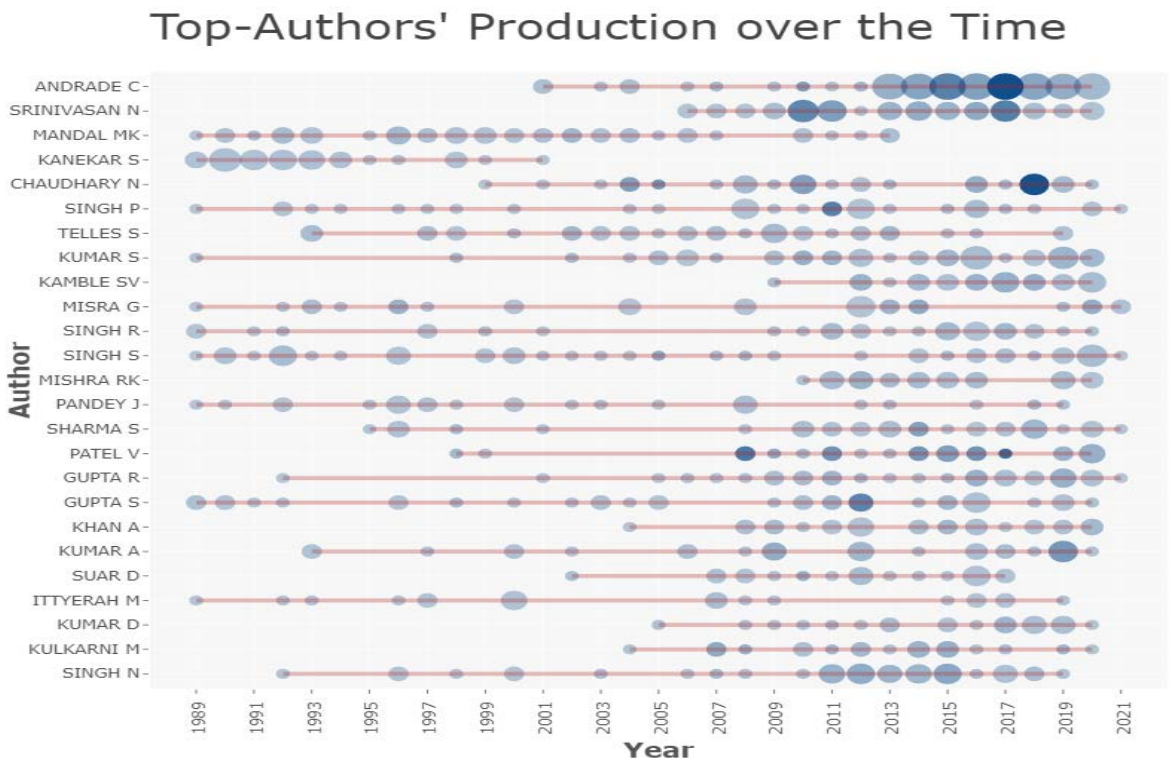

Figure 6. Top author's productivity over time

Table 7 shows the most productive and influential institutions for psychological research in India. The list is sorted based on the number of publications. The most productive Indian institution is the National Institute of Mental Health and Neurosciences, Bangalore, with 289 publications. It has also achieved the highest total citations of 3253 and an h-index of 29. The institutions that follow are the University of Delhi (215 publications), the University of Allahabad (179 publications), and Banaras Hindu University (138 publications).

The Indian Institute of Management, Ahmedabad (ranked 17th in the list as a most productive institution) is the most influential institute, with a TC of 1354 (CPP 32.24) for its 42 publications. The National Institute of Mental Health and Neurosciences, Bangalore, and the Indian Institute of Technology, Kharagpur, have five papers cited more than 100 times. Figure 7 shows the network of collaborative institutions. Only the institutions with ten publications and strongly connected are shown in the network. Each circle in the network map

represents an institute, and the size of the circle indicates the number of publications. In the network map, if two institutes are close to each other, that means institutes have more collaborative publications.

Table 7. Most productive and influential Institutions in India

Rank	Institute	TP	TC	CPP	h-index	≥100	≥50	≥20
1	National Institute of Mental Health and Neurosciences	289	3253	11.26	29	5	6	37
2	University of Delhi	215	2259	10.59	23	4	4	19
3	University of Allahabad	179	1755	9.8	24	0	6	25
4	Banaras Hindu University	138	1347	9.76	22	0	5	19
5	All India Institute of Medical Sciences, New Delhi	121	2262	18.69	21	4	8	8
6	Indian Institute of Technology, Bombay	79	675	8.54	12	2	1	5
7	Indian Institute of Technology, Kharagpur	79	1449	18.34	17	5	3	9
8	Post Graduate Institute of Medical Education Research, Chandigarh	70	625	8.93	11	1	1	8
9	University of Mumbai	66	427	6.12	12	0	1	3
10	Indian Institute of Technology, Delhi	61	723	11.85	12	2	1	4
11	University of Calcutta	60	485	8.08	8	2	0	3
12	Indian Institute of Technology, Kanpur	54	298	5.52	10	0	0	7
13	Karnataka University	53	653	12.32	13	1	0	8
14	Tata Institute of Social Sciences	53	492	7.96	12	0	3	3

15	Manipal Academy of Higher Education	46	230	5	7	0	2	1
16	Indian Council of Medical Research	44	693	15.75	16	0	1	12
17	Indian Institute of Management, Ahmedabad	42	1354	32.24	14	2	3	8
18	Jawaharlal Nehru University, New Delhi	41	89	2.17	5	0	0	1
19	Defence Research and Development Organisation	40	483	12.08	13	0	3	6
20	Department of Biotechnology	38	424	11.16	12	0	1	3
21	Indian Institute of Management, Bangalore	37	728	19.68	14	2	2	7
22	University of Hyderabad	36	182	5.06	9	0	0	1
22	Indian Institute of Technology, Gandhinagar	35	192	5.49	7	0	0	4
24	Savitribai Phule Pune University	35	356	10.17	9	0	3	3
25	Panjab University	34	106	3.12	7	0	0	1

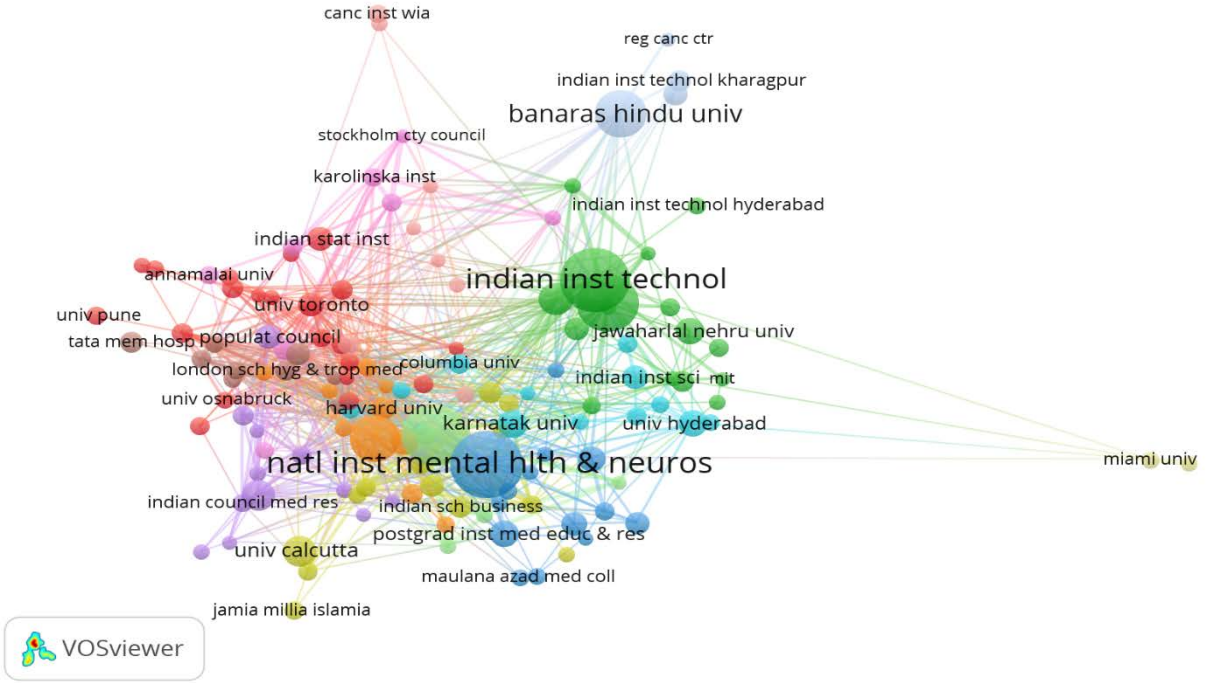

Figure 7. Co-authorship network of institutions with a threshold of 10 publications

VII. Keywords Analysis

Table 8 presents the list of the top 25 author keywords. The words such as India, culture, HIV, and depression are the most frequently used keywords by the authors. Figure 8 shows the network map of author keywords analyzed by VOSviewer software. The keywords used in at least five publications are shown in the network. The size of the circle in the network represents the number of publications in which each keyword appears. In general, if the size of the circle is larger, that means the keyword is used more frequently in different publications, which can be verified in Table 8. The distance between keywords in the network represents their association; if two keywords are close, they are often used together in several publications. The color of the circles shows different clusters of keywords.

Table. 8 Top 25 co-occurrence of author keywords

Rank	Author Keywords	Occurrences
1	India	272
2	Culture	82
3	HIV	65
4	Depression	64
5	Anxiety	43
6	Attention	35
7	Cross-Cultural	35
8	Gender	32
9	Mental Health	32
10	Quantitative	32
11	Adolescents	31
12	Meditation	31
13	Stress	31
14	Children	29
15	Schizophrenia	29
16	Autism	28
17	Cognition	27
18	Emotion	27
19	Memory	26
20	Quality of life	26
21	Eeg	22
22	Personality	22
23	Stigma	20
24	Bilingualism	19
25	Mindfulness	19

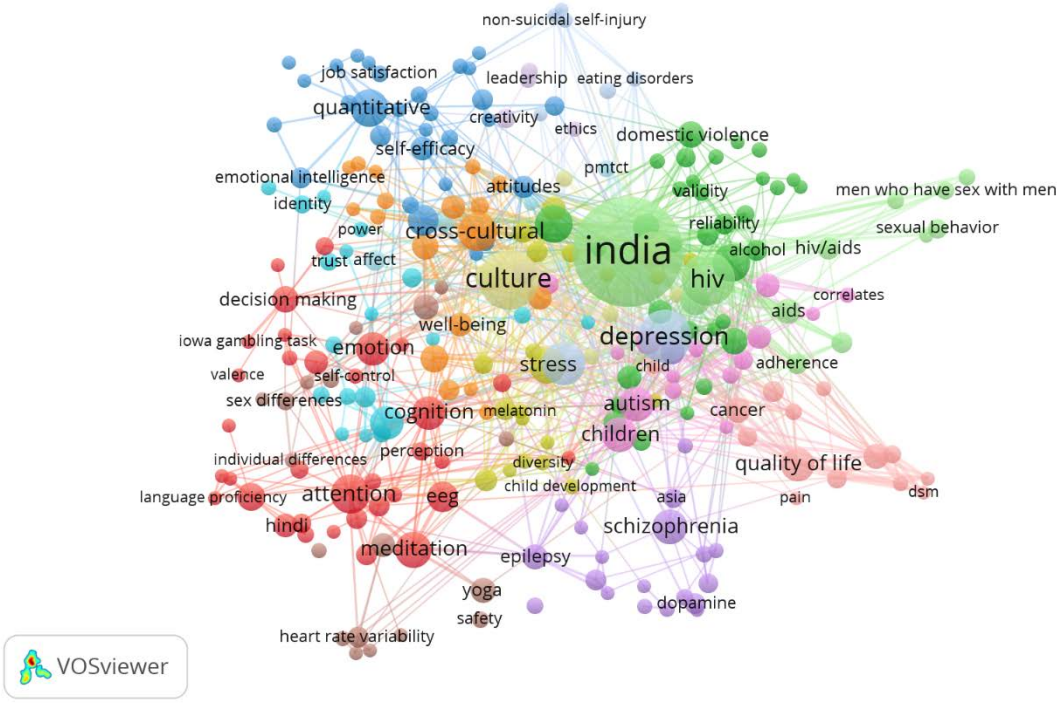

Figure. 8 VOS-viewer co-occurrence network map of authors' keywords with a threshold of 5 documents

VIII. Discussion

India ranks second in the world in terms of population and first in population density. The above analysis shows that there has been a substantial increase in the percentage of publications in recent years. Still, the situation of Psychology research in India is not good as compared to developed nations in terms of quality and quantity. Compared to the Psychology research output globally, India's contribution constitutes a tiny percentage of the world's total work. The paper highlights that India's average contribution is only 0.33% of the world's Psychology research output from 1989 to 2020. Therefore, substantial government funding is required in terms of R & D investment for the

development of the field and to increase research output. The study highlights that apart from government-funded institutions, private investment initiatives and public-private partnerships can also play an important role in increasing the research output and quality of research. Moreover, international collaboration in publications can play a significant role in improving research quality. As the study shows, although many scholars are actively involved in research, they need to be motivated for quality research by offering special incentives and promotions.

Along with the above outcome, the study also has some limitations. As mentioned in the methodology section, the data for this study was obtained from the Web of Science. However, several other databases may provide different perspectives on research output in this field. Furthermore, the study used bibliometric indicators like citations, h-index, etc., to examine the quality of the publications. Still, many other indicators can be incorporated to scrutinize the quality of the publications.

Finally, the limitation of the study is the keyword used for analysis. "Psychology" is a broad term that may or may not cover every aspect of psychological research. However, as per the scope of the present study, the aim of this study has been successfully achieved with the mentioned keyword.

IX. Conclusion

This Web of Science-based Scientometrics Review provides a comprehensive overview of the development and structure of psychological research in India from 1989 to 2020. The analysis has been divided into four parts. First, the growth of publications is analysed along with the leading countries in Psychology research output, India's global standing in the world in terms of Psychology publications, and interdisciplinary research areas of psychology. The United States is the leading country in Psychology research, accounting for more than 47% of the total publications. It is followed far behind by England (9.18%), Canada (6.99%), Germany (6.71%), Australia (4.65%), Netherlands

(3.95%), France (2.52%), and Spain (2.41%). India holds the 34th position globally concerning Psychology research output with 4,244 publications. The highest papers were related to Clinical Psychology followed by Experimental Psychology, Psychiatry, Developmental Psychology, Neurosciences and Applied Psychology. 1997 was the least productive year with 32 publications, while 2016 was the most productive year with 396 publications. Second, the citation structure of India's publications is analysed, including cited vs. uncited papers, general citation structure, and 25 top-cited papers. It was found that 20 papers were cited more than 200 times while 40 were cited more than 100 times. The 2010 publications achieved the highest total citations (3689) followed by 2005 (2831), 2014 (2801), 2013 (2388), 2018 (2377), while the publications of 2002 achieved the highest average citations per paper (42.95). The highly cited paper is "Is general self-efficacy a universal construct? Psychometric findings from 25 countries," with 721 citations published in the European Journal of Psychological Assessment in 2002. The study found that "Bayesian inference for psychology. Part II: Example applications with JASP" by Wagenmakers EJ, published in the journal Psychonomic Bulletin & Review (2018), is second highest cited paper with 710 citations. The journal International Journal of Psychology, Psycho-Oncology, Journal of Clinical Psychiatry, Aids Care-Psychological and Socio-Medical Aspects of Aids/HIV, Frontiers in Psychology and Physiology & Behaviour are key journals in publishing India's scientific production in Psychology. After that, the most productive and influential authors and institutions are studied along with their co-authorship network maps. Andrade C from the National Institute of Mental Health & Neurosciences, Bangalore, is the most productive author, while Patel V from Sangath, Goa, is the most influential author. The National Institute of Mental Health and Neurosciences is the most productive Institute, whereas the Indian Institute of Management, Ahmedabad, is the most influential Institute. At last, keywords are analysed along with the co-occurrence network of author keywords. The words India, culture, HIV, depression, anxiety, attention, cross-culture, gender, and mental health are the most frequently used author keywords.

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