

Fifty Years of Complementary and Alternative Medicine (CAM) – a Bibliometric Analysis of Publication Activity and General Content of the Publications

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ABSTRACT

The aim of this article is to analyze the development of complementary and alternative medicine (CAM) as a research domain over the period 1966-2016. Using bibliometric methods, the publication pattern will be analyzed with a focus on journal articles and sources. Furthermore, we will analyze the development of clinical research and map the general content of the publications. The data set consist of 105 216 publications, that have Complementary Therapies as their MeSH major topic, in the Medline database. The expansion of CAM research took place in the late 1990s. At the end of the time period about 20 percent of the publications were classified as clinical trials, but relatively few according to clinical phase. A majority of the core journals, defined by the Bradford law of scattering, showed a focus on CAM. The impact of these journals, measured by SNIP values, were close to the average. The analysis of MeSH terms revealed that the dominating therapies were Musculoskeletal manipulations, Acupuncture Therapy and Mind Body Therapies. The co-word analysis of author keywords showed that Acupuncture were the largest single node. Furthermore, it was possible to detect a specific CAM cluster. CAM has developed to a small but distinct research domain. There are signs of specialization in/about CAM as well as integration in other medical sub-fields. Furthermore, there are signs of a young medical domain, characterized by small and exploratory clinical studies.

Keywords: Complementary medicine, Alternative medicine, Research domain, Bibliometric analysis, Co-word analysis.

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INTRODUCTION

Complementary and alternative medicine (CAM) is, in many regards, a contested scientific and medical domain. As the concepts indicate, CAM is often understood in contrast to conventional medicine as ideas and practices not qualifying to the standards of the scientific or medical community. However, over the last few decades CAM has gained increased popularity among health care users^[1-3] and acceptance – although often with limited knowledge about specific treatments – among health care professionals.^[4-6] Furthermore, CAM has been established as research activities, including publications in academic journals,^[7,8] specialized research centers^[9] and inclusion in medical education.^[10,11]

From a sociological point of view, the status and development of CAM as a research domain may be interpreted both in

terms of academization and in terms of boundary work. The academic world entails several compelling properties: resources for carrying out research, power to define legitimate knowledge and reputation and prestige as a serious knowledge producer.^[12] Part of the attraction is social acceptance and credibility through academic inclusion. This type of attractiveness of the academic world has been conceptualized as academization by educationalists and social scientists,^[13] a trend by which different actors seek to become insiders in academic institutions by establishing research programs, higher education curriculums and research centers. One key strategy in academization is to publish in well-reputed academic journals. But as Thomas Gieryn^[14,15] has emphasized, the demarcation of science and non-science is fundamental in modern societies and it is in the interest of trusted scientific authorities to uphold clear boundaries to other knowledge producers. Consequently, it is expected that actors (such as researchers and medical professionals) who propose new ideas (for example regarding treatments or research designs) need to negotiate with different types of authorities (such as funding agencies, editors or reviewers) to gain acceptance

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– and inclusion – in academia. Examination of this type of boundary work has shown great variety of rhetorical strategies and dispersal along a continuum of established scientific or medical knowledge^[16] and that methodology plays a crucial role.^[17]

In this article we will analyze the development of CAM as a research domain, with a focus on the key strategy in academization, namely publications in academic journals.

OBJECTIVE

The objective of this article is to analyze the development of CAM as a research domain over the period 1966–2016. Using bibliometric methods, the publication pattern will be analyzed with a focus on journal articles and sources. Furthermore, we will analyze the development of clinical research and map the general content of the publications.

Previous bibliometric research on CAM research

There are a number of bibliometric studies of CAM research, either using a general scope on the domain,^[7,8,18–23] regions,^[24,25] therapies such as acupuncture,^[26–29] Tai chi,^[30] homeopathy^[31] and yoga,^[32,33] health issues/disorders,^[34] and medical sub-areas.^[35] These studies are based on data from different databases such as Medline/PubMed, Scopus, Web of Science/SCI Expanded, Google Scholar, the Cochrane Library and IndMED and have been carried out using diverse bibliometric methods and delimitations. Still, there are some recurrent patterns. Most of the studies identify a substantial increase in the number of published articles from the late 1990s or early 2000s and that this increase is more substantial and/or more rapid than biomedical research in general. For example, Ma *et al.*^[29] found that acupuncture publications not only have grown at a double growth rate compared to biomedical research, but also a faster growth rate than CAM and Traditional Chinese Medicine in general over the last 20 years. Another recurrent pattern is a considerable increase in the share of clinical research in general and of randomized controlled trials in particular. Starting as a relatively small share in the 1970s and 1980s, clinical research has expanded to about 20 percent in the 2000s.^[8] Similar development is found in research in the area of cancer,^[35] but there are examples of even greater shares of clinical studies on therapies like Tai Chi and Yoga,^[30,32] and in regions like Scandinavia,^[25] although results are difficult to compare due to different databases and subsets.

In CAM publications in general there is dominance of authors with an address/affiliation in North America, followed by East Asia (especially from China) and Europe.^[7] This pattern changes when looking at specific therapies, such as acupuncture, yoga or homeopathy. For example, Ma *et al.*^[29] Found a dominance of Chinese publications in

acupuncture research, especially when including publications in all languages. A rapid increase of Chinese research, and that Chinese research outnumbers North American in the 2000s, is confirmed by others.^[26] A similar dominance by Indian research has been found in Yoga publications^[32,33] and of European research (especially from the U.K. and Germany) in the case of homeopathy.^[31] Moreover, there are notable geographical differences in how publications are cited. Fu *et al.*^[7] found that US-authored publications were cited most, but that the share was lower than its percentage of all of publications. In contrast, Indian-authored publications attracted more citations compared to their share of the publications. Danell and Danell^[8] found that there is a growing number of specialized CAM journals, but that the increase of CAM publications was found both within and outside this journal category. Specialized journals may reflect increasing research activity and need for specialized knowledge, but may also be a strategy to handle ontological and epistemological conflicts and exclusion from conventional medicine. The first line of argument is proposed by Jeter *et al.*^[32] who found that about 50 percent of the yoga studies were published in general medical journals: “suggesting that the mainstream literature is beginning to explore the plausibility of complementary and integrative therapies in practice” (p 590). Furthermore, they found that a larger share of the studies in specialized yoga journals had unassessed designs, indicating poorer methodological quality, compared to the general medical journals. The share of non-yoga and non-CAM, journals were even larger (about 2/3 of the publications) in a study by Cramer *et al.*^[33]

METHODOLOGY

This study is based on data from the Medline database, in the PubMed interface (<https://pubmed.ncbi.nlm.nih.gov>). Medline is one of the largest databases in the area of life sciences and biomedicine, published by the U.S. National Library of Medicine and National Institute of Health. One of the main advantages of this database is that it is possible to identify research with the Medical Subject Heading (MeSH), a controlled vocabulary, indexed by professionals, instead of free text or general keyword searches.^[36]

In this article, CAM research has been operationalized using the Medical Subject Heading (MeSH) term Complementary Therapies, including all its sub terms. The material is restricted to journal articles and to the publications that have Complementary Therapies as their MeSH major topic. The time period is set to the years 1966–2016, since it takes a couple of years for databases like Medline to become reasonably well updated. The choice to start in 1966 is motivated by the fact that it makes this study comparable with a previous study of

the research domain.^[8] The data set was retrieved in December 2019 and consist of 105, 216 publications.

RESULTS

Publication activity

In Figure 1 we present the development of articles classified as Complementary Therapies in the Medline database during the period 1966–2016 and their share of the database as a whole. From the blue graph, read to the left axis, we can see that there were about 500 articles published each year at the beginning of the period. At the end of the period publication activity had increased to about 5, 000 articles per year.

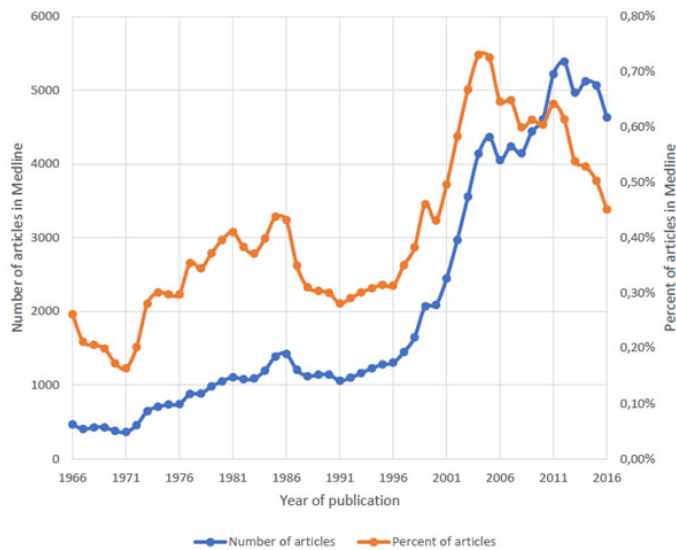


Figure 1: Journal articles classified as Complementary Therapies in Medline, 1966–2016.

From the orange graph, read to the right axis, it can be observed that these publications, during the early years were equal to 0.2–0.3 percent of the Medline database. Similar to the number of publications, there is a general expansion of the share of CAM articles in the late 1990s. The peak was in 2004–05 when about 0.7 percent of the articles in Medline were classified as Complementary Therapies. Since then there has been a drop in their database share and the share has stabilized at an annual rate of 0.4–0.5 percent.

Their annual growth rate has varied throughout the period. In the 1970s it was about 8 percent each year, but starting at very low numbers. The expansion slowed down during the 1980s, only to grow again from the end of 1990s up until 2005. The growth peak was between the years 2010 and 2011 with an increase of more than 600 articles, although the peak in number of publications was in 2012, with 5,380 publications.

When comparing the results from the two graphs it can be concluded that the number of articles per year has increased and that there has been a general expansion of CAM research

in the database (i.e. that CAM research is growing faster than the database as a whole) but that the expansion has dropped away after 2011.

Sources

The articles are found in 6,589 sources. We have used the Bradford law of scattering to group these journals. The idea of this law is that a relatively large share of the publications on a given subject is found in a relatively small number of sources and that growth in the publications on a subject requires growth in the number of sources.^[37] In the words of Bradford, publications are distributed as follows: ‘If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same articles as the nucleus, when the number of periodicals in the nucleus and succeeding zones will be as 1: n: n² where ‘n’ is a multiplier”.^[38] Following from that, we have divided the organized list of sources into three approximately equal groups.

The first group, which we label as core journals, consist of 35,208 publications in 41 sources (see Table 1). The majority of the journals have a focus on CAM, in general (for example *Journal of Alternative and Complementary Medicine* and *Complementary Therapies in Medicine*) or on specific traditions/therapies (for example *Journal of Ethnopharmacology* and *Journal of Traditional Chinese Medicine*). Among the core journals there are a few more general sources, like *PLoS One* and the *Cochrane Database of Systematic Reviews*.

There are several ways to measure the impact of journals. In general, impact factor reflects the annual average number of citations of publications, usually based on the last two or five years. The assumed logic is that high quality research is recognized and cited by other authors and that the most prestigious journals, in which it is difficult to get published, attract high quality research.^[39,40] However, citing practice varies substantially among research domains, consequently field normalized measures are preferred.^[41] In Table 1, information about the journals SNIP value has been added. SNIP is a source-normalized measure of journal impact based on the characteristics of the sources from which citations originate. One advantage of this measurement is that it is not dependent on pre-defined categorization of journals based on subject.^[42] If a journal is cited by publications with long publication lists it is suggested that the journal is part of a field with high citation density. Moreover, it is expected that publications in such journals attract more citations compared to publications in journals in low citation density fields.^[43]

The majority of the core journals presented in Table 1 have SNIP values close to 1 or below, indicating that the journals have an average (or lower) impact compared to the field. Most

Table 1. Core journals for journal articles classified as Complementary Therapies in Medline, 1966-2016.

Rank	Name of journal	SNIP value (2018)*	Number of articles	Cumulative number of articles
1	Zhongguo Zhen Jiu (Chinese Acupuncture and Moxibustion)	-	3361	3361
2	Zhongguo Zhong Xi Yi Jie He Za Zhi (Chinese Journal of Integrated Traditional and Western Medicine)	-	2620	5981
3	Journal of Ethnopharmacology	1.5	2396	8377
4	Journal of Alternative and Complementary Medicine	0.83	1844	10221
5	Journal of Traditional Chinese Medicine	0.26	1747	11968
6	Zhen Ci Yan Jiu (Acupuncture Research)	-	1493	13461
7	American Journal of Clinical Hypnosis	0.93	1281	14742
8	Planta Medica	1.02	1192	15934
9	International Journal of Clinical and Experimental Hypnosis	0.75	1191	17125
10	Phytotherapy Research	1.24	1154	18279
11	Fitoterapia	1.33	1035	19314
12	American Journal of Chinese Medicine	0.99	955	20269
13	Zhong Xi Yi Jie He Xue Bao (Journal of Chinese Integrative Medicine)	-	954	21223
14	BMC Complementary and Alternative Medicine	1.16	947	22170
15	Zhongguo Zhong Yao Za Zhi (China Journal of Chinese Materia Medica)	-	848	23018
16	Phytomedicine	1.24	831	23849
17	Zhong Xi Yi Jie He Za Zhi (Chinese Journal of Modern Developments in Traditional Medicine)	-	812	24661
18	Complementary Therapies in Medicine	0.97	759	25420
19	Alternative Therapies in Health and Medicine	0.45	721	26141
20	Acupuncture in Medicine	0.86	641	26782
21	PLoS One	1.12	519	27301
22	Homeopathy	0.95	474	27775
23	Complementary Therapies in Clinical Practice	1.05	458	28233
24	Chinese Journal of Integrative Medicine	0.58	456	28689
25	Biofeedback and Self-Regulation	-	455	29144
26	Beginnings	-	449	29593
27	Social Science and Medicine	1.76	441	30034
28	Cochrane Database of Systematic Reviews	1.63	435	30469
29	Journal of Manipulative and Physiological Therapeutics	0.85	408	30877
30	Zhong Yao Tong Bao (Bulletin of Chinese Materia Medica)	-	398	31275
31	Holistic Nursing Practice	0.56	398	31673
32	Explore	0.84	396	32069
33	Nursing Times	0.35	393	32462
34	Minerva Medica	0.44	380	32842
35	Journal of the Acoustic Society of America	-	375	33217
36	Acupuncture and Electro- Therapeutics Research	-	356	33573
37	Perceptual and Motor Skills	0.60	334	33907
38	Journal of Holistic Nursing	0.60	329	34236
39	Journal of Music Therapy	0.64	327	34563
40	Psychophysiology	1.33	324	34887
41	Forschende Komplementärmedizin	-	321	35208

* Based on Scopus.

of the Chinese speaking journals on the list have no SNIP value, due to lack of database coverage.

The second group, which we label subsidiary journals, consists of 35,096 publications in 478 sources (the number of publications in each journal varies between 317 and 31). This group is much more diverse, regarding their focus. There are a number of journals dedicated to CAM therapies (such as acupuncture, osteopathy or yoga) as well as complementary, integrative and holistic medicine in general. However, the vast majority of these journals are specialized medical journals in areas such as anesthesiology, cancer/oncology, gastroenterology, gerontology, gynecology/obstetrics/midwifery, immunology, neurology, nursing, nutrition, occupational therapy, pain, pediatrics, pharmacology, physiology, primary care, psychology, psychiatry, public health, rehabilitation and sports medicine. Moreover, in this group there are some high impact medical journals such as *JAMA* (186 publications, SNIP 9.85), *New England Journal of Medicine* (72 publications, SNIP 13.0) and *The Lancet* (158 publications, SNIP 16.04) and some of the most prestigious natural science journals, such as *Nature* (37 publications, SNIP 9.2) and *Science* (36 publications, SNIP 7.31).

The third group representing marginal journals consist of 34, 912 publications in 5,896 journals (the number of publications in each journal varies between 31 and 1) and includes an even greater variety. As in the second group, many journals are dedicated to medical sub-fields, but there are also many journals focused on specific diseases/disorder (such as Alzheimer, asthma, rheumatism, sleeping disorders, stress or tumors), national contexts (for example journals from national medical associations) and research fields such as medical anthropology, history or sociology.

Clinical trials

In Figure 2 the number and share of articles classified as Complementary Therapies and as Clinical Trials in Medline are presented. At the beginning of the time period up until the end of the 1980s, less than 5 percent of the publications were classified as clinical trials. After this date there has been an increase in both actual numbers and in share of publications. Over the last decade the share of clinical trials has been about 20 percent.

The vast majority of the publications classified as Complementary Therapies and as Clinical Trials are not classified according to phase (see https://www.nccn.org/patients/resources/clinical_trials/phases.aspx), indicating small scale exploratory studies in phase 0. In all, 44 of the publications were classified as phase one, 92 as phase two, 56 as phase three and seven as phase four. All of the studies stating a specified phase were published in 1994 or later.

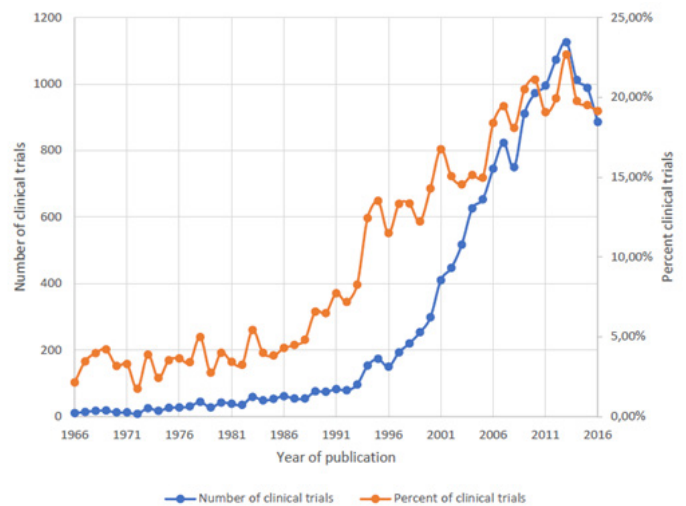


Figure 2: Journal articles classified as Complementary Therapies and Clinical Trials in Medline, 1966-2016.

Content of publications

As a consequence of the sampling criteria, all of the publications in the material are indexed using the MeSH term Complementary Therapies as the major topic. However, each document may have an unlimited number of MeSH terms, for example indicating anatomy, diseases, or drugs within the 16 MeSH descriptor/main headings and a very large number of subcategories (up to 13 levels in the MeSH tree structure). In order to provide an overview, the most common sub-therapies under Complementary Therapies and how they have developed over time, are presented in Figure 3.

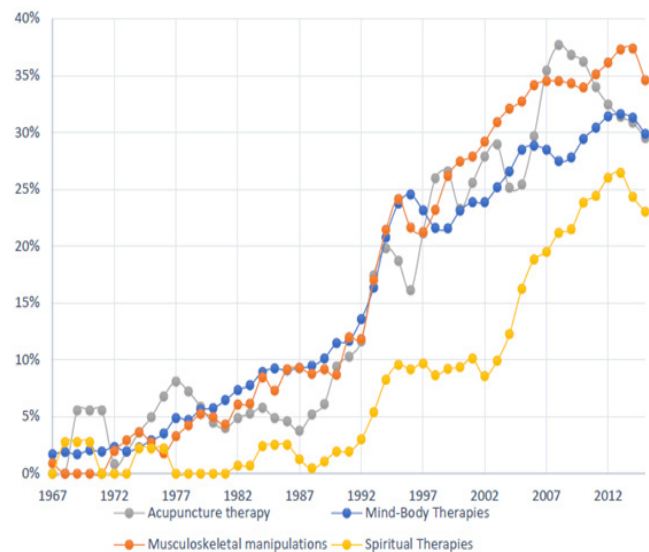


Figure 3: Most common MeSH terms in journal articles classified as Complementary Therapies in Medline, 1966-2016.

The most common sub-terms are Musculoskeletal Manipulations, Acupuncture Therapy, Mind Body Therapies and Spiritual Therapies. Musculoskeletal Manipulations consist

of therapies such as applied kinesiology, soft tissue therapies, chiropractic, osteopathic and orthopedic manipulation. Acupuncture Therapy includes general acupuncture as well as specialized therapies such as electro acupuncture and ear acupuncture. The Mind Body Therapies include therapies such as breathing exercises, meditation and yoga. Spiritual Therapies include meditation, tissue therapies and different kind of healing. There is a substantial increase in all four sub-terms from the end of the 1990s, a pattern similar to the general publication development shown in the main category, although the increase in Spiritual Therapies is delayed.

In order to provide supplementary analysis of the content of the publications we have used co-word analysis on the author keywords. Co-word analysis is a method used to identify themes and relationships between and within subject areas. It counts and analyses co-occurrences of words or phrases in a text corpora, often supported by visualization techniques.^[44] One basic assumption is that text is the main product of research activities and that researchers write their texts intentionally to convince the audience of their legitimacy. Words represent various dimensions of knowledge production such as topics, methodologies, findings or interpretations and are linked together in phrases. These phrases, in turn, are linked together in networks.^[45] In this case, we have analyzed how the keywords, as chosen by the authors, co-occur in the material as a whole. Keywords are often limited in number, according to journals guidelines and multidimensional in character. For example, they may indicate aspects such as topics, therapies, research designs, concepts, populations, measurements, diseases and health issues. Authors keywords can be assumed to represent the content in a publication in condensed form and how they co-occur in larger number of texts may indicate different themes and relationships in subject areas, for example how specific therapies are linked to certain health issues or research designs. In practice we have calculated the co-occurrences of author keywords in the VOS-viewer software,^[46,47] using the full-counting option, with a minimum of 25 occurrences of the keywords.

Figure 4 represents how the keywords co-occur in the material. Because of the increased publication activity, especially from the end of the 1990s (see Figure 1), this visualization is dominated by author keywords from the last two decades. This pattern is reinforced by the fact that many of the early publications, from the 1970s and 1980s, have few or no keywords.

The largest single node is *Acupuncture*, in the purple cluster. This cluster includes other large nodes like *Traditional Chinese Medicine* and *Chinese Medicine*. Yet other nodes indicate research designs such as *Systematic Review*, *Review* and *Meta-analysis*. Acupuncture and other forms of traditional medicine are also represented in the red cluster to the right. Some of the

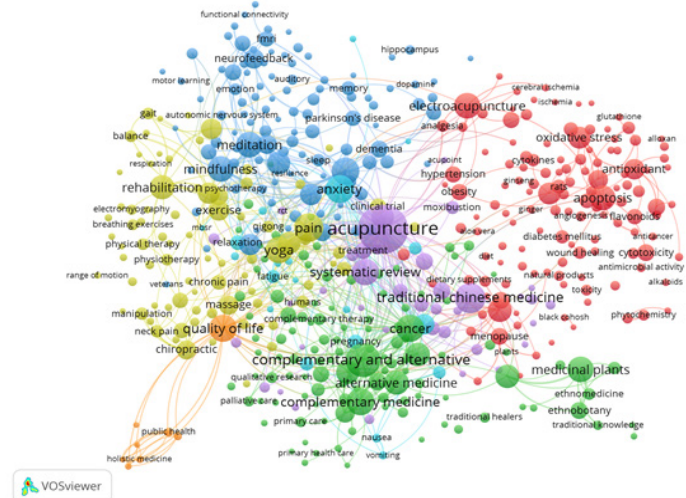


Figure 4: Network visualization based on author keywords in journal articles classified as Complementary Therapies in Medline, 1966-2016.

largest nodes in this cluster are *Electroacupuncture* and *Herbal medicine*. Several of the other nodes are related to biomedical processes like cell division (e.g. *Apoptosis*, *Cytotoxicity*, *Oxidative stress*, *Lipid peroxidation*), antioxidants (e.g. *Antioxidants*, *Flavonoids*) and proteins (e.g. *Nf kappa b*, *Tnf alpha*). Some of the substances (like *Green Tea*, *Ginseng*, *Aloe Vera*, *St Johns Wort*) are associated to the use of herbal medicine and CAM. Nodes like *Rats* indicate laboratory and pre-clinical research. Furthermore, in this cluster it is possible to detect health issues and diseases, such as *Cancer*, *Breast Cancer*, *Menopause*, *Diabetes* and *Obesity*.

At the bottom of the visualization we find a cluster in green, indicating explicit CAM research. This cluster include nodes such as *Complementary and Alternative*, *Complementary Therapies*, *CAM*, *Alternative Medicine*, *Integrative Medicine* and *Traditional Medicine* (the unnamed large node between *Alternative Medicine* and *Medicinal plants*). A part of this cluster, to the right, is focused on traditional and herbal medicine, including nodes such as *Medicinal plants*, *Ethnopharmacology* and *Ethnobotany*. Furthermore, nodes like *Cancer*, *Oncology*, *Nursing* and *Primary Care*, indicate connections between CAM and broad medical research areas.

The yellow cluster to the left includes a number of nodes related to the MeSH-terms Mind body therapies (e.g. *Yoga*, *Tai chi*, *Biofeedback* and *Breathing Exercise*, *Qi Gong*) and musculoskeletal manipulations (e.g. *Manual therapy*, *Manipulation*, *Chiropractic*, *Massage*, *Spinal manipulation*). These, in turn, are connected to a number of health issues (e.g. *Pain*, *Chronic Pain*, *Stroke*) and to rehabilitation and exercise. Nodes such as *Randomized Clinical Trials*, *Clinical trials* and *Humans* indicate clinical research.

In the upper left corner we find a large blue cluster, including a number of nodes related to the MeSH terms Mind body

therapies (e.g. *Hypnosis, Meditation, Neurofeedback*) and Sensory Art Therapies (e.g. *Music Therapy, Music*). This cluster includes the relatively large node *Mindfulness*. This therapy is not included in the MeSH-term Complementary therapies but in Psychotherapy. Nodes like *Mindfulness* and *Meditation* have clear connections to health issues like *Stress, Depression* and *Sleep* [disturbance]. In the upper part of the cluster we find a number of nodes related to neuro- and cognition research (e.g. *fMRI, EEG, Neuroimaging, Memory, Cognition*). Intervened in this cluster, but also close to the yellow and purple clusters, is a small turquoise cluster, with the central node *Anxiety*. Finally, there is a small and rather isolated orange cluster at the bottom left of the visualization. This cluster is united by the node *Quality of life* and include several smaller nodes focused on holistic and public health.

CONCLUSION

In this article the development of CAM as a research domain has been analyzed over the time period 1966–2016. In particular we have analyzed publication pattern, sources, clinical research and general content of publications.

Regarding publication pattern we found that the expansion of the domain observed in previous studies^[7,8] has continued. Starting at relatively small annual numbers at the beginning of the time period (about 500 articles each year) a rapid increase took place in the late 1990s. After a small drop in 2005–06, the number of publications continued to increase although there was some variation between individual years. At the end of the time period around 5 000 articles were published each year. However, since the entire research sector, including publication in scientific journals, has expanded dramatically over the decades,^[48] increased number of publications alone does not reveal whether or not a research domain is growing. To obtain a measure of the expansion of CAM the share of Medline database was examined and whether or not articles classified as Complementary Therapies had grown faster than the database as a whole. The share of the database began at a level between 0.2–0.3 percent during the early years. An expansion took place during the late 1990s and early 2000s. The peak was in 2004–05, before the share stabilized at an annual rate of 0.4–0.5 percent. Overall, the expansion has faded away after 2011.

Although there is an ongoing debate on the value of clinical studies,^[49–51] there is no doubt that clinical support is crucial to have new therapies accepted in medical practice. Clinical research is the most publicly visible part of (bio) medical research activities; “from the potential human application of novel laboratory findings to the generation of robust evidence about treatments or preventive interventions in routine clinical care.”^[52] In our study we found that only a small share (less than 5 percent) of the early publications were classified

as clinical trials. The expansion began in the late 1980s and has landed at about 20 percent of publications in the last decade. Relatively few publications (and none before 1994) were classified according to clinical phase, indicating small-scale and exploratory studies. For a growing – and contested – domain this is hardly surprising, since clinical research requires considerable resources (such as access to patients and laboratories) and a certain level of acceptance to be carried out in conventional health care settings.

Another part of the publication pattern concerns the sources. As indicated above, previous research has indicated that there is a growing number of journals dedicated to CAM and that there is an expansion of publications both within and outside this journal category. Establishment of CAM journals, as well as the growing numbers of publications in these, may reflect needs for specialization – but may also be signs of exclusion from other academic forums.^[8] In general, establishment of specialized journals is considered as crucial for development of scientific disciplines. As Vanderstaeten pointed out, specialized journals “facilitate the formation of networks of (potential) authors”^[53] and enable scholarly communication. It can be argued that journals and their editorial boards, control access to publication and possess the capacity to establish values and norms. Furthermore, journals may exert considerable influence on choice of topics, initiate theoretical debates and set methodological and ethical standards. At the same time, authors need to accept the specialization of the journal and to choose in which particular forum to communicate their findings. In this study we found that a majority of the core journals, including one third of the publications according to the Bradford law of scattering, have a focus on CAM in general or on specific therapies. The impact of the core journals, measured by SNIP values, is close to the average, although there are examples of journals with slightly higher and lower values. In general, this supports the idea that CAM is established as a research domain, no matter whether it is caused by exclusion or specialization. However, the subsidiary and marginal journals, including two-thirds of the publications, revealed another (or supplementary) pattern. Here we found a large number of specialized journals, focused on other medical subfields (such as gynecology, nursing or oncology), disorders/diseases, national contexts or non-medical fields (such as sociology and anthropology), indicating that much of the research is integrated into established (mainly medical) scientific domains and that the primary interest of the authors is not necessarily to communicate the results with an exclusive “CAM audience”, but with researchers that share interest in specific treatments, disorders and/or patient groups.

In order to capture the general content of the publication we analyzed the MeSH terms attached to them. To provide an overview, the development of the sub-terms to the major

term Complementary Therapies were presented. We found that the most common were Musculoskeletal Manipulations, Acupuncture Therapy, Mind Body Therapies and Spiritual Therapies and that these sub-terms developed in a similar manner as the main category, although Spiritual Therapies were a bit delayed. It is important to keep in mind that the MeSH terms do not simply indicate clinical studies of specific therapies, such as musculoskeletal manipulations or acupuncture, but may represent user studies, reviews and other types of studies. Furthermore, the same study may have a number of MeSH terms, indicating several Complementary Therapies. With that in mind, the sub-terms above offer an overview on what complementary therapies that are of interest in the research domain.

For more detailed information about the content, we mapped how the author keywords co-occur. This analysis showed a number of clusters similar to the MeSH terms mentioned above, but also included a number of other aspects such as research designs and health issues. The largest single node in the material was acupuncture and two of the clusters were clearly related to acupuncture and Traditional Chinese medicine. One of them was characterized by laboratory research and pre-clinical research and the other by different kind of reviews and meta-studies. Other large clusters were focused on Musculoskeletal Manipulations and Mind Body Therapies and clinical research related to various aspects of pain, stress and anxiety. Furthermore, it was possible to detect an explicit “CAM cluster”, including a part concerning traditional and herbal medicine, which appear to represent research on/about this particular domain, supporting the idea that CAM has been established as a study object in itself. Overall, the co-word analysis of the author keywords indicated different themes and relationships in the material. Some CAM therapies (especially Mind body therapies and musculoskeletal manipulations) seem to have stronger links to clinical research, compared to others (like Traditional Chinese Medicine and herbal medicine) that are more associated with laboratory and pre-clinical research. Furthermore, some CAM therapies were linked to specific health issues and medical areas (such as neuro- and cognition research, rehabilitation and oncology/cancer).

Overall, we conclude that CAM has developed to a small but distinct research domain. Both sources and content in the publications indicate specialization in/about CAM as well as integration in other medical sub-fields. Furthermore, there are signs of a young medical domain, characterized by small scale and exploratory clinical studies.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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