



Review article

Illness perception: A bibliometric study

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ABSTRACT

Illness perception is a crucial area of study that has seen significant growth and development over the years. This study conducts a comprehensive bibliometric and network analysis of illness perception research, capturing its evolution from 1975 to 2023. Utilizing 1813 publications from the Scopus database, authored by 5428 researchers, we identify key scholars and influential articles in the field. Our analysis includes various bibliometric networks such as citation, co-citation, collaboration, and keyword co-occurrence networks, along with the presentation of intellectual structure maps. Major research areas include the role of illness perception in mental health conditions like depression, coping mechanisms, quality of life, and chronic illnesses like diabetes, as well as the influence of lay beliefs on health behaviors, and the impact of illness beliefs on conditions like Myocardial Infarction and stroke. The results show a growing academic interest in understanding how illness perceptions shape healthcare outcomes and behaviors.

1. Introduction

When faced with health threats, patients assess their illness situation and try to make meaning out of it. How patients make meaning of their illness and how they respond based on their understanding has been studied using various theoretical models in Psychology. Arthur Kleinman [1] proposed that patients develop an explanatory model of their illness, which is heavily influenced by the personal and social meanings of their illness. Understanding these explanatory models of illness held by patients is essential for clinical management. Arthur W. Frank [2], in his work, has also argued that patients make sense of their illness through stories; therefore, as a health practitioner, it is crucial to know their illness narratives. However, the Self-Regulation Model (SRM) of illness, also known as the Common-Sense Model (CSM) of self-regulation, proposed by Leventhal, Nerenz, and Steele in 1984 [3], is the most widely used model of contemporary times to understand the process of meaning-making. Illness perception is the central theme of the Common-Sense Model (CSM) of self-regulation proposed by Leventhal et al. [3]. It is also the most important factor that affects health behaviour. It can be defined as an attempt by patients to give meaning and to understand their illness at a cognitive as well as emotional level. It has been named by various terms in literature, such as 'illness representation' [3,4], 'illness cognition' [5], and 'illness perception' [6]. Initially, the construct of illness perception consisted of five dimensions, namely, identity, cause, timeline, consequences, and cure/control [7]. Later research has added two more dimensions: illness coherence and emotional representation [8].

The details of these seven dimensions of illness perception are as follows.

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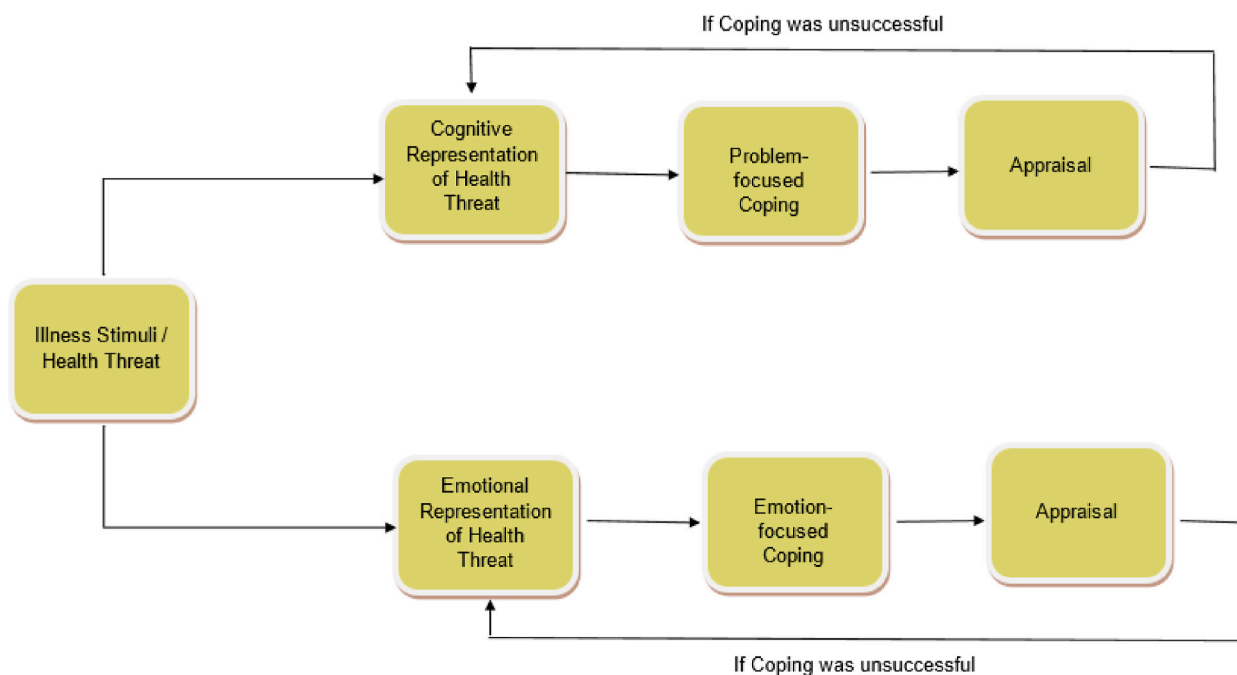


Fig. 1. Self-regulation model (Adapted from Leventhal et al., [9]).

1. Identity: it relates to a person's perception of whether or not their physical symptoms point to a health problem.
2. Cause: it is an individualistic theory regarding the causation of one's illness that may differ from that of a physician.
3. Timeline: belief regarding the duration of one's illness, i.e., if it will last for a few days (acute) or a lifetime (chronic).
4. Consequences: one's belief regarding the probable outcome or influence on one's life due to illness condition
5. Cure/controllability: this dimension determines whether patients perceive their illness as controllable or not.
6. Illness coherence: whether one's experience of illness 'makes sense as a whole' or not.
7. Emotional representation: it assesses the emotional aspect or reaction to illness.

Leventhal incorporated the idea of illness perception in his self-regulatory model of illness behavior [9] (Fig. 1). According to this model, our approach to a health threat is similar to any other problem-solving behavior. When threatened with possible health issues, patients go through three stages in order to attain a state of equilibrium. These three stages include (1) interpretation (making sense of the health threat), (2) coping (dealing with the health threat), and (3) appraisal (assessing how successful the coping strategies were).

Thus, when diagnosed with a health issue, patients develop their own beliefs of what caused this illness, how it will affect their life, how long it will last, and whether he/she can control the illness. This perception of illness, also known as a mental picture of one's illness, directs patients' interpretation of their illness experience as well as their coping mechanisms. Further, illness perception may differ from patient to patient depending on various factors [10]. Moreover, patients' understanding of illness is an idiosyncratic view and does not necessarily conform to the understanding of the scientific community [11]. Although patients' perception of illness is formed based on their understanding of medical knowledge and the experiences of others with similar health issues, their medical knowledge is often limited [12]. A study, for instance, has shown that patients suffering from a specific organ-related illness are no better than the general public at identifying the relevant organ of their disease [13]. However, several studies have also found that patient's perception of their illness is not significantly influenced by objective medical knowledge. In one such study, patients with already developed negative illness perceptions of their health conditions were not convinced by medical reports showing no pathology [14]. In another study, patients, based on their illness perception characteristics such as strong illness identity, illness worry, a long timeline perspective, and a belief that the symptoms would have serious consequences, were found to utilize primary medical care for those symptoms even before getting diagnosed with any disease [15]. These studies suggest the importance of exploring and considering patients' illness perception rather than their objective medical knowledge in clinical settings for improving their illness behavior.

Numerous researchers have studied illness perception to predict various illness behaviour and health outcomes. Studying illness perception could enable a practitioner to understand the world of their patient, their worries, their conceptions, their fears, and other important factors that can influence the treatment and illness outcomes. Carrying a negative illness perception is positively associated with increased future disability and slower recovery [16,17]. Differences in illness perception could lead to the performance of different illness behaviour like coping behaviour as well as different health-related outcomes [3] such as adherence behaviour [18], depression [19], period of returning to work [20] readmission in hospital [21], and Quality of Life [22]. Illness perception has been explored extensively in literature with respect to various chronic diseases such as cardiovascular diseases [23], arthritis [24],

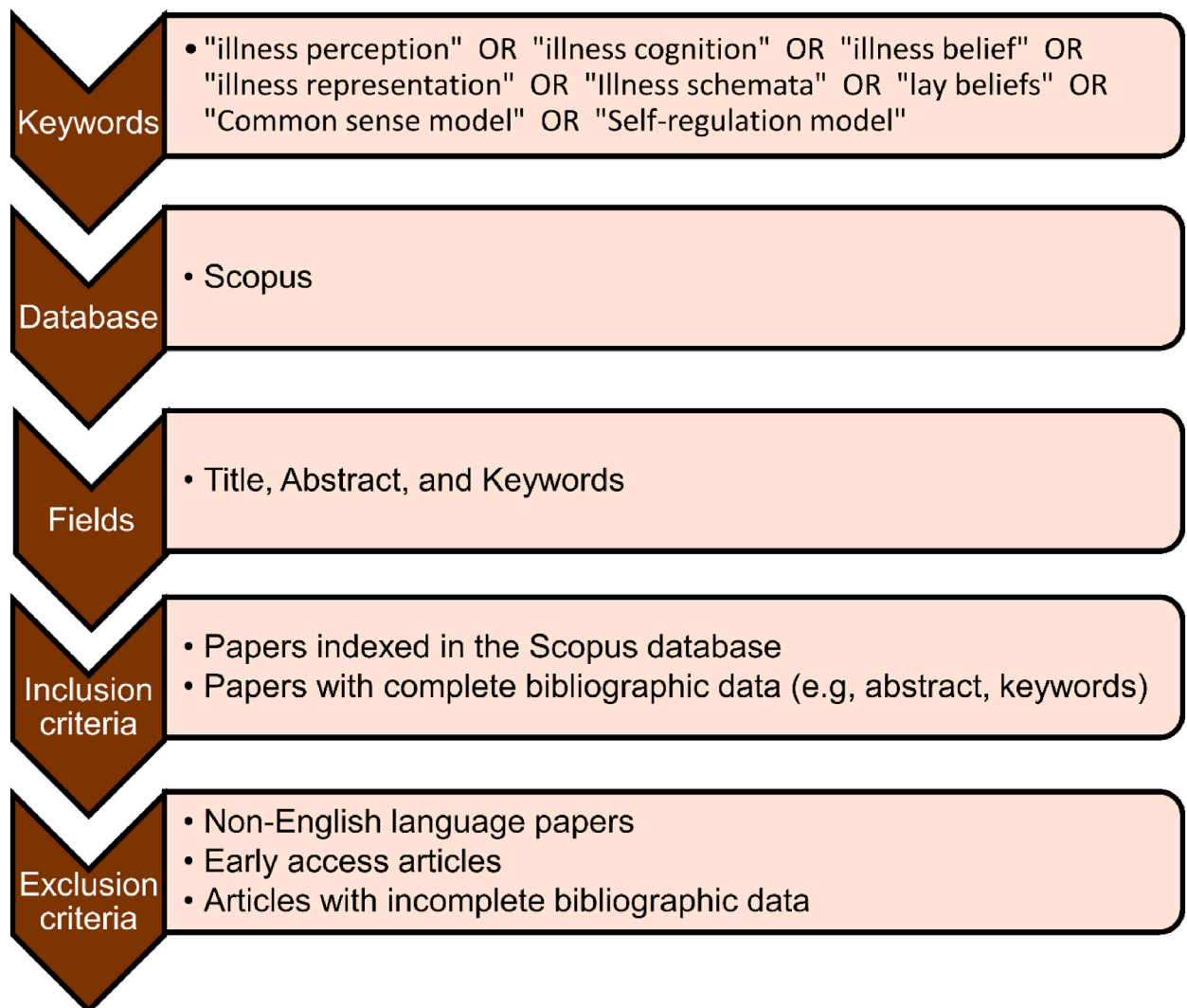


Fig. 2. Research procedure.

hypertension [25], asthma [26]; critical diseases such as renal disease [27], cancer [28,29], stroke [30]; acute diseases such as COVID-19 [31], pneumonia [32]; and even for psychiatric disorders like OCD [33], bipolar disorder [34].

Since the last forty years, the number of studies on illness perception has increased manifold. Numerous researchers have collected primary data to understand its role in health behaviour, while others have also attempted to summarize the findings from these studies using various statistical and non-statistical methods such as meta-analysis [35,36], systematic reviews [37], and literature reviews [38], respectively. However, a majority of these review studies focused on either one type of illness or patient population, such as diabetes [35], breast cancer, and myocardial infarction [39,40], or one type of health outcome such as adherence behaviour [41,42], hospital readmission [21], or quality of life [43,44]. To the authors' knowledge, no single study has attempted to portray the overall picture of the growth and trends of this field of knowledge. To fill this academic gap, this study aimed to present bibliometric indicators of published literature on Illness Perception and systematically portray this field's vastness. Furthermore, it will aid in pinpointing the least explored areas by providing new knowledge and critical insights into illness perception research trends. This will enable researchers in identifying important areas for future research.

Bibliometric studies utilize statistical and mathematical methods to understand a field's overall growth and trends. Further, it involves analysing literature from a particular field quantitatively as well as qualitatively [45]. It efficiently identifies gaps in the literature that future studies could focus on [46]. Bibliometric analyses differ from systematic reviews, literature reviews [47], and scoping reviews [48,49]. Unlike working on limited literature and specific aims or identifying the nature of research evidence of a field, bibliometric analysis enables a researcher to examine unlimited publications [50] and 'to arrive at a consistent and standardized set of indicators' [46]. Further, it provides a timely, unbiased, comprehensive, and visual output to understand the field of study, its intellectual structure, development [51], and overall trends and hotspots in knowledge domains from both macro and micro perspectives

Table 1
Main information related to reviewed sample.

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1975–2023
Sources	400
Documents	1813
Average years from publication	10.3
Average citations per documents	38.84
Average citations per year per doc	2.99
References	57124
DOCUMENT TYPES	
Article	1661
Book Chapter	42
Review	110
DOCUMENT CONTENTS	
Keywords Plus	3886
Author's Keywords (unique)	2897
Author's Keywords (total)	7679
AUTHORS	
Authors	5428
Author Appearances	7594
Authors of single-authored documents	92
Authors of multi-authored documents	5364
AUTHORS COLLABORATION	
Single-authored documents	111
Documents per Author	0.33
Authors per Document	2.99
Co-Authors per Documents	4.19
Collaboration Index	3.15

[52].

Several researchers have published bibliometric studies in psychology and its allied fields in the last decade. Previously, it has been used to understand the growth of a field of research in psychology such as positive psychology [53], social psychology [54], music psychology [55], and cross-cultural psychology [56]. More recently, researchers have started using it to understand the trends of more specific topics, such as Yeo et al. [57] conducted a bibliometric study to explore the trends of research for understanding attitudes towards L.G.B.T. community. To understand the symptom network in psychopathology, Berta et al. [58] also used bibliometric analysis. Whereas, Zyoud et al. [59] conducted bibliometrics to understand the trends in research related to social media in psychology. Vogl et al. [60] used bibliometric analysis to understand the prevalence of lay psychology in online media.

As mentioned earlier, in the absence of a bibliometric study related to illness perception, the present research aimed to study the field of illness perception and to uncover the important paradigms that contribute to research on illness perception, including the most influential scholars, journals, institutions, and countries, as well as the networks that connect them.

Based on bibliometric analysis, we attempted to answer the following research questions.

1. *What have been the developments in illness perception research since its inception?*
2. *Which scholars have published the most on the topic of illness perception?*
3. *What are the most influential journals and publications in the field of illness perception?*

On a network and impact level, we propose the following research questions.

4. *Who are the most influential authors in terms of citations?*
5. *How have co-citation networks been formed between authors and journals?*
6. *What kinds of collaborations exist among scholars, academic organizations, and countries?*
7. *What are the most prominent keywords, and how are they connected?*
8. *What is the current conceptual structure?*
9. *Which themes involving illness perception are the most popular among scholars?*

2. Methodology

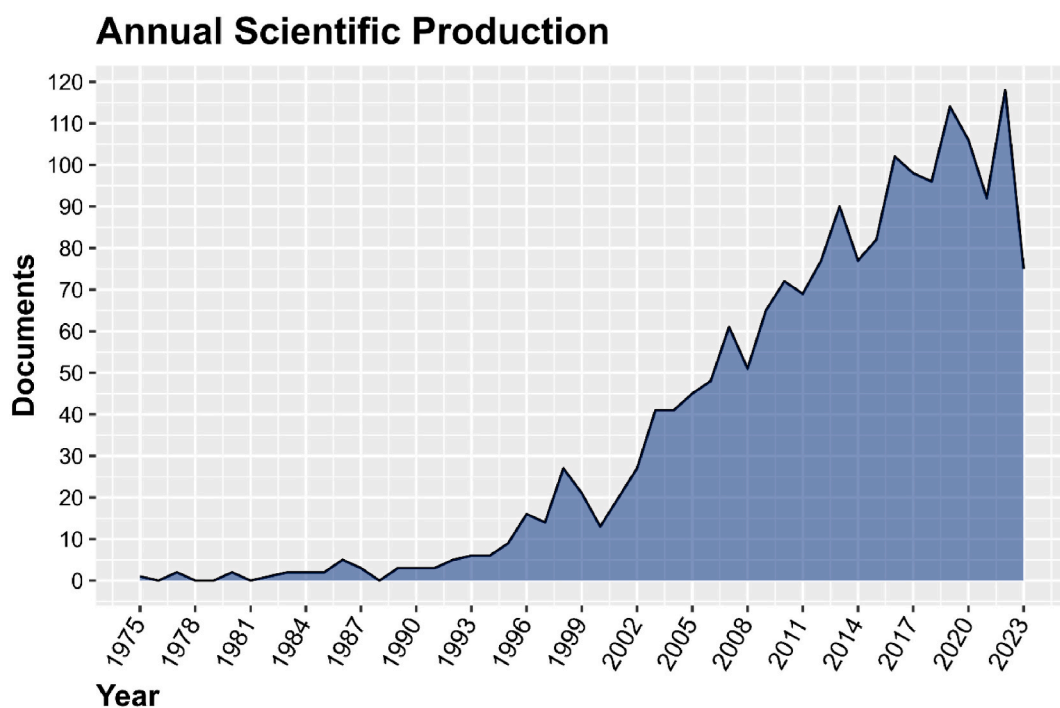
Adhering to the methodology proposed by Wamba & Mishra [61], our bibliometric analysis was conducted in four distinct phases. The outcomes of this review are based on these sequential steps: (1) Selection of the search database and determination of keywords; (2) Execution of preliminary data analysis; (3) Conducting network analysis; (4) Performing thematic and conceptual analysis.

The analysis utilized R3.2.3 statistical software [62] and VOSviewer for graphical representation [63]. Further details about our methodology are presented in the subsequent sections.

Table 2

Details of articles (between 1975 and 1984) published before Leventhal's seminal work on Illness Perception.

	Year of publication	Author/s of publication	Title of publication
1.	1975	Newman, G.R. & Trilling, C.	Public perceptions of criminal behavior: A Review of the Literature
2.	1977	Spates, C.R. & Kanfer, F.H.	Self-monitoring, self-evaluation, and self-reinforcement in children's learning: A test of a multistage self-regulation model
3.	1977	Mathews, C.O.	A review of behavioral theories of depression and a self-regulation model for depression
4.	1980	Barling, J.	A multistage multidependent variable assessment of children's self-regulation of academic performance
5.	1980	Barling, J.	Performance Standards and Reinforcements effects on children's academic performance: A test of social learning theory
6.	1982	Wise, T.N. & Rosenthal, J.B.	Depression, illness beliefs and severity of illness
7.	1983	Grimm, L.G.	The relation between self-evaluation and self-reward: A test of Kanfer's self-regulation model
8.	1983	Furnham, A. & Henderson, M.	Lay theories of delinquency
9.	1984	Castro, F.G., Furth, P. & Karlow, H.	The Health Beliefs of Mexican, Mexican American and Anglo American Women
10.	1984	Piner, K.E. & Kahle, L.R.	Adapting to the stigmatizing label of mental illness: Foregone but not forgotten

**Fig. 3.** The annual scientific output of Illness Perception research (1975–2023).

2.1. Choice of database and keywords

For our study on illness perception publications until September 2023, we chose Scopus, which is frequently used in bibliometric studies for its extensive coverage and high-quality resources [64,65]. Fig. 2 illustrates our research process. We searched for the term/terms ("illness perception" OR "illness cognition" OR "illness belief" OR "illness representation" OR "Illness schemata" OR "lay beliefs" OR "Common sense model" OR "Self-regulation model") in titles, abstracts, and keywords. No limitations were imposed on the starting year of the search. Journal articles, chapters, and reviews indexed in Scopus with complete bibliographic information were considered, focusing on English-language papers, the predominant language in this research area, to align with Scopus standards and ensure consistency with prior studies [51].

2.2. Preliminary analysis of documents

We gathered bibliometric data, including author details, titles, abstracts, keywords, and other relevant information. Table 1 summarizes the key data from illness perception-related publications between 1975 and 2023. In total, 1813 articles written by 5428

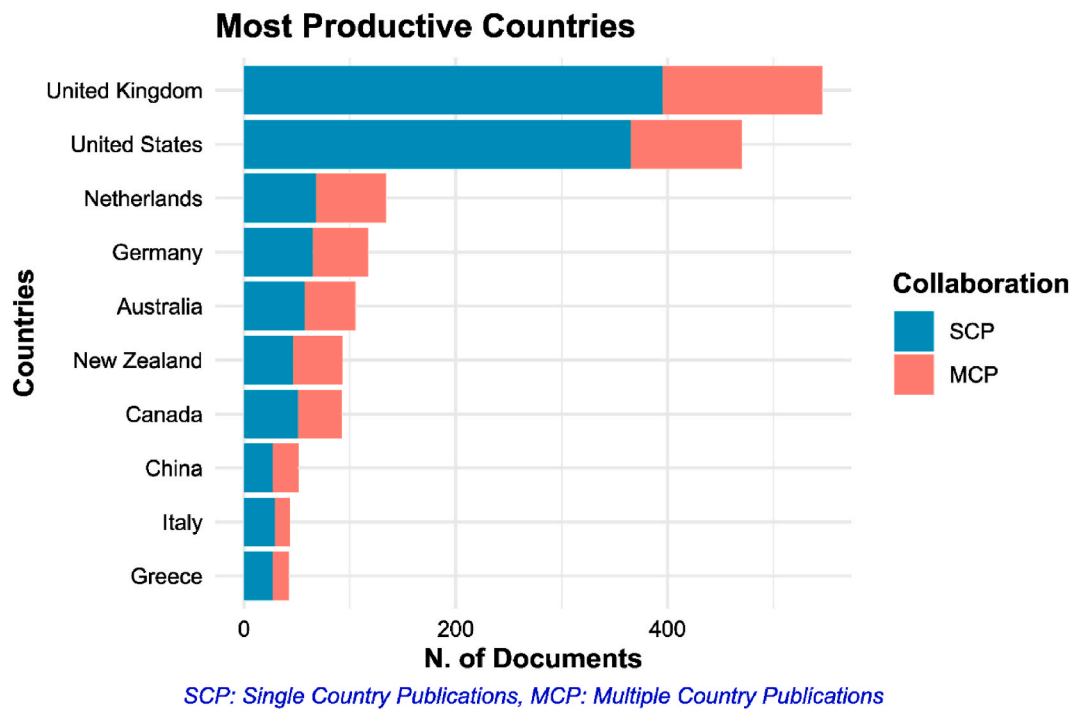


Fig. 4. Illness Perception research in various countries.

Table 3

Top 20 journals in Illness Perception research.

Nr.	Journal	Articles
1	Journal of Psychosomatic Research	144
2	Psychology and Health	141
3	Journal of Health Psychology	99
4	British Journal of Health Psychology	82
5	Psychology, Health and Medicine	80
6	Psycho-Oncology	69
7	Frontiers in Psychology	44
8	Health Psychology	42
9	International Journal of Behavioral Medicine	37
10	Journal of Behavioral Medicine	34
11	Journal of Clinical Psychology in Medical Settings	26
12	Annals of Behavioral Medicine	19
13	Journal of Personality and Social Psychology	18
14	Psychosomatic Medicine	18
15	Personality and Social Psychology Bulletin	16
16	British Journal of Clinical Psychology	16
17	Social Psychiatry and Psychiatric Epidemiology	16
18	Cognitive Therapy and Research	15
19	Journal of Affective Disorders	14
20	Journal of Pediatric Psychology	13

authors were collected from Scopus. The average number of citations per document was 38.84, with an annual average of 2.99 citations per document. The collaboration index, reflecting the extent of collaborative efforts in the research, was 3.15. Analyzing the content, we identified 2897 unique keywords provided by authors, with a total of 7679 keywords overall. In terms of authorship, 92 authors published individually, while a significantly higher number, 5,364, contributed to papers with multiple authors.

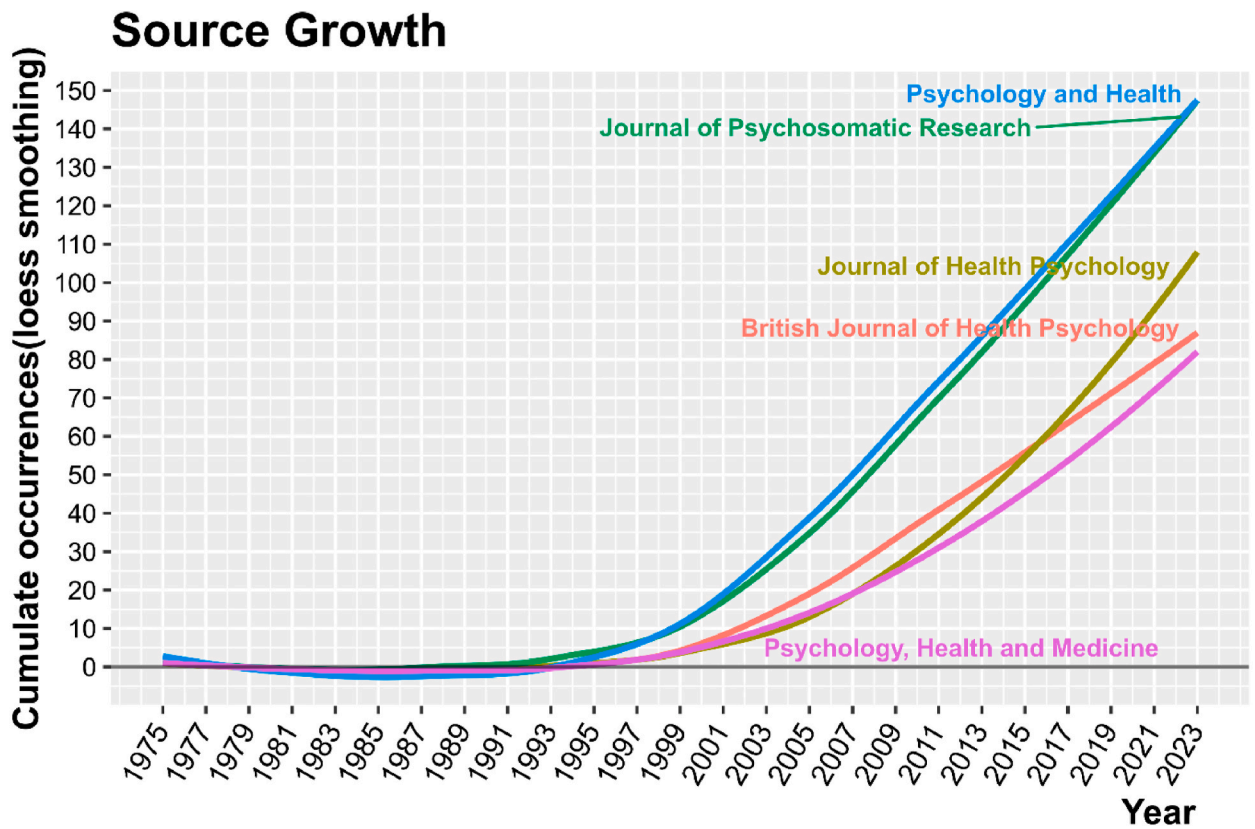


Fig. 5. Illness Perception research source growth dynamics.

Table 4
Top 20 publications according to total citations.

Publication	Total Citations (TC)	TC per Year
(Moss-Morris et al., 2002)	2171	103.38
(Broadbent et al., 2006)	2086	122.71
(Horne & Weinman, 1999)	1634	68.08
(Horne et al., 1999)	1596	66.50
(Hagger & Orbell, 2003)	1203	60.15
(Weinman et al., 1996)	1156	42.81
(Leventhal et al., 1992)	1058	34.13
(Leventhal et al., 2020)	1035	345.00
(Rentfrow & Gosling, 2003)	952	47.60
(Wilson & Brekke, 1994)	844	29.10
(Boekaerts & Corno, 2005)	813	45.17
(Leventhal et al., 2012)	739	67.18
(Petrie et al., 2002)	645	30.71
(Horne & Weinman, 2002)	634	30.19
(Leventhal et al., 2016)	561	80.14
(DeShon & Gillespie, 2005)	521	28.94
(Leventhal et al., 1998)	496	19.84
(Meyer et al., 1985)	496	13.05
(Evers et al., 2001)	472	21.45
(Schwarzer et al., 2011)	418	34.83

3. Results

3.1. Individual analysis

3.1.1. Scholarly output

The search terms (as explained in section 2) gave us the scholarly output since 1975. It is worth mentioning that some scholars had

Table 5
Most productive scholars.

Authors	Documents
Weinman J	64
Moss-Morris R	37
Petrie KJ	32
Kaptein AA	30
Broadbent E	28
Karademas EC	27
Leventhal H	22
Furnham A	21
Chilcot J	20
Cameron LD	17
Chalder T	15
Knowles SR	14
Pereira MG	14
Rief W	13
Horne R	12
Hagger MS	12
Lobban F	12

Top-Authors' Production over the Time

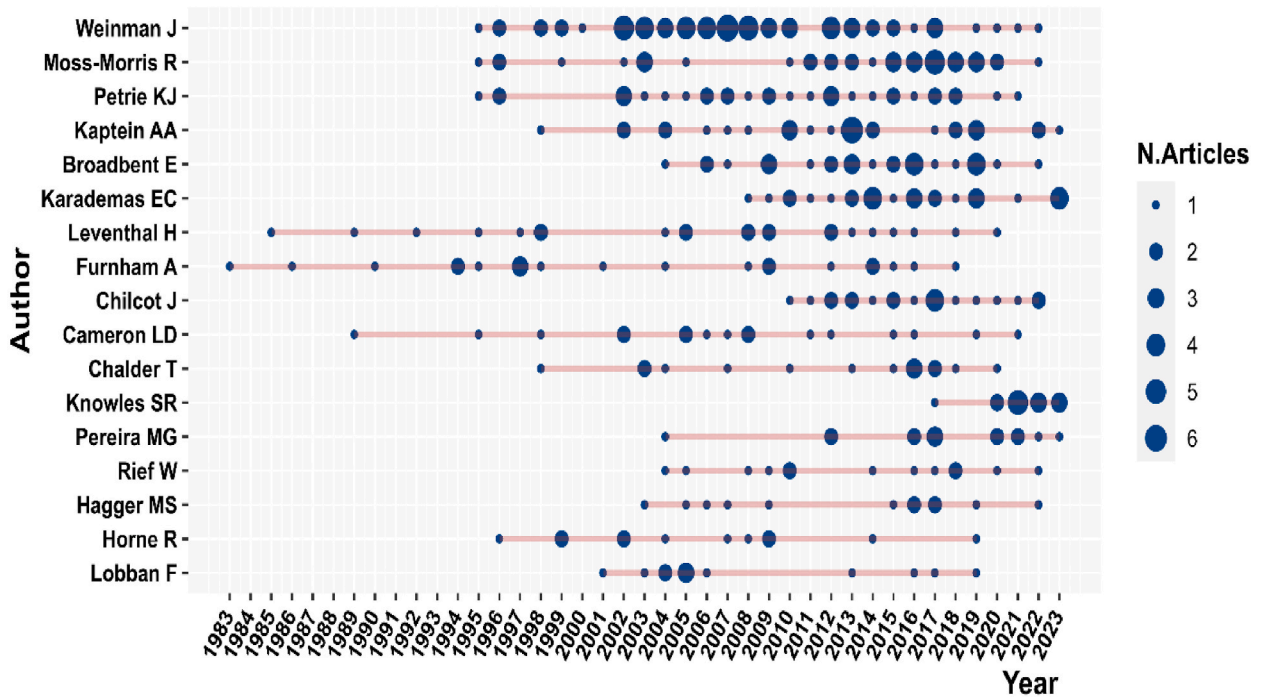


Fig. 6. Most productive authors in Illness Perception research.

already begun exploring related constructs prior to the publication of the seminal paper on Illness Perception by Leventhal et al., in 1984. These scholars published their work in different fields, such as education [66], self-evaluation [67], and self-regulation [68]. The following table gives an overview of those papers that were published before 1984.

We have conducted various analyses to answer the first research question, which is "What have been the developments in the field of illness perception research since its inception?" Table 2 presents an overview of the growth of Illness Perception as a research field before Leventhal's seminal work, while Fig. 3 shows the annual scientific growth of research on illness perception. Our study reveals that the annual scientific growth of this field is 9.4117 articles per year. To better understand the growth of this field, we have divided the timeline from 1975 to 2023 into five periods: (i) the period before 1984, (ii) from 1984 to 1993, (iii) from 1994 to 2003, (iv) from 2004 to 2013, and (v) from 2014 to 2023 (until the first eight months). From Fig. 3, it is clear that researchers started publishing on the topic of Illness Perception since its introduction in 1984, but the actual pace of publication began in 1993.

It has been observed that the majority of growth in scholarly literature occurred during the fifth period, which spans from 2014 to

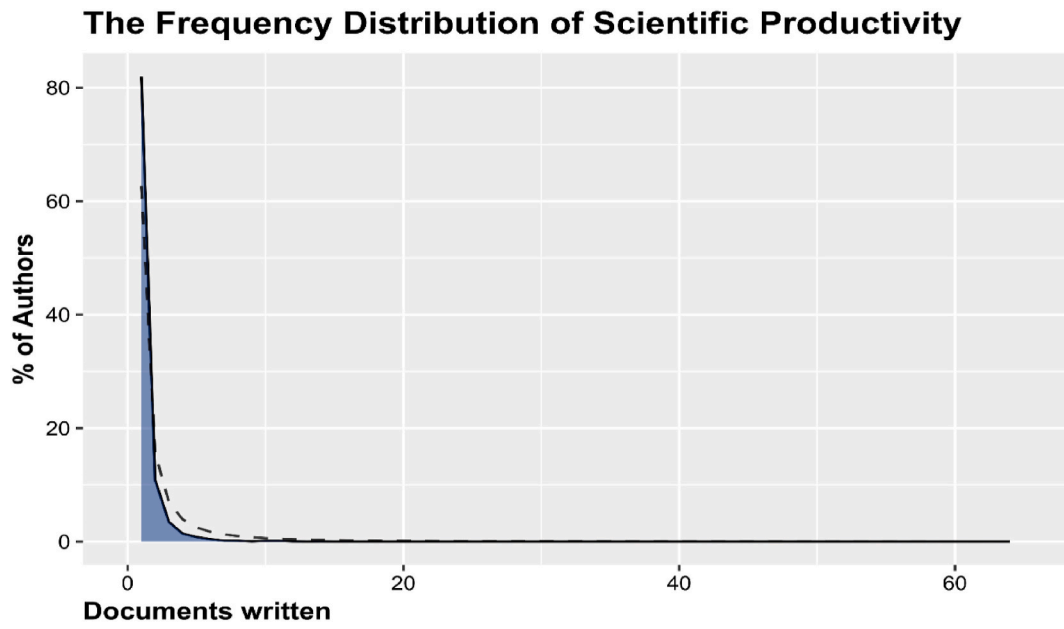


Fig. 7. The fit of Illness Perception research distribution as compared to Lotka's law.

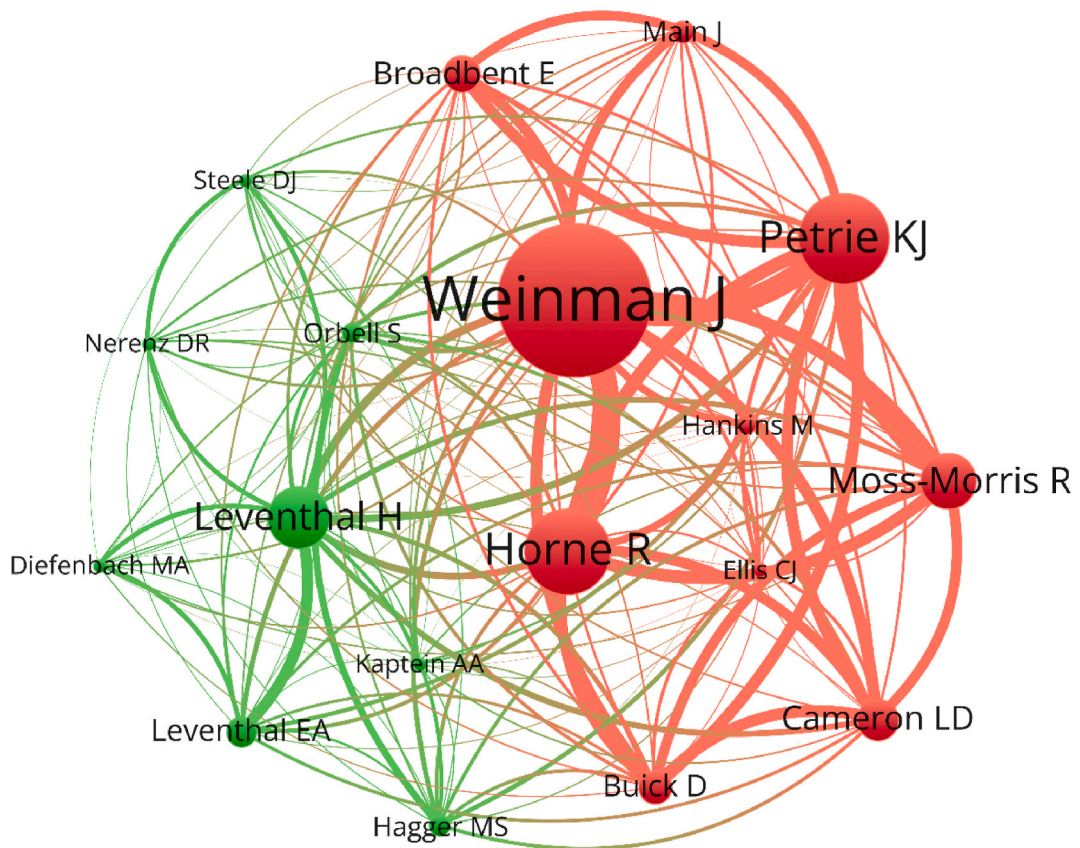


Fig. 8. Most influential authors in Illness Perception research.

Historical Direct Citation Network

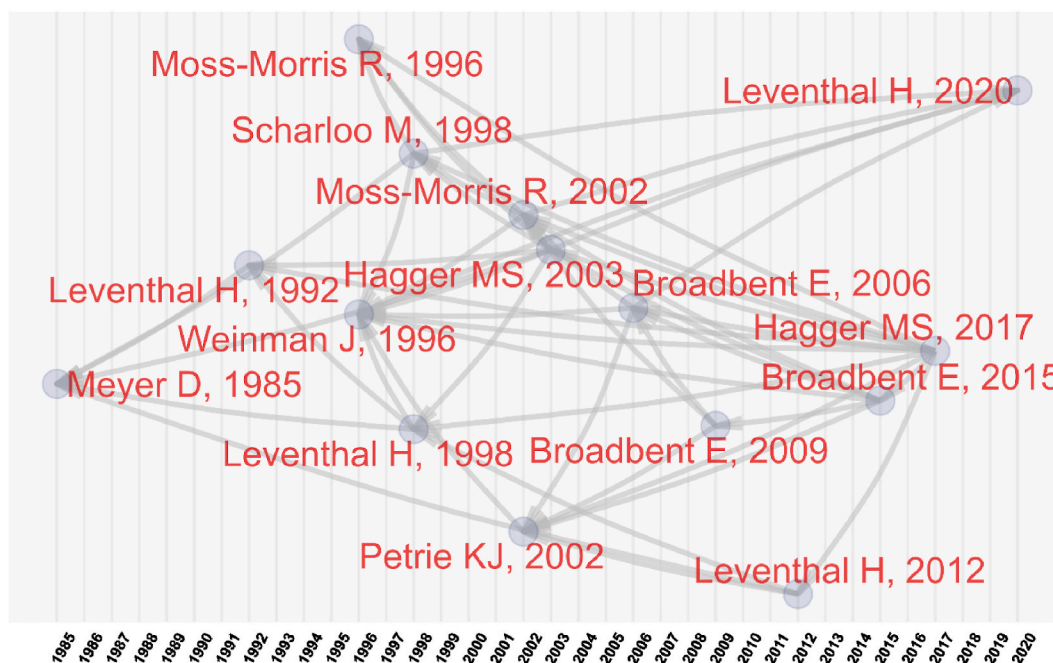


Fig. 9. Historiography of illness Perception research.

2023 (as of August 2023). Within the first eight months of 2023 alone, nearly 120 publications on illness perception were published. Additionally, geographical growth can be analyzed by referring to Fig. 4. The United Kingdom has made the most contributions to this field of research through both single-country and multiple-country publications, followed by the United States and the Netherlands.

3.1.2. Journals and publications

Table 3 shows the top 20 journals publishing most on the topic of Illness Perception. Fig. 5 gives us an idea of these top journals and their growth since 1975 for illness perception as a field. The top five journals in this field are; the Journal of Psychosomatic Research, Psychology and Health, Journal of Health Psychology, British Journal of Health Psychology, and Psychology, Health and Medicine. Both the Journal of Psychosomatic Research and Psychology and Health have published over 140 articles till now.

Table 4 provides information on the top 20 most cited publications in the field of Illness Perception. These publications are crucial in understanding health behavior, as evidenced by the fact that all the top 20 publications in this field have over 400 citations. The two most cited publications have over 2000 citations and are authored by Moss-Morris et al. [8] and Broadbent et al., [69]. Moss-Morris et al. [8] developed the revised Illness Perception Questionnaire (IPQ-R), while Broadbent et al. [69] developed the Brief Illness Perception Questionnaire.

Information related to the top-most influential scholars and their respective publication numbers are given in Table 5. With a total of 64 contributions, John Weinman (King's College London) has contributed the most, followed by 37 publications by Rona Moss-Morris (University of Auckland, New Zealand) and 32 by Keith Petrie (University of Auckland, New Zealand). Furthermore, using Fig. 6, which is the author's dominance diagram, we have attempted to illustrate the development of these top 20 scholars in the field of Illness Perception. In this figure, the different sizes of the circle correspond to the different numbers of publications. This diagram also highlights the contributions made by these top 20 contributors over time.

We also employed Lotka's law [70] to understand the author's contribution to a given field (Fig. 7). To clarify the representation in Fig. 6, we introduced a visual aid in the form of a dotted line. This line represents the theoretical distribution of author contributions as predicted by Lotka's Inverse Square Law of Scientific Productivity. According to this law, "the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 per cent" [71]. In simpler terms, in a given field of study, 60 % of authors only write one paper, 15 % of authors write two papers, and only 6 % of authors write ten or more scholarly articles [71]. The Kolmogorov-Smirnov Goodness-of-Fit test confirms the adherence of illness perception research to Lotka's law with a P value of 0.0366, while also highlighting a notable disparity between the predicted (theoretical) and actual (observed) distributions of author productivity.

3.2. Network analysis

To answer research questions number four to nine, we conducted a network analysis of the existing literature.

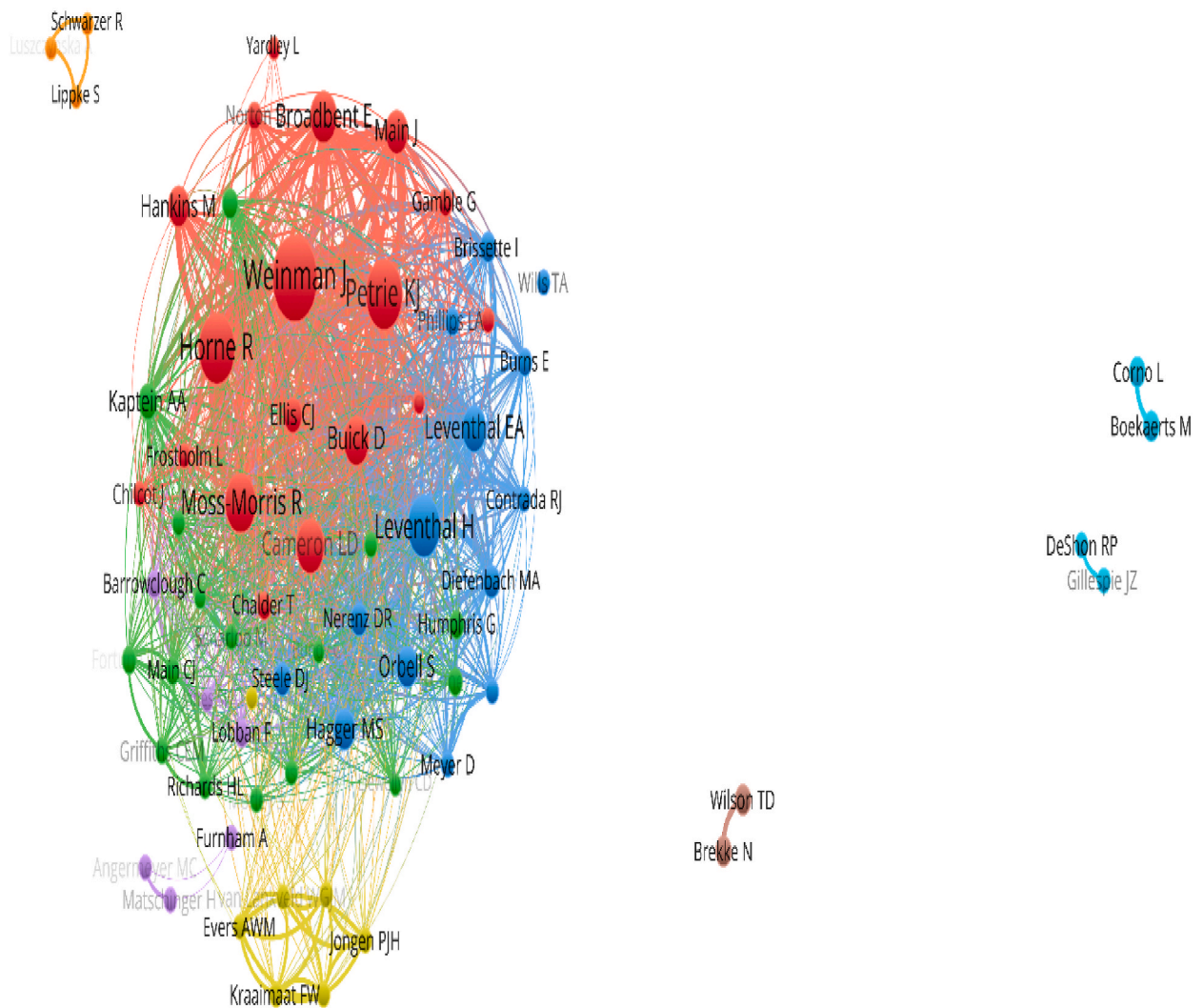


Fig. 10. Author co-citation network in Illness Perception research.

3.2.1. Citation networks

Citation count has been used in academia as an indicator of the impact of an article as well as an indicator of the quality of the research [72]. According to Judge et al. [73], citations can establish measurable links between citing and cited documents to understand the 'web of knowledge' of a subject field. Citation analysis is considered as a tool of science mapping in the field of bibliometrics [74]. Combining this citation analysis tool with network analysis produces the intellectual structure of a given field of study [75,76]. The main aim of this technique is to uncover the underlying 'structure and characteristics of a certain research field' [77]. In such network visualizations, the use of different colors often signifies various clusters or groups within the network, representing thematic or methodological similarities among the aggregated works or authors, thereby facilitating a broader understanding of the field's divisions and focal points.

In our study, Fig. 8 shows the citation network of the most influential scholarly output. The colors within Fig. 7 represent two distinct clusters of authors based on the co-citation analysis conducted using VOSviewer. These clusters are identified through an algorithm that groups authors based on the frequency with which their works are cited together, indicating thematic or methodological similarities in their research. In this particular network, the two clusters signify two main thematic areas within the field of illness perception that these influential authors have predominantly contributed to. John Weinman (King's College London), Keith Petrie (University of Auckland, New Zealand), Rob Horne (University College London) and Howard Leventhal (Rutgers University) played the most crucial role in establishing the field of Illness perception.

The citation analysis network is a useful tool that can help us uncover the knowledge structure and gain a better understanding of how a research field has developed over time. It allows us to compare different time periods, making it essential for updating our knowledge organization system [78]. To understand the citation network across time, we conducted a historiographic citation analysis (See Fig. 9) of the top 20 most cited papers. The historical citation network has been used in the study of various fields such as research

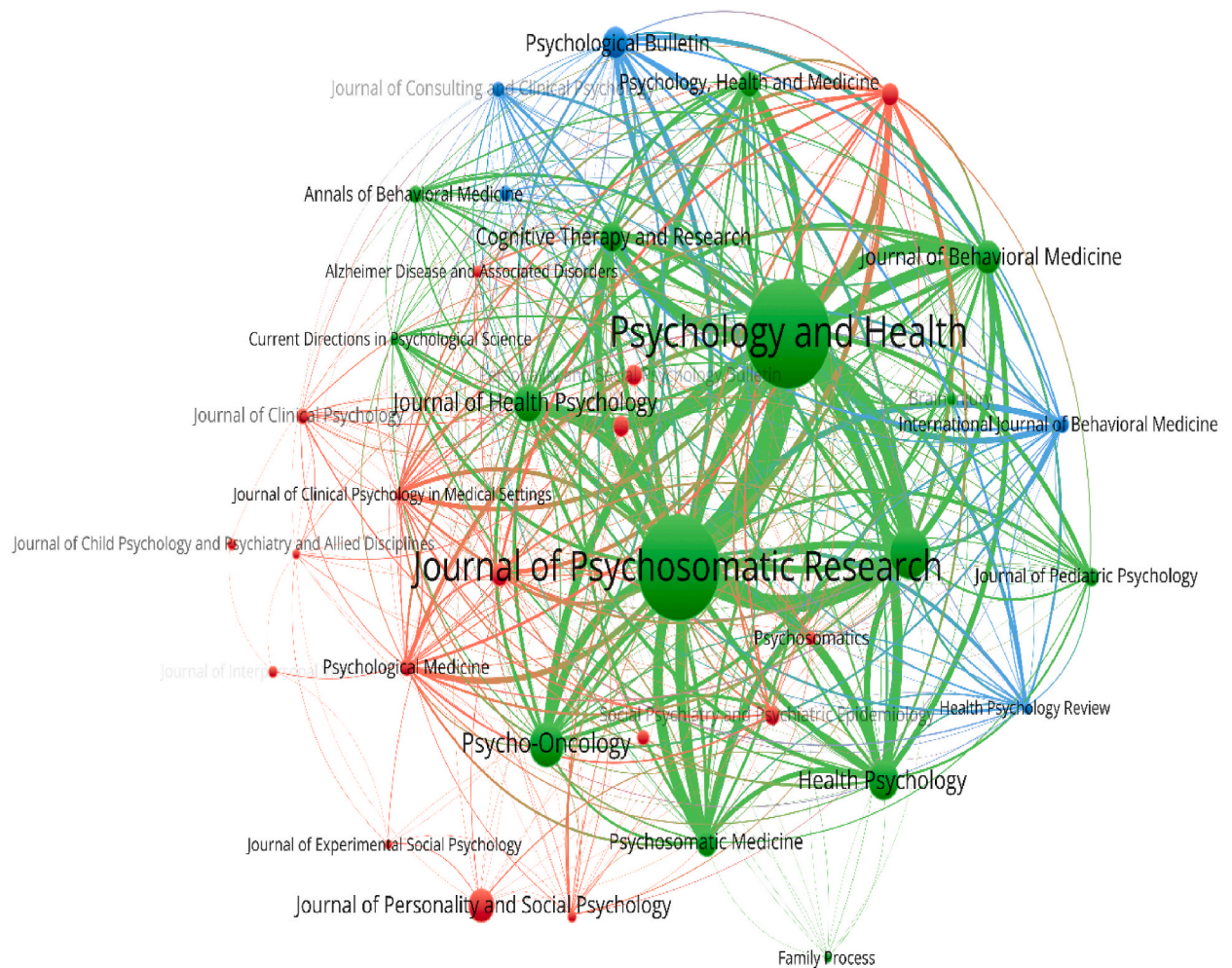


Fig. 11. Journal co-citation network in Illness Perception research.

on poisonous weeds [79], Instagram [51], and education [80]. Our analysis shows that the paper published by Meyer et al. [81] is a landmark work in the field of Illness perception. Meyer et al. [81] have been widely cited by other prominent researchers in this field, such as Leventhal [10,82], Weinman et al. [7], Petrie et al. [83], among others.

3.2.2. Co-citation network

In order to anticipate the direction of future research and study in the field of illness perception, it is crucial to examine the hidden relationships among the most prominent publications. One way to do this is through the use of co-citation networks. This technique helps researchers to simplify the complex nature of cross-citations into a more comprehensible visual form [84]. Since its first usage in core publications from the field of particle physics by Small [85], many researchers have employed it in their own areas of research. For example, Tang et al. [86] used it to explore the research trend in computer-supported collaborative learning, while Holman et al. [87] conducted a co-citation network analysis to understand the role of social context in planning health behaviour interventions. They found that references to social context had significantly decreased after 2006. Similarly, González-Teruel et al. [88] used this technique to explore publication trends in global health.

As proposed by Lin and Himelboim [89], we have used this technique to identify the most influential authors and journals from the field of Illness Perception. Fig. 10 shows the authors' co-citation network in the field of Illness Perception with a size, density and diameter of 70, 0.731, and 4, respectively. The nodes' label contains the first authors' last name, and its size represents the extent to which an article has been co-cited with others, i.e., a large node represents more links. Our author co-citation network consists of eight distinct clusters with John Weinman as the most influential author of this field of research. Other famous scholars from the field of Illness Perception include Keith Petrie and Rob Horne. Lastly, the authors' co-citation network consists of four isolated clusters.

Next, we examined the journal co-citation network for the Illness Perception (Fig. 11). The network contains three different clusters and has a size, density, and diameter of 37, 0.635, and 3, respectively. Our results suggest that the biggest cluster of this network was dominated by the Journal of Psychosomatic Research and Psychology & Health. Additionally, Psycho-oncology and Health Psychology

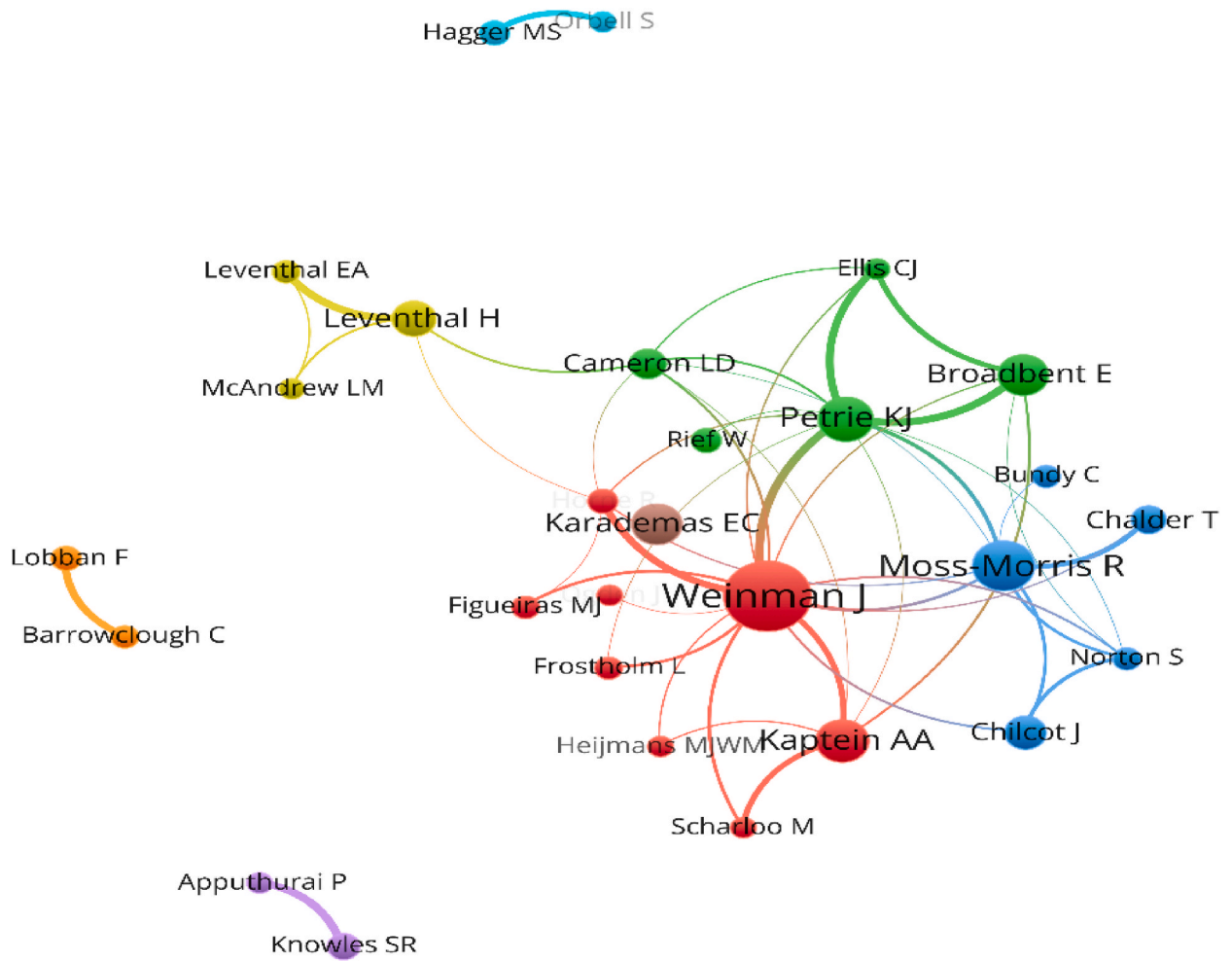


Fig. 12. Author collaboration network in Illness Perception research.

are two other journals in this same blue cluster with many co-cited articles.

3.2.3. Collaboration network

The expansion of a research field is not solely based on the quantity of research conducted by scholars, but also relies on the collaboration between scholars from various institutes and countries. To investigate this aspect of research on Illness Perception, we performed a collaboration network analysis at three levels: (i) among authors, (ii) at the institutional level, and (iii) at the country level.

The number of articles co-authored within a particular research field is represented by the author cooperation network [90]. In Fig. 12, we can see the author collaboration network of the Illness Perception research field. The size, density, and diameter of this network are 33, 0.091, and 4, respectively. The author collaboration network can be broadly categorized into three inter-connected research clusters of red, green, and blue colors along with four independent clusters of collaboration. This network identifies John Weinman as the most active collaborator, followed by Adrian A. Kaptein, Rona Moss-Morris, and Keith Petrie, respectively. Although Howard Leventhal is considered the pioneer of the field of Illness Perception, he was not found to be actively establishing research collaborations.

The second level of collaboration network is based on across-institute or university collaboration. Fig. 13 displays the institutional collaboration network for the field of Illness Perception, with a network size of 30, a density of 0.315, and a diameter of 5. The linkages signify the collaboration relationships among different institutes, while the node size represents the total number of publications for each institution. Our network figure shows three clusters of research collaboration in red, green, and blue colors. The largest green cluster consists of 15 institutes collaborating on Illness Perception, followed by the red-colored cluster consisting of 10 institutes. Interestingly, King’s Medical College London has contributed the most by collaborating extensively with several European universities, such as the University of Manchester and the Faculty of Life Science & Medicine University. Our author collaboration network also suggests that European Universities have collaborated the most in the field of Illness Perception, followed by American and Australian

Institutional Collaboration

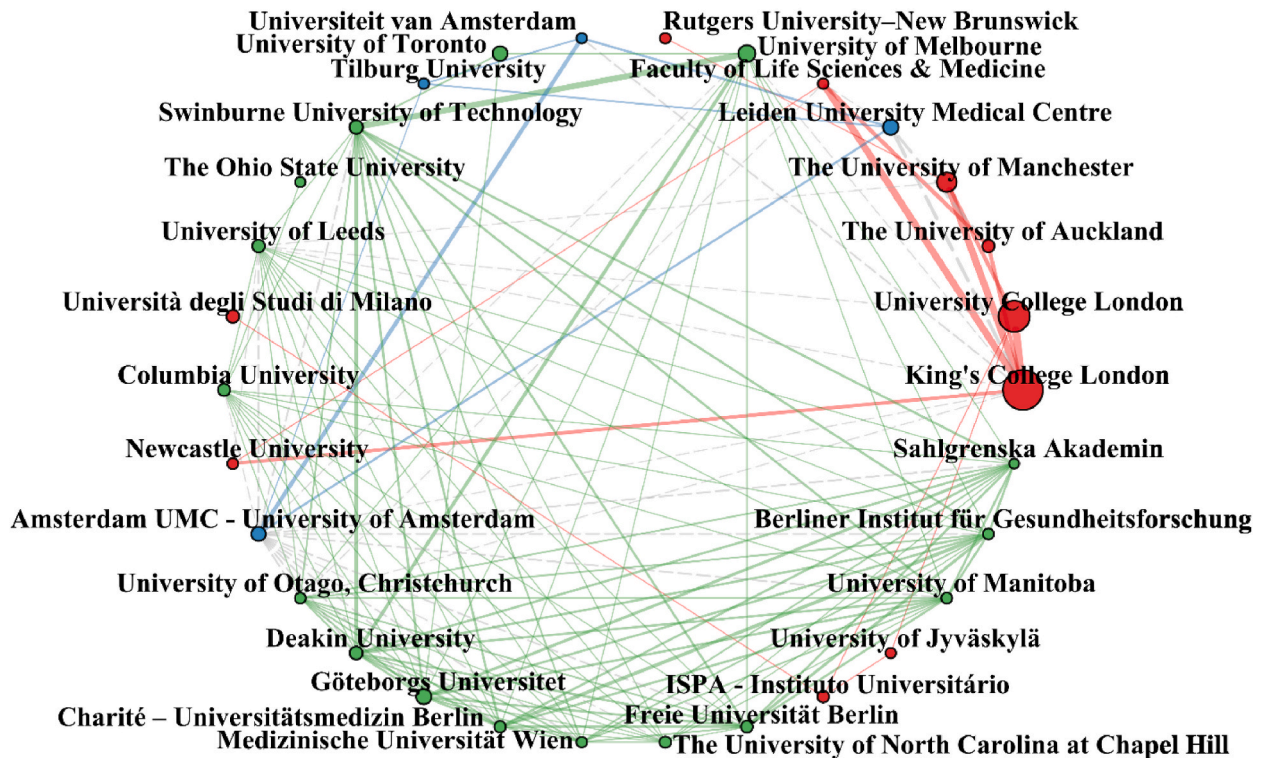


Fig. 13. Institutional collaboration network in Illness Perception research.

universities.

We conducted a collaboration network analysis to gain insights into research collaboration between countries. Fig. 14 illustrates the national collaboration network for research on Illness Perception. The network size is 70, density is 0.15, and diameter is 4. Our analysis indicates that the United Kingdom has collaborated the most in this field of study, with Germany and the Netherlands being their major collaborating countries, followed by Australia, New Zealand, and Denmark respectively. On the other hand, universities from the USA have collaborated mostly with Canada and Columbia.

To gain a better understanding of the research collaboration across nations, we utilized temporal presentation, which is illustrated in Fig. 15. From this figure, we can see that China is emerging as a hub for research collaboration on Illness Perception, followed by Poland and Austria. Fig. 16 shows the trends in research collaboration on a world map.

3.2.4. Keywords and keyword co-occurrence analyses

Analysis based on keywords have always been part of bibliometric studies [91]. It is mandatory for researchers to include a list of keywords at the end of their research article, as it helps in making their work more visible. These keywords are a combination of various terms and phrases that summarize the content of the publication [91]. Keyword analysis has been used by several researchers to understand the current important research themes and predict the future development of a particular research field [92].

We used the frequency analysis of keywords to identify the most common research areas for the field of Illness Perception (Table 6). The top keywords in abstracts are illness, patients, perception, beliefs, symptoms, health, treatment, model, psychological, and representation.

To understand the evolution of keywords over time, we employed word growth analysis (Fig. 17). It gives us a better understanding of present as well as future research trends. Research on depression has gained more popularity in recent years in comparison to other topics. Studies exploring the role of illness perception in perceived quality of life, coping and anxiety are also gaining importance.

We used a Sankey diagram in our analysis, as shown in Fig. 18. The Sankey flow diagram was named after Captain Matthew Sankey (1898) and is used to illustrate the flow or transition from one state or time to another [93]. It helps researchers visualize the connection between different attributes, such as keywords, authors, publications, and citations of a research output [94].

From Fig. 19, we can conclude that the most frequent keywords related to illness perception are illness perception itself, illness representation, and the common-sense model. We can also see that J Weinman has used different combinations of these keywords the most, followed by R Moss-Morris, AA Kaptein, and KJ Petrie, respectively. Based on the width of the edges, we can see that the top names in the field of illness perception have published their research in the Journal of Psychosomatic Research and Psychology and Health. However, it is worth noting that a wide variety of journals have published research output on illness perception.

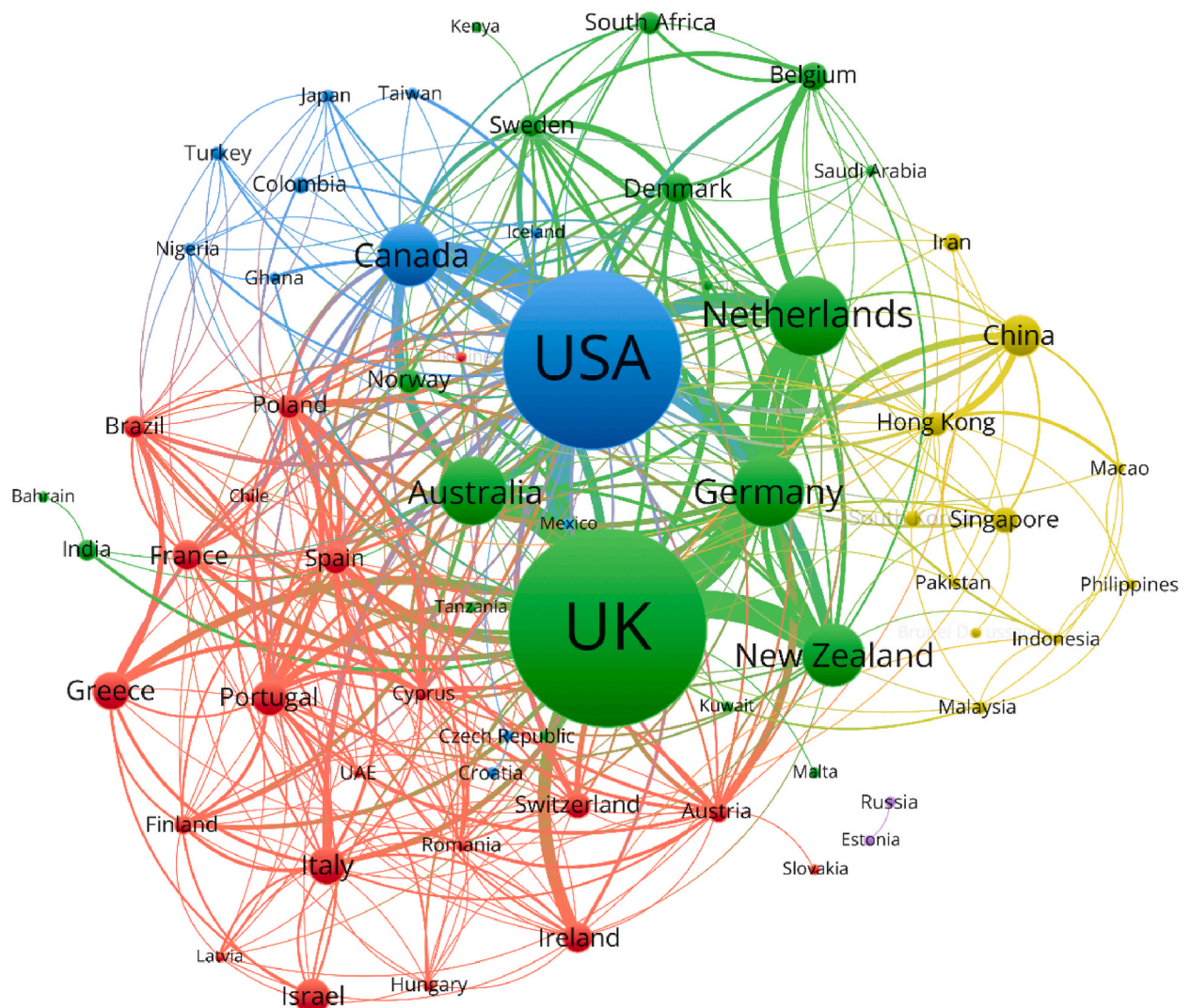


Fig. 14. National collaboration networks in Illness Perception research.

We utilized the Keyword Co-occurrence Network (KCN) approach to analyze the knowledge structure [95] of our area of interest i. e., Illness Perception. KCN is a well-known network-based method that examines the connections between keywords in the literature [96]. KCN has been reported to be more efficient than traditional literature reviews [97]. Based on our KCN findings (Fig. 18), we have identified four research clusters for our study. Some of the major research areas in Illness Perception include: (a) the role of Illness Perception in depression, quality of life, coping, and anxiety, (b) the role of illness representation in adherence, well-being, and diabetes, (c) lay belief and health behavior, emotions, and stigma, and (d) illness beliefs and their association with Myocardial Infarction, stroke, rehabilitation, and fatigue.

3.3. Intellectual structure maps

3.3.1. Conceptual structure map

To analyze and interpret the results of illness perception research, we employed a Multiple Correspondence Analysis (MCA), adhering to best practice guidelines from recent studies [51,98]. Utilizing the Bibliometrix package, MCA was applied to map the conceptual structure of this research field, focusing on the proximity of keywords within publications. This method identifies similarities in keyword distribution and depicts closely related terms nearer each other on the conceptual map. Further, we harnessed the Conceptual Structure function in R to extract author keywords and applied K-means clustering. This approach is widely used in clustering [99] and it combines with MCA to generate a two-dimensional plot. This plot not only highlights important keywords but also elucidates their interrelationships and emerging trends in illness perception literature.

According to Fig. 20, the analysis uncovered three distinct clusters, each representing a unique research focus within the field. This

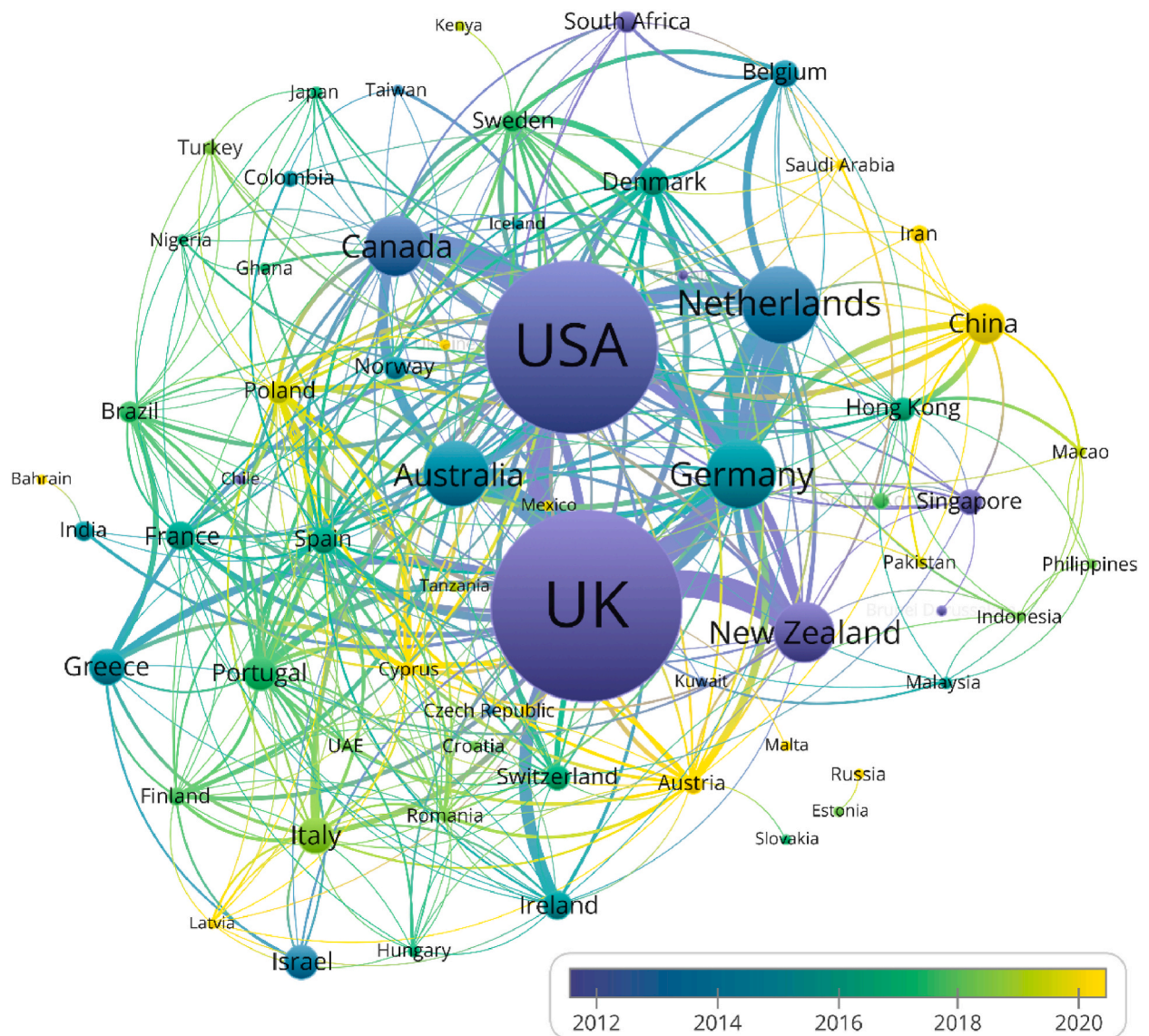


Fig. 15. Temporal presentation of national collaboration networks.

diversity suggests contributions from scholars across various disciplines. The red cluster, encompassing keywords like "illness cognition," "Common-sense model," and "Self-regulation," represents a comprehensive understanding of how individuals perceive and manage chronic conditions such as chronic fatigue syndrome and diabetes [100,101]. It emphasizes the importance of personal beliefs and the self-regulation model in coping with chronic illnesses [42,102]. This cluster also highlights the impact of illness perception on quality of life and adherence to treatment protocols [103,104].

In the green cluster, the research focused on "breast cancer" and "oncology". This cluster suggests researchers' interest in investigating into how cancer patients perceive their illness, which significantly influences their treatment decisions and overall wellbeing [105,106]. The blue cluster centers around mental health issues like "Depression" and "Anxiety." It indicates a growing interest in understanding how mental health conditions are perceived by patients and the broader society. This cluster likely explores the stigma associated with these conditions, their impact on quality of life, and the coping mechanisms employed by individuals [107,108]. Overall, these clusters collectively reflect the multifaceted nature of illness perception research, encompassing various aspects from chronic physical conditions to mental health, each with its unique set of challenges and coping strategies.

3.3.2. Thematic map

In our analysis of illness perception research, we developed a thematic map to distinguish the concentration of research themes, informed by centrality and density levels. This approach aligns with the methodology described by Mobin et al. [109] and Esfahani et al. [110], where X-axis depicts network cluster centrality and Y-axis depicts density. Centrality reflects the interconnectedness

Country Collaboration Map

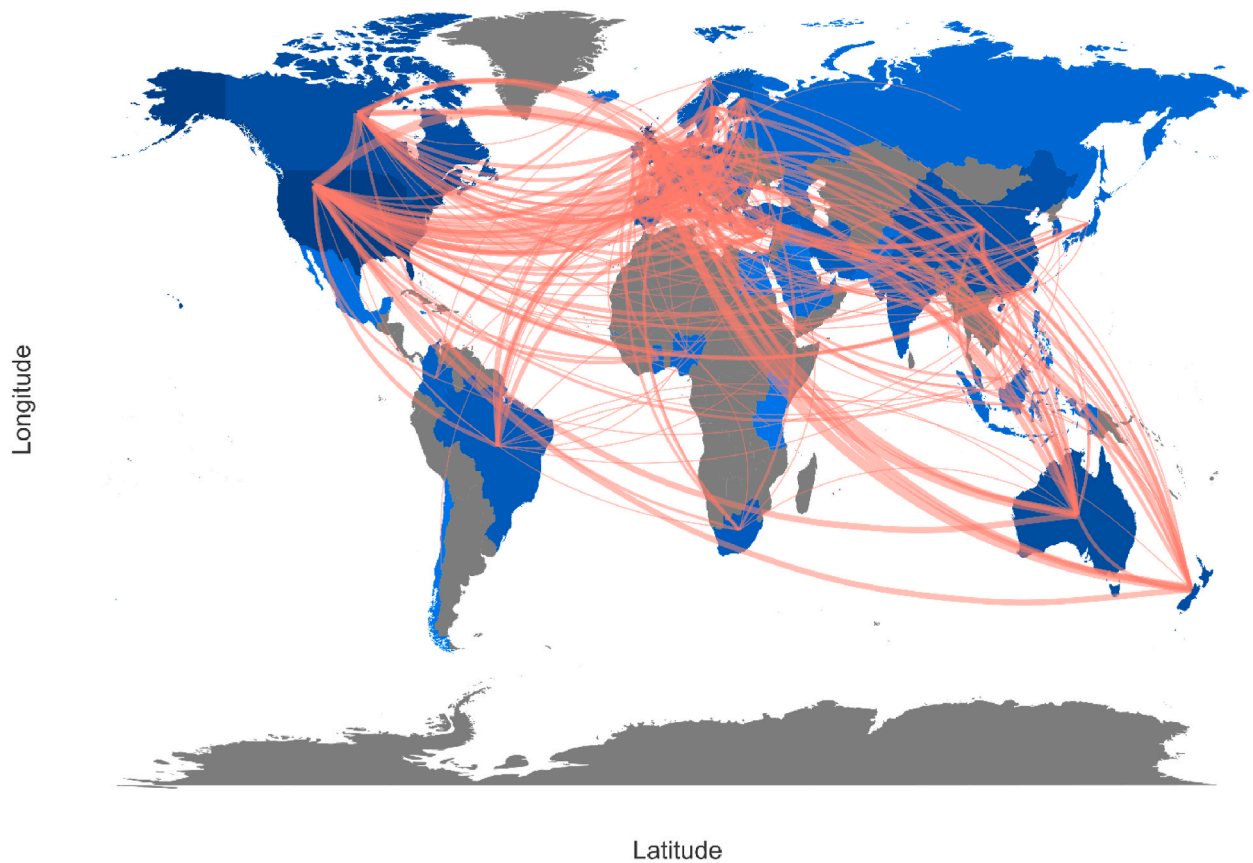


Fig. 16. National cooperation map.

Table 6

The most frequent keywords in the abstracts of Illness Perception-related studies.

Keyword	Frequency	Keyword	Frequency
Illness	4711	behaviour	877
Patients	3147	disease	876
Perception	2789	outcome	867
Beliefs	2080	cancer	854
Symptoms	1544	participants	849
Health	1514	anxiety	814
Treatment	1352	intervention	794
Model	1287	people	783
psychological	1223	effects	720
representations	1218	life	717
Factors	1014	measures	715
questionnaire	983	perceived	714
Control	947	relationships	712
Depression	946	individual	677
Coping	895	emotional	671

among topics/clusters and ‘measures the significance of a themes’ whereas, density indicates the growth of a theme [111,112]. The thematic map is an adjunct to the conceptual structure map that offers unbiased insights by clustering recurring keywords [113]. The thematic map enables an intuitive understanding of the themes and assists in analyzing their position within the different quadrants [114].

As depicted in Fig. 21, the thematic map for illness perception research is categorized into four quadrants, divided by dotted lines based on density and centrality. The size of each bubble on the map corresponds to the frequency of the keyword in the literature. The

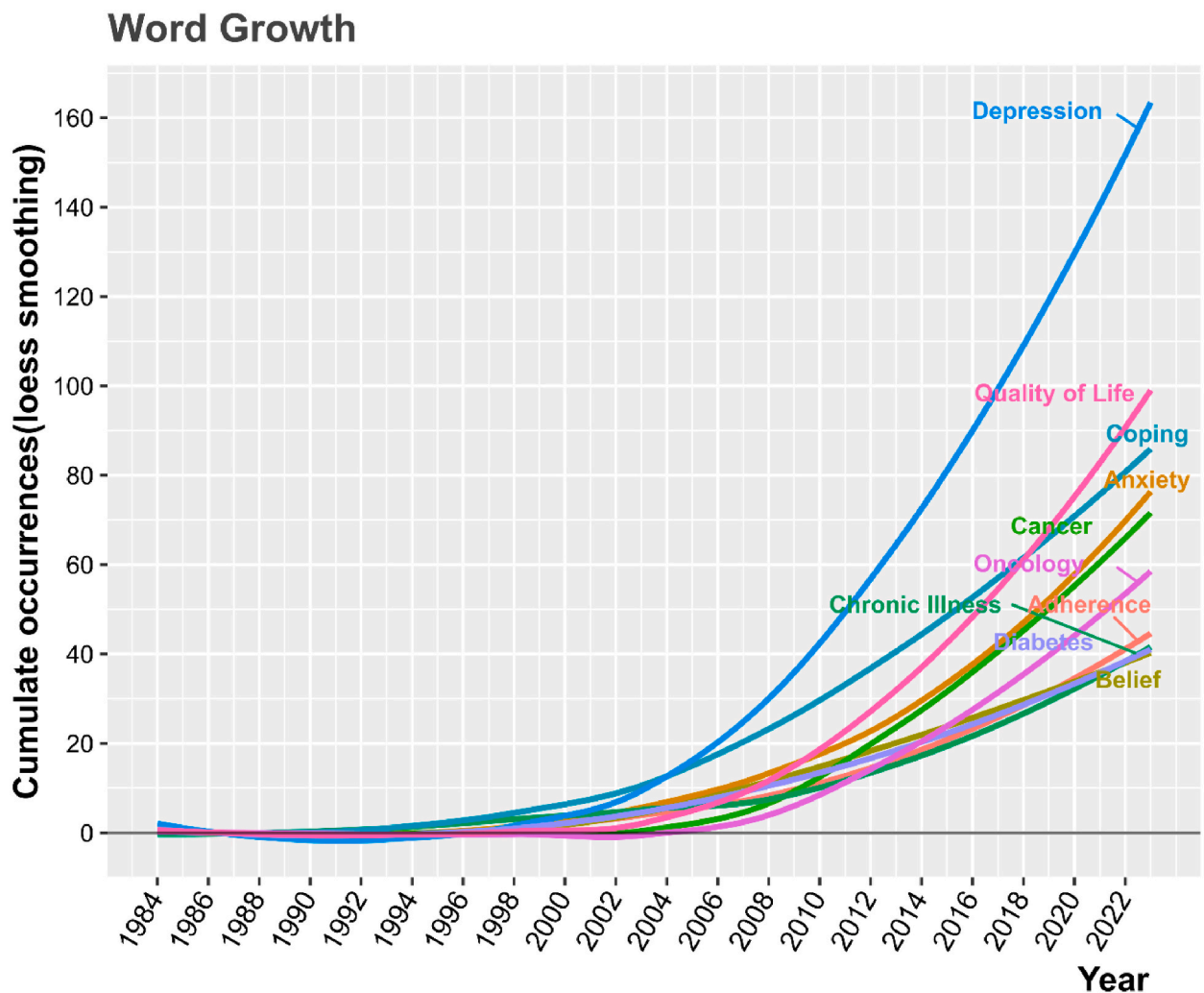


Fig. 17. The evolution dynamics of authors' keywords over time.

motor themes (top right) in the first quadrant of the thematic map, it includes 2 research clusters; Cluster 1: (illness) belief, culture, COVID-19, stigma, mental health; Cluster 2: chronic fatigue syndrome, HRQL, CBT, fatigue, attribution. These identified themes are well-developed research ideas within illness perception research, featuring a substantial body of interconnected studies. These themes are not only robust due to their extensive internal development but also hold significant influence in the broader research field due to their external connections. Their central position in the thematic map underscores their importance in shaping and being shaped by related areas, making them key focal points for both academic exploration and practical application in healthcare and patient management [115].

In the second quadrant of the thematic map, basic themes (right bottom) such as "Coping", "Adherence", "Diabetes" and "Chronic illness" are positioned. These themes are crucial to the field of illness perception research, recognized for their well-established external connections. However, they differ from the motor themes in that they exhibit less internal development. This implies that while these topics are widely recognized and connected to broader research areas, they have not yet developed the same depth and complexity of internal research as seen in the more densely populated themes of the first quadrant. Their significance lies in their role as foundational elements that link various aspects of illness perception research, providing a base for more specialized or advanced studies [116].

The third quadrant comprises emerging or declining themes (left bottom), consist of 2 clusters. Cluster 1: Quality of life, cancer, breast cancer, oncology, and, psychological distress; Cluster 2: Depression, anxiety, stress, obesity, and, cardiac disease. These themes are characterized by low density and centrality, indicating weaker internal and external connections, and reflect areas that are either nascent or diminishing in focus within the field. Finally, the niche themes (top left) in the fourth quadrant, including "Health anxiety", "Illness behavior", "Primary care", "somatoform disorder" and "Pain," have high centrality but low density. These themes are significant for cross-disciplinary linkages but lack internal development. In conclusion, the thematic map provides a comprehensive view of the current state of illness perception research, highlighting areas of robust development, foundational topics, emerging interests, and specialized niches, each contributing uniquely to the field's evolution.

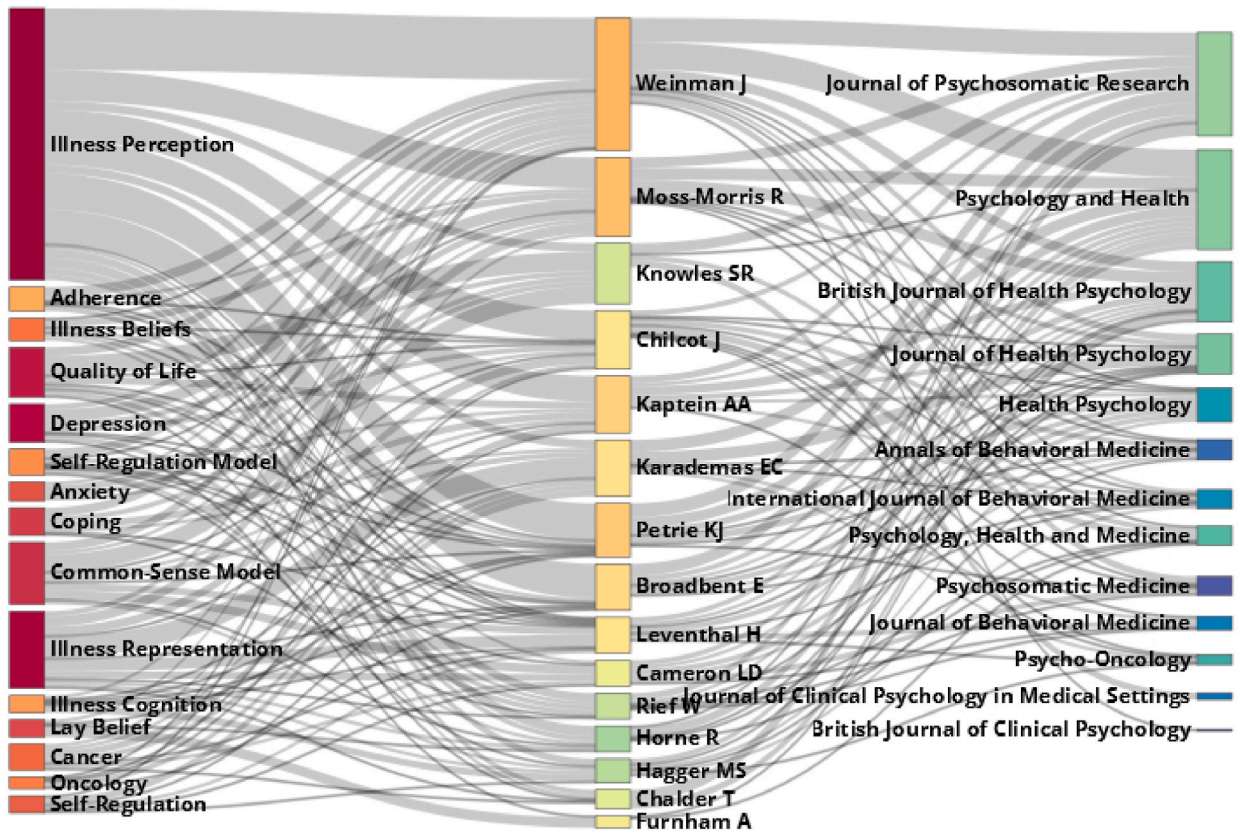


Fig. 18. Sankey diagram of Illness Perception research (keyword-author-publication linkages).

4. Conclusion

To understand the trend of research in the area of illness perception, we conducted a bibliometric analysis of 1813 documents retrieved from Scopus database since 1975. The field of illness perception has seen a tremendous growth since its introduction. However, since 2002, researchers have paid more attention to this construct to predict health behaviours. Most probably, this change in the pace can be attributed to the revised version of Illness Perception Questionnaire (IPQ-R) developed by Moss-Morris et al., [8]. This surge of interest in the field of illness perception also highlights the importance of psychological assessments for advancing scientific knowledge and establishing a research area [117].

Although the field of illness perception started with the seminal work by Leventhal et al. [3], and Meyer et al. [81], however, Weinman has been found to be most cited as well as most actively contributed researcher of this field. Weinman has majorly worked on measures of illness perception among chronic and cancer patients.

The collaboration among authors is weak both at institutional level as well as at the level of authors. Among most influential names in this field, Weinman, Petrie and Moss-Morris are closely linked to each other in collaboration. As for the country wise contribution, United Kingdom has dominated this field as single-country publication as well as in collaboration with other countries. With respect to journals publishing research work on Illness Perception, *Journal of Psychosomatic Research* and *Psychology and Health* are close contenders of leading journal followed by *Journal of Health Psychology*.

Research within the field of illness perception has yielded a significant number of studies on how patients' perception of their illness affects health outcomes such as coping, quality of life, and adherence in chronic conditions like diabetes and chronic fatigue syndrome. This is understandable given the impact of rapid lifestyle changes on health conditions [118]. Chronic illnesses have been found to be one of the leading causes of death and disability [119] particularly in low and middle-income countries, which emphasizes the importance of understanding patients' belief of illness. With the help of conceptual network, we were able to identify specific researched themes in the area of illness perception. We found stigma related to health, attribution, role of culture, health-related quality of life, and CBT are well-researched areas. Whereas, mental-health issues of cardiac diseases and obesity such depression, anxiety and stress are least explored areas under illness perception.

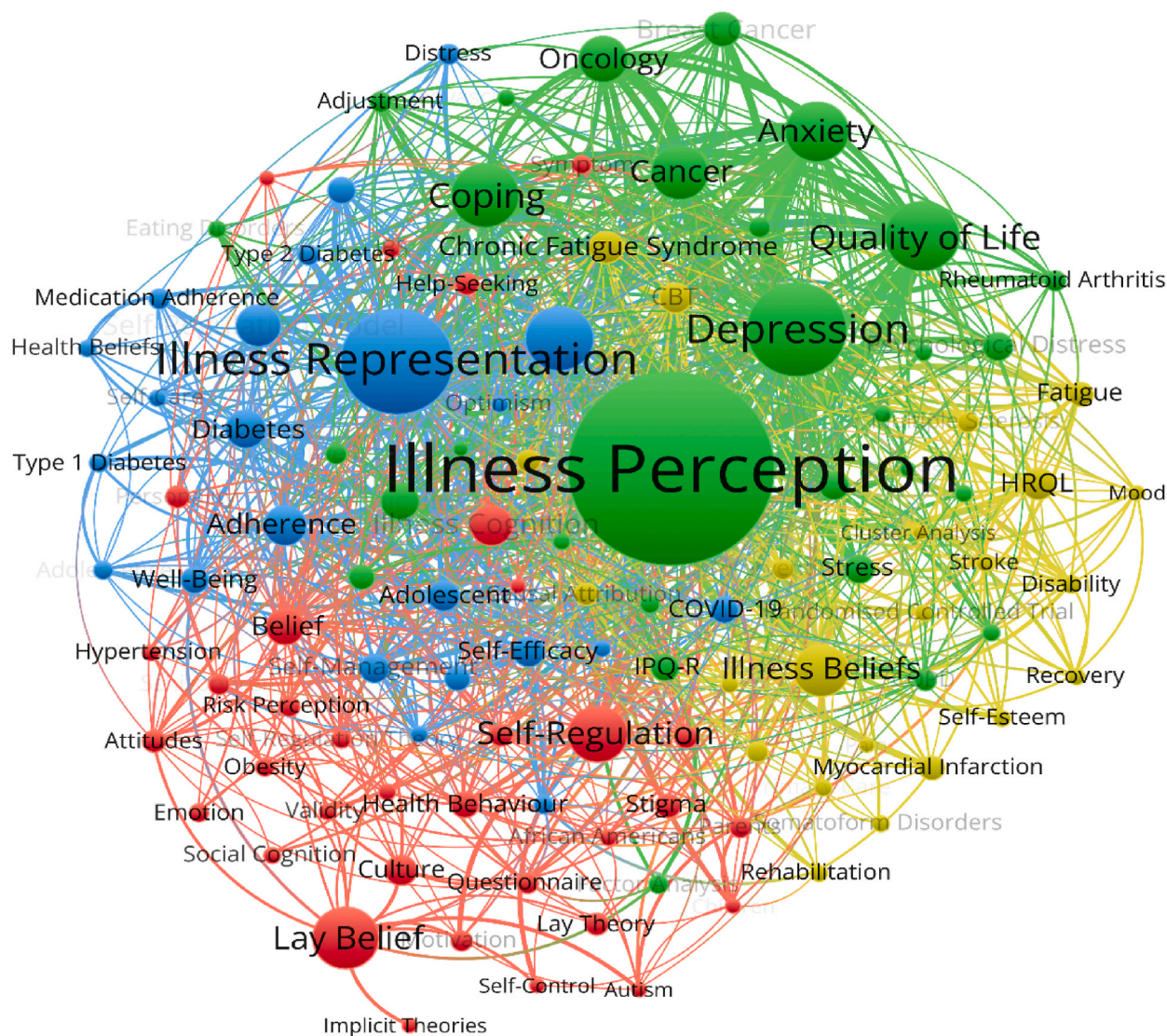


Fig. 19. Keyword co-occurrence network in Illness Perception research.

4.1. Implications

Illness perception is crucial in understanding patient health behavior [12]. Therefore, it is important to identify trends and intellectual structures in this field for future research. Although, the present study uses scientometrics to understand the field of illness perception, this study has many implications. One such major contribution of this study is to bring new knowledge and key insights into the research trends of illness perception. The results of this paper provide a comprehensive view of illness perception research since 1975. Therefore, it is helpful in getting an overview of the evolution of this research area. This study also enables graduate students and newcomers of this field in identifying main research areas and thus making it possible to discover new areas and opportunities within this field.

This paper also shed light on identifying least explored areas of illness perception study and provide an insight into the existing gaps on which future studies should focus. Our analysis suggest that areas related to cancer patients, cardiac patients and mental health issues are not sufficiently explored in comparison to other areas of illness perception.

Our study provides insights into collaboration between institutes and countries. This would help researcher of this field in identifying possible collaborators for their study. Even though there is a substantial research collaboration in this field, there is a need to push collaboration with developing countries.

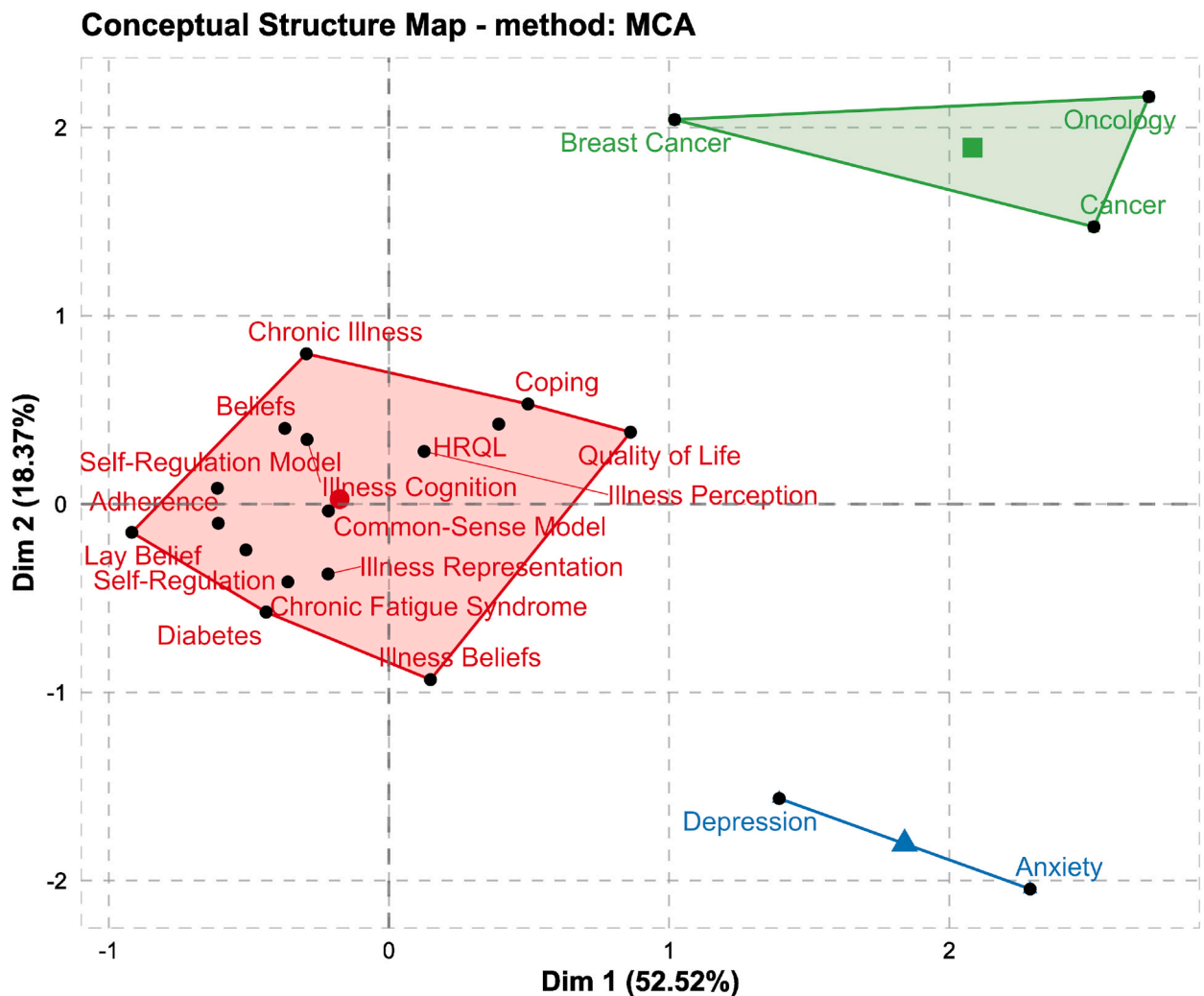


Fig. 20. Conceptual structure map.

4.2. Limitations

Just like any other research, our study also suffers from some limitations. One such limitation is the absence of any brief overview of the published literature reviews, meta-analysis and systematic reviews on the topic of illness perception. A better understanding of illness perception as a field could have been achieved by providing a brief overview of the literature along with scientometrics of illness perception.

Another limitation of our study lies in the usage of citation analysis. Although various researchers have pointed out many advantages of using it [72,73], it has some limitations too. Citation counts measure a very specific definition of "impact" [120], and does not differentiate between different or sometimes conflicting motivations for citing a research output [121]. Also, it does not take author ordering into account, as the first and last authors get similar credit for citations [121]. It is important to mention that our present research database is restricted to one scientific database (SCOPUS) only. Therefore, a bibliometric analysis based on other databases can be carried out in future research. Further, Scopus is biased toward the English language and journals based in developed countries. Therefore, publications on illness perception in unindexed journals in developing countries such as Indonesia, South Africa, Brazil, India, Middle East, and Eastern Europe might have been missed.

In our analysis, we only included peer-reviewed journal articles and book chapters, while other sources such as conference proceedings were excluded. Further, we did not consider grey literature also, which might have affected the total number of retrieved documents. Future studies can include these excluded literature to get a more comprehensive overview of this field. Although we have attempted to provide a comprehensive picture of the various paradigms that shape research on illness perception, we encourage future researchers to supplement our findings with other clustering techniques. Our study does not investigate the root causes behind the increase in publications related to illness perception, nor does it analyze the longitudinal changes in topics, co-authorships, and journal co-citations. Future research can work on this aspect also.

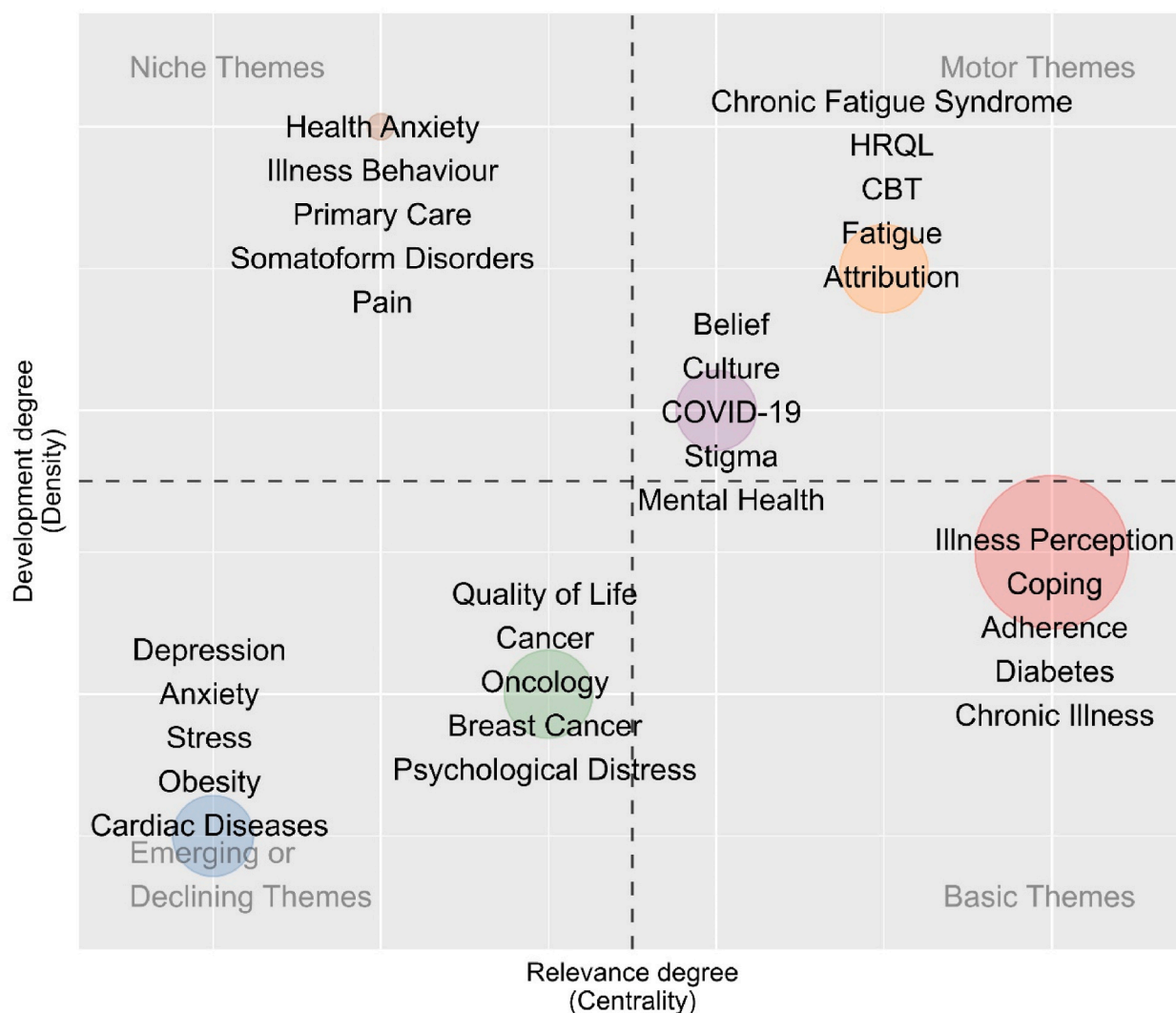


Fig. 21. Thematic map in illness perception research.

While our study illustrates collaborations among researchers at both the institute and country levels, in the future, researchers can explore the structure of collaboration based on gender. Some researchers in other fields have also explored gender-based collaboration [122,123]. There is an ongoing debate on how collaboration affects performance indicators, such as the number of articles, citations, and h-index [124–126]. In the future, these discussions might be explored in the field of illness perception. Despite these limitations, this bibliometric analysis offers novel insights into identifying underexplored niches within the field of illness perception and illustrates the evolutionary pattern of existing studies in the literature.

Data availability statement

Data is available upon request.

CRedit authorship contribution statement

Arti Singh: Writing – review & editing, Writing – original draft, Validation, Supervision, Formal analysis, Conceptualization.
Abderahman Rejeb: Visualization, Software, Resources, Project administration, Methodology, Investigation, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to

influence the work reported in this paper.

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