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REVIEW | REVISÃO

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Use of the complexity paradigm in the field of health: scope review

Utilização do paradigma da complexidade no campo da saúde: revisão de escopo

Uso del paradigma de complejidad en el campo de la salud: revisión y alcances

Maria de Fátima Cordeiro Trajano Cabral[1]
Angelina Lettiere Viana[2]
Daniela Tavares Gontijo[1]

1. Universidade Federal de Pernambuco, Programa de Pós-Graduação em Saúde da Criança e do Adolescente. Recife, PE, Brasil.
2. Universidade de São Paulo, Departamento de Enfermagem Materno-Infantil e Saúde Pública. Ribeirão Preto, SP, Brasil.

ABSTRACT

Objective: To analyze the knowledge about the use of the complexity paradigm in health research. **Methods:** Scope review with articles published in the last 10 years in English, Spanish, or Portuguese using the Edgar Morin paradigm of complexity. **Results:** Returned 302 publications, of which 54 remained after the selection stages. Most of the studies were conducted in Brazil; with publications in 2017; with professional production only; empirical articles, and all qualitative. In 47.05% of the articles did not perform the triangulation of data collection techniques; referring to 20 works by the author and 83.33% used the complexity paradigm as a theoretical framework. **Conclusion:** There is a light use of the complexity paradigm in health research and a need for conceptual appropriation in its use as a theoretical framework in research.

Keywords: Health; Research; Knowledge; Postmodernism; Philosophy.

RESUMO

Objetivo: Analisar o conhecimento sobre a utilização do paradigma da complexidade em pesquisas no campo da saúde. **Método:** Revisão de escopo com artigos publicados nos últimos 10 anos, em inglês, espanhol ou português, com o uso do paradigma da complexidade do autor Edgar Morin. **Resultados:** Retornaram 302 publicações, das quais 54 permaneceram após as etapas de seleção. A maioria dos estudos foram: realizados no Brasil; com publicações no ano de 2017; com produção uniprofissional; artigos empíricos e qualitativos. Em 47,05% dos estudos não se realizou a triangulação das técnicas de coleta de dados; foram referenciadas 20 obras do autor e 83,33% utilizaram o paradigma da complexidade como referencial teórico. **Conclusão:** Observou-se uma tímida utilização do paradigma da complexidade nas pesquisas no campo da saúde e destaca-se a necessidade de maior apropriação conceitual no seu uso enquanto um referencial teórico nas pesquisas.

Palavras-chave: Saúde; Pesquisa; Conhecimento; Pós-modernismo; Filosofia.

RESUMEN

Objetivo: Analizar el conocimiento sobre el uso del paradigma de la complejidad en la investigación en salud. **Métodos:** Revisión de alcances con artículos publicados en los últimos 10 años en inglés, español o portugués, utilizando el paradigma de complejidad de Edgar Morin. **Resultados:** De un total de 302 publicaciones, se tomaron 54, transcurridas las etapas de selección. La mayor parte de los estudios se realizaron en Brasil; con publicaciones de 2017; con producciones inherentes a una actividad profesional; artículos empíricos y cualitativos. En el 47.05% de los artículos, no se realizó la triangulación de las técnicas de recolección de datos; se hizo referencia a 20 obras del autor y el 83.33% utilizó el paradigma de la complejidad como marco teórico. **Conclusión:** Se advierte un uso tímido del paradigma de la complejidad en la investigación en salud y se destaca la necesidad de una mayor apropiación conceptual en su uso como marco teórico en la investigación.

Palabras clave: Salud; Investigación; Conocimiento; Posmodernismo; Filosofía.

Corresponding author:
Maria de Fátima Cordeiro Trajano Cabral
E-mail: enffatimact@gmail.com

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INTRODUCTION

Throughout human existence, different ways of thinking have accompanied human beings in their quest to unravel the mysteries that devastate the world and the universe, just as there has always been an intention to reach knowledge closer to reality, thereby boosting development of science. In this process, in the field of health, for a long time, science has developed from a Cartesian perspective[1] and without considering, in most cases, the multi-causality that appears in this area.

At present, it is understood that health is determined by social, economic, cultural, environmental, behavioral and biological aspects; Thus, it is necessary to consider not only the absence of diseases, but a state whose social conditions and determinants can positively or negatively affect the health of populations.[2] Thus, health is understood as a complex phenomenon that needs different perspectives for its comprehension, with new ways of reflecting health processes, to change from a hegemonic and centralizing perspective to the dialogue between the innumerable connections that involve health of collectivities and all participating social actors.[3] These new ways of thinking guided practices and models and led to the emergence of new paradigms.

Unlike the theory dealing with a set of rules set to area specific, the word "paradigm" means "to show", "to present" or even "to confront" and is a concept of science and epistemology that defines a typical example or model of something.[4] It is in this perspective, broadened to contemplate multidimensional phenomena, that the complexity paradigm (CP) was born, discussed by different authors, among them, Edgar Morin, and focus of attention in the present study. The author makes a division between two paradigms, the simplifier and the complex. The simplifying paradigm (SP) undoubtedly allowed the greatest advances in scientific knowledge and marked the development of science, contributing to important advances, including in the health field. However, the SP also produced a simplified and isolated view of the universe and began to show some shortcomings in the late twentieth century.[5]

The SP controlled - and still controls - science according to some principles, such as disjunction, reduction and fragmentation, becoming limited, as it separated the different areas of knowledge, excluded randomness and conceived a strict and deterministic universe by eliminating the observer of the set.[6] The CP, in turn, breaks the separation between science and common sense, since it understands that the knowledge of the parts depends on the knowledge of the whole, and that the whole depends on the parts to recognize the multidimensional phenomena that permeate the web of relationships between individual/society/environment.[5]

The word "complexity" derives from *complexus,* meaning binding or weaving, denoting the innumerable interactions and feedback about life in general.[7] The CP develops and allows for a dialogue between the physical, biological, spiritual, cultural, sociological, and historical dimensions of what is human.[8] Moran established seven guiding principles of the CP, namely: the systemic, holographic, retroactive, recursive, self-organizing, dialogical principle, and the reintroduction of knowledge into all knowledge.[9] It is noteworthy that the author discusses and articulates the importance of the work of several areas of knowledge and performance through transdisciplinarity, as well as the ecological and planetary care with the world, in addition to the importance given to processes of order/disorder/organization, intersecting complexity.[8]

In the scientific field, the use of theoretical references becomes increasingly indispensable to support research in the health area, as it helps in the development of generalizable and robust knowledge.[3] In this sense, it is understood the importance of discussing health situating the subject and object in the universe,[6] valuing their interrelationships and understanding that health is a multidimensional process, which needs a complex look for its understanding. Therefore, CP can be an important reference for understanding the broad concept of health and the principles of the Unified Health System (Sistema Único de Saúde). Thus, the aim of this review is to analyze the current state of knowledge about the use of the complexity paradigm, according to Edgar Morin, in health research published between January 2009 and December 2018.

METHOD

The scoping review *(or scoping study)*, which is a form of knowledge synthesis, addresses an exploratory research issue and aims to map key concepts, types of evidence and gaps in research related to an emerging field, as well as clarifying the working definitions and/or conceptual boundaries of a topic.[10-12] The methodology proposed by the Joanna Briggs Institute,[13] described in five stages, was adopted: Identification of the research question; Identification of relevant studies; Selection of studies; Data mapping; and Grouping, synthesis and reporting of results. As guiding questions, the following were identified: What are the characteristics of scientific publications that used CP in the health field? How did researchers approach CP in research?

Were eligible for inclusion published studies between January 2009 and December 2018, empirical and theoretical studies published in English, Spanish or Portuguese and used the CP from the perspective of author Edgar Morin. Were excluded: studies that did not address content relevant to the achievement of the objective; repeated studies; letter to the editor, editorials, study in the design phase, abstracts published in annals and texts that were not available in full for access during the research. The scope review does not foresee the exclusion of studies according to methodological quality criteria.[13]

The search for scientific production was conducted in journals indexed in the BIREME (Latin American and Caribbean Center for Health Sciences Information), MEDLINE/PubMed (US National Library of Medicine), Web of Science, SCOPUS/Elsevier and CINAHL (Cumulative Index to Nursing and Allied Health

Literature). The electronic search took place in March 2019, according to the keywords: *Health*; *Paradigm of complexity; Complex thought; Complex thinking; Theory of complexity* e *Edgar Morin*. These keywords have been chosen because the terms referring to the complexity paradigm are not yet controlled descriptors of DeCS/ MeSH. The Boolean operator (AND) was used and, according to each database, the parenthesis signs (), asterisk * or quotation marks "" were also used to assist in the search. It was used the following intersections: (1) paradigm of complexity AND health, (2) complex thoughts AND health, (3) complex thinking AND health, (4) theory of complexity AND health and (5) Edgar Morin AND health.

The selection of scientific articles was performed in four steps: a) search formed by the combination of the keywords contained in the title, abstract and descriptors or keywords of the retrieved articles; b) reference list of selected articles considered relevant in the studied context that were searched as additional studies, accessed by the CAPES Journals Portal (Coordinator of the Under-graduation Personnel Improvement Coordination, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, in Portuguese); c) duplicate articles and not relevant to the purpose of the study were excluded; d) the pre-selected articles were read in full, identifying, more accurately, their relevance to the research, which resulted in the final number of texts included in the review.

Data extraction was performed by filling in the data collection instrument and then typing it into a database in the *Excel,* 2016 version software of the *Office da Microsoft* package. Were identified and extracted the data regarding the authors' profession, year of publication, country of origin, country of the journal, type of production (single or multiprofessional), type of study, sample/population, main themes of the study (health area), outcome, discussion and considerations of the study. Quantitative findings were grouped using descriptive statistics, and narrative data were organized using *Atlas.ti* 7.0 version software and coded based on the CP. The writing of the article was guided by the PRISMA-ScR checklist for scope revisions.[12]

RESULTS

The search in the databases resulted in 280 occurrences and were included, from the analysis of references, 22 more texts, totaling 302 studies. Among these, 112 duplications were found. After reading the titles, abstracts, and descriptors of the 190 studies, 119 were excluded, resulting in 71 texts submitted to full reading, whose analysis resulted in 54 studies, scope review. Exclusion of studies was guided by the exclusion criteria. Figure 1 specifies the results of each analysis step, following the PRISMA model.[14]

Of the 54 studies included in the scope review, 92.59% (50) were performed in Brazil, 3.70% (02) in Venezuela, 1.85% (01) in Argentina and 1, 85% (01) in Colombia. According to the country of origin of the journal, 87.03% (47) are Brazilian journals, 3.70% (02) Venezuelans, 3.70% (02) Colombians, 1.85% (01) American, 1.85% (01) Cuban and 1.85% (01) Mexican. Regarding the language of studies, 85.18% (46) are published in Portuguese, 7.40% (4) in Spanish and 7.40% (4) in English. Regarding the

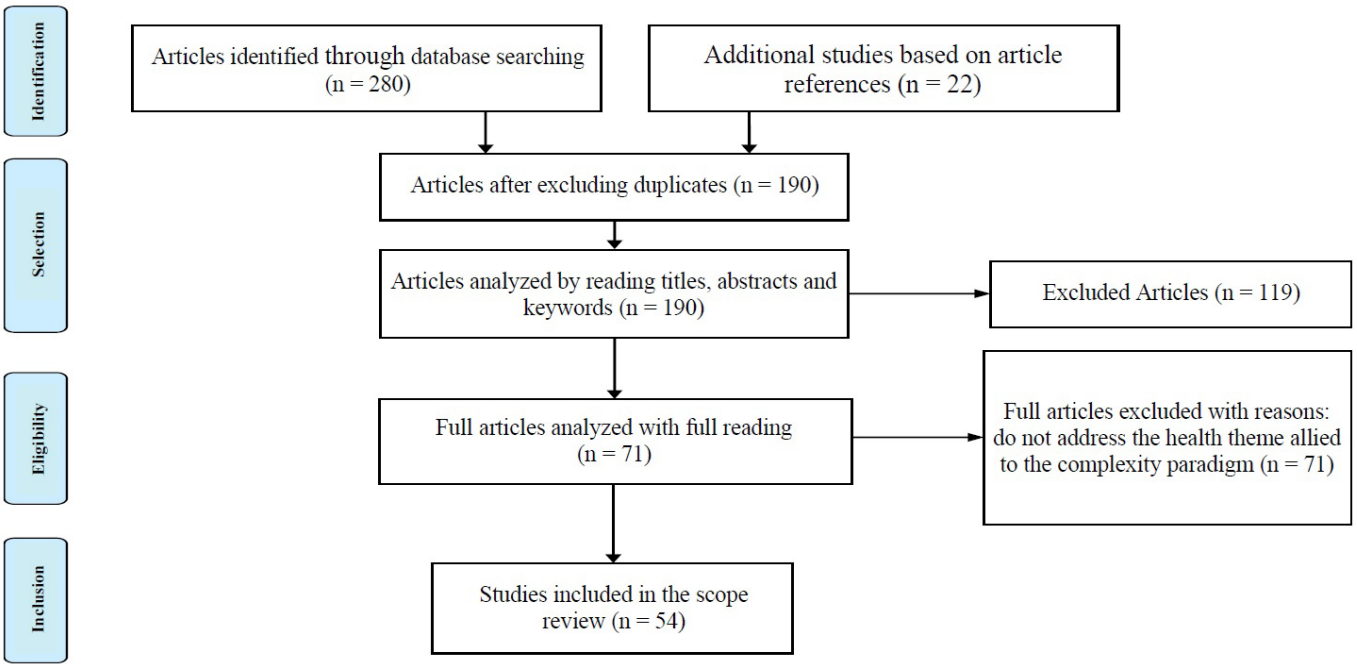

Figure 1 - Diagram of the process of inclusion and exclusion of studies - Recife, PE, Brazil, 2019.
Source: PRISMA 2009 Flow Diagram.

year of publication, the distribution over a 10-year interval was as follows: 2009 - 03, 2010 - 06, 2011 - 03, 2012 - 06, 2013 - none, 2014 - 02, 2015 - 05, 2016 - 10, 2017 - 12 and 2018 - 07 studies.

The author values the joint work of different professional areas to understand complex problems, thus analyzing the profession of the authors of studies to identify authors of a single profession (uniprofessional production) or of two or more professions (multiprofessional production). The form of uniprofessional production was the most frequent, with 70.62% (43), and the multiprofessional, with 20.37% (11). In relation to the first author cited in the studies, the most published professional category was nursing, with 77.77% (42) of the total articles, followed by psychology, with 7.40% (04), medicine, with 5.55% (03) and nutrition, with 3.70% (02); Biomedicine, pharmacy and dentistry each had an article as their first author. Table 1 describes the distribution of publications according to the type of study, method, collection technique and analysis technique.

The author stresses the importance of viewing the object from different perspectives and forms, thus, it is pertinent a survey regarding the triangulation of data collection techniques used in the 34 empirical and qualitative studies, of which 47.05% (16) did not perform the triangulation - a single collection technique, therefore 32.35% (11), used two collection techniques and 20.58% (07) three data collection techniques. The sample sizes/populations of the empirical studies ranged from 05 to 66, with an average of 24.41 participants. The investigation of the most frequent themes of the articles was based on the descriptors cited in the articles, which resulted in the division into 19 thematic areas. Table 2 presents the appearance ratio of each thematic area.

The works of the author on CP were evaluated, referenced in the studies, which totaled 20 works, of which 14 were individually authored and six in partnership with other authors, as shown in Table 3.

Regarding the use of CP in the studies, 83.33% (45) used it as a theoretical reference, reporting its concepts, characteristics and principles; 9.25% (05) cited the CP in just one or two paragraphs in discussions of studies; 3.70% (02) addressed exclusively the SP, without mentioning the CP; 1.85% (01) mentioned only the concept of transdisciplinarity; and 1.85% (01) mentioned only the concept of ecological care. In the research process, the concepts, characteristics and principles of the SP and CP paradigm were extracted from the texts, through an analysis based on the complexity referential, presented in Table 4.

Table 1 - Distribution of publications by type of study, method, collection, and analysis technique - Recife, PE, Brazil, 2019.

Study types and methods	n	%
1. Empirical	34	62.96
1.1. Qualitative design	34	62.96
1.1.1 Data Collection Technique		
Interview	34	62.96
Note	13	24.07
Documental	07	12.96
Focus group	04	7.40
Field journal	02	3.70
Conversation Yarning Circles	01	1.85
Workshops	01	1.85
1.1.2 Data Analysis Technique		
Thematic Content Analysis (Bardin)	12	22.22
Axial, open and selective (Grounded Theory)	07	12.96
Dialectical Hermeneutics (Minayo)	03	5.55
Minimal Maps (Sluzki)	02	3.70
Qualitative Analysis (Creswell)	01	1.85
Propositions and counterpropositions (Yin)	01	1.85
Other interpretative analyzes	08	14.81
2. Theoretical	20	37.03
2.1 Reflective	11	20.37
2.2 Assay	07	12.96
2.3 Review	02	3.70

Table 2 - Frequency and percentage of the appearance of the main thematic areas of the studies according to the descriptors cited - Recife, PE, Brazil, 2019.

Thematic Areas	n	%
Nursing	09	16.66
Child and adolescent health	08	14.81
Health Professional Training	06	11.11
Mental health.	04	7.40
Public health.	04	7.40
Primary Health Care	03	5.55
Women's health	03	5.55
Health Ethics	02	3.70
Nutrition	02	3.70
Quality and lifestyle	02	3.70
Environmental health	02	3.70
Elderly Health	02	3.70
Health Management	01	1.85
Interdisciplinarity	01	1.85
Scientific method	01	1.85
Collective health	01	1.85
Indigenous Health	01	1.85
Emergency medical services	01	1.85
Health Information Technology	01	1.85

Table 3 - Frequency and percentage of Edgar Morin's works on complexity referenced in the studies - Recife, PE, Brazil, 2019.

Papers	n	%
Introduction to complex thinking	23	42.59
Science with conscience	15	27.77
The Well-Made Head: Rethinking Reform, Rethinking Thought	14	25.92
The Seven Knowledges Necessary for the Education of the Future.	14	25.92
Method 1: The Nature of Nature	06	11.11
The Reconnection of Knowledge: the 21st Century Challenge (partnership)	04	7.40
Method 5: Humanity of Humanity	04	7.40
Educating in the Planetary Age: Complex Thinking as a Method of Learning by Human Error and Uncertainty (partnership)	02	3.70
Method 3: Knowledge of Knowledge	02	3.70
Method 4: Ideas, Habitat, Life, Customs, Organization	02	3.70
Method 6: Ethics	02	3.70
The Intelligence of Complexity (partnership)	01	1.85
The Road to Humanity's Future	01	1.85
Love, Poetry, Wisdom	01	1.85
Teaching to Live: Manifest to Change Education	01	1.85
Method 2: The Life of Life	01	1.85
To Leave the Twentieth Century	01	1.85
Global Knowledge and Local Knowledge: The Transdisciplinary Look (partnership)	01	1.85
Homeland (partnership)	01	1.85
A Policy of Civilization (partnership)	01	1.85

Table 4 - Distribution of the concepts, characteristics, principles and articulations of the simplifying paradigm and complexity paradigm encoded in the studies - Recife, PE, Brazil, 2019.

Concepts, characteristics, principles and articulations	n	%	Studies
1. Simplifying Paradigm			
Concept	15	27.77	1, 3, 4, 7, 8, 9, 10, 13, 14, 19, 23, 30, 37, 49 and 50
Characteristics	34	62.96	1, 2, 3, 4, 6, 7, 9, 11, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 28, 30, 32, 33, 34, 36, 37, 38, 40, 41, 47, 48, 49, 50, 51 and 52
2. Complexity Paradigm			
Concept	32	59.25	1, 2, 3, 4, 7, 8, 9, 10, 13, 15, 16, 17, 18, 19, 21, 24, 26, 27, 28, 30, 31, 35, 36, 39, 41, 42, 47, 48, 49, 51, 52 and 53.
Characteristics	33	61.11	1, 2, 3, 4, 5, 6, 7, 8, 13, 17, 18, 19, 10, 21, 22, 23, 24, 26, 28, 31, 36, 37, 40, 42, 43, 44, 46, 47, 48, 49, 51, 52 and 54
3. Principles of Complexity			
Systemic	06	11.11	1, 3, 10, 16, 18 and 24
Holographic	18	33.33	4, 6, 10, 15, 17, 18, 19, 22, 24, 25, 30, 36, 37, 41, 43, 45, 49 and 54
Retroactive	03	5.55	10, 18 and 37
Recursive	16	29.62	4, 10, 15, 17, 18, 22, 24, 30, 36, 37, 41, 43, 45, 48, 49 and 54
Self-eco-organization	07	12.96	5, 7, 9, 10, 17, 18 and 30
Dialogic	26	48.14	4, 10, 12, 14, 15, 16, 18, 20, 22, 24, 25, 28, 29, 30, 36, 37, 38, 41, 43, 45, 49, 50, 51, 52, 53 and 54
Reintroduction of knowledge into all knowledge	02	3.70	10 and 18
4. Joints			
Transdisciplinarity	11	20.37	1, 7, 11, 13, 22, 23, 35, 42, 47, 52 and 54
Order/disorder/organization	10	18.51	1, 4, 7, 20, 22, 30, 37, 40, 51 and 54
Ecological/planetary care	02	3.70	5 and 16

DISCUSSION

The results point to different aspects whose analysis contributes to the understanding of how the referential proposed by Edgar Morin is used in the health field. Brazil is the country with the most frequency of publication of this reference. The CP is believed to have found fertile soil in Latin America because it is an approach that invites criticism and reconnection of thought and action. Complexity contemplates the possibility of joint construction of previously distinct or different elements for a global understanding of the phenomena,[5] applying to the understanding of health as a complex phenomenon in its individual, social and social sphere,[15,16] which may facilitate its use in research conducted in several countries. Research involving the CP has become a category with a large presence in various disciplines in Latin America.[17]

In the formation of the authors of the studies, uniprofessional production prevailed and, in this sense, it is important to reflect that this conformation goes against the CP, which values the performance between different categories, breaking the logic of hyper specialization and centralization of knowledge in disciplines, aiming to enable transdisciplinarity.[9] Facing the most frequent professional category as first author, Nursing stands out and it is inferred that this occurs due to the fact that Nursing, in its National Curriculum Guidelines, highlights the importance of having a professional profile capable of working in a multidisciplinary team, focused on the Unified Health System and that understands the social determination of the health-disease process and, especially, the expanded concept of health.[18]

Regarding the method of studies, stand out theorists who dialogue with the reference of complexity, by reconnecting the theoretical and empirical knowledge, without detriment of the parts.[5] Theoretical studies on health can support future reflections, conducting empirical studies and on different health practices. The empirical studies used the qualitative method and it was observed that, although using different techniques, in 47% of the studies, the triangulation of data collection techniques was not adopted. The importance of this data is reflected in the fact that in CP theory and method are two indispensable components. The method is characterized by the thinking and conscious activity of the subject (researcher), implying the need to look at the object in an articulated manner, avoiding the simplification of data.[8] Thus, the method in research with the theoretical framework of the CP needs to be perfectly in line with this framework, in order to contemplate the diversity of the object of study. This contextualization is reflected in the use of triangulation of various techniques in order to give more reliability to the results, aiming to contemplate the multidimensionality of data.[19-21]

The use of the theoretical framework of the CP took place in several areas of health, which corroborates the conception of the multidimensionality of the themes. The CP aims to bring together, contextualize, globalize and at the same time recognize the singular, the individual and the concrete. It is not limited to a single area, but allows communication, with its usefulness beyond understanding organizational, social and political problems, as well as clarifying the multidimensionality of the human being and the world.[22] Regarding the author's works, it was evident that most studies cited, expressively, four works, namely: "The well-made head: Rethinking Reform, Rethinking Thought", "Science with Conscience", "Introduction to Complex Thinking" and "The Seven Knowledges Necessary for the Education of the Future". The author has a vast bibliography on complexity, and this fact expresses the importance of deepening his works to understand the CP, as this corroborates the quality of production.[3,23]

Most studies used the CP as a theoretical framework, reporting its concepts, characteristics and principles. However, it is essential to emphasize the need for proper and in-depth use of CP by researchers, linking theory to methodology, epistemology, and even ontology.[5] Thus, the theoretical framework allows knowledge, but cannot be considered the absolute solution.[8]

The studies 1, 3, 4, 7, 8, 9, 10, 13, 14, 19, 23, 30, 37, 49 and 50 that brought the concepts of SP dealt with it negative, without showing the scientific advances in the health field throughout the development of science, highlighting it as a limited paradigm regarding the problems that involve health. It is important to remember that advances in various areas promoted under the PS cannot be denied. However, as gaps appeared within each isolated paradigm, openings to other hitherto forbidden domains were made possible, and through which the first connections to new theoretical emergencies operated.[6] Thus, one must consider that all forms of thinking have their value, and that the SP is also necessary, but must be relativized, that is, one can accept the conscious reduction that it produces of phenomena without, however, believing that this reduction is the simple and absolute truth.[5] What the author warns about SP refers to the absolute validity that he himself defends with regard to the simplification of processes, which in reality are complex and inserted in a broad context of connections and reconnections, which is not controlled.[7]

Still on SP, most of the studies cited some type of SP feature (1, 2, 3, 4, 6, 7, 9, 11, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 28, 30, 32, 33, 34, 36, 37, 38, 40, 41, 47, 48, 49, 50, 51 and 52), as a biologicist, centralizer, disarticulated in knowledge, hyperspecialized, fragmenting, mechanistic, mutilating, reductionist and technicist. According to the author, in a focus commanded by disjunction, reduction and fragmentation, PS does not escape the mutilating alternative of trying to explain phenomena in a simplistic way, disregarding all the randomness that interferes with the object, as well as distancing it from the observer/subject.[8] The SP misconception is to choose to conceive of simple objects that obey the general laws, considering any object as a deterministic machine, thus choosing what is controllable and rejecting the uncontrollable, that is, the humanity itself and the existence. Therefore, it considers as error or unscientific everything that does not fit into its simplifying system.[22]

The studies that brought the concepts about CP (studies 1, 2, 3, 4, 7, 8, 9, 10, 13, 15, 16, 17, 18, 19, 21, 24, 26, 27, 28, 30, 31, 35, 36, 39, 41, 42, 47, 48, 49, 51, 52 and 53), described it as an associative way of understanding the world and health relations, which are established in and through it, contemplating the union of different professional areas, knowledge and dimensions and their interdependence. These concepts reflect the author's thinking about the CP, which considers that every network is made up of inseparably associated heterogeneous constituents. Thus, it makes it possible to respect differences, distinguish and unite, as well as to recognize phenomena in a multidimensional form.[5] Complexity assumes that there are no simple phenomena, since the phenomenon is a fabric of relationships.[22]

It was also approached by the studies that, to contemplate complexity, there is a need for a change of thinking, so that the real change of paradigm and conducts can be achieved. However, the problem of complexity is still marginal in scientific, epistemological, and philosophical thinking.[8] Thus, there is the demand for the reform of thought so that there is a context and complex approach, which links and faces uncertainties, replacing linear and unidirectional causality with a causality in a circle and multi-referential, the rigidity of classical logic through dialogue, capable of conceiving both complementary and antagonistic notions.[9] In the health field, especially, there is an urgent need for change in the way we think and produce health to conceive of all human, social and environmental factors involved in the health-disease process.

Some characteristics were identified, such as the articulation of knowledge and areas, integrality, intersectoriality, multidimensionality and context (studies 1, 2, 3, 4, 5, 6, 7, 8, 13, 17, 18, 19, 10, 21, 22, 23, 24, 26, 28, 31, 36, 37, 40, 42, 43, 44, 46, 47, 48, 49, 51, 52 and 54). Unlike what is thought, the CP is not the opposite of SP. It brings together the simplicity and complexity of different areas of knowledge, does not eliminate uncertainty, but links parts to wholeness by prescribing, assembling everything and distinguishing at the same time, above all prioritizing emergencies and interferences as constructive multidimensional phenomena of the object through the mental exercise of creativity.[5,22]

As for the first principle of the CP, the systemic, the studies 1, 3, 10, 16, 18 and 24 approached it by linking society and man, considering them all-time interacting systems, receiving influences and influencing other systems on a continuum. Thus, the systemic idea, which opposes the reductionist idea, is that the whole of the phenomenon is more than the sum of its parts. Thus, if a system is divided into parts, these parts will not make it possible to know the whole, since each of them interacts within itself.[9] This principle shows that health should not be viewed in a fragmented way, as there are different connections that relate to it (individual - society - environment), so it is impossible to understand it by considering each one in isolation, so it is necessary to consider them an inseparable network.

The second holographic principle was evidenced in such a way that the subjects involved in any complex process were part of and contained the whole of the set (studies 4, 6, 10, 15, 17, 18, 19, 22, 24, 25, 30, 36, 37, 41, 43, 45, 49 and 54). This principle is present in the biological and socio-biological world and associates that the smallest unit of a system holds almost all the information of the represented whole. An example is society, which is present in every individual - as a whole - through their language, culture, and norms.[8,9] In health, this makes it possible to understand the importance of valuing each human being involved within a system, in intrinsic relationship with other subsystems, and that health needs, while unique, express the reflection of society and the context in which it's inserted.

The third principle, of retroaction or retroactive circle, has been cited as the disruption of linear causality (studies 10, 18 and 37). This principle allows knowledge of self-regulatory processes, where the cause acts on the effect, and the effect acts on the cause. Thus, regulatory processes are permitted by numerous backslashes.[9] One can reflect a person's health as a set of regulatory processes based on multiple internal (organism of the individual) and external (context) feedback from the perspective of cause and effect. Therefore, a person's state of health/illness is influenced by the negative or positive balance of self-regulation.

On the fourth principle, recursion or recursive circle, studies 4, 10, 15, 17, 18, 22, 24, 30, 36, 37, 41, 43, 45, 48, 49 and 54 expressed that the effects of an event are both causers and producers of the process itself in a cycle. This principle goes beyond the notion of regulation with those of self-production and self-regulation, the effects and products of which are necessary for their own causation and their own production.[8,9] Similarly, in a social system, individuals produce society, which produces individuals.[5] In health, this idea requires looking beyond cause and effect to understand that health/illness is the result of a back and forth movement, in which everything that is produced turns on what is produced in one cycle in which he himself is self-constructing, self-organizing and self-producing.

The fifth principle of self-eco-organization or autonomy/dependence, present in the studies (5, 7, 9, 10, 17, 18 and 30), highlights the ability that organizations/structures/societies have to organize themselves and the necessary autonomy for such an organization depends on their needs in relation to the environment in which they are inserted. This principle applies specifically to human beings, who develop their autonomy in dependence on their culture, and to societies, which develop in dependence on their geological environment. Therefore, living beings are self-organizing beings, which are constantly producing themselves and therefore expending energy to maintain their autonomy, which, at the same time, is inseparable from dependence on the environment.[9] This principle allows us to see the human being as an open system, which establishes a relationship of autonomy-dependence with another open system, the health system. Therefore, the health of the individual will also depend on all health policies, empowerment processes, ability to provide care and seeking information that

the health system allows, influencing the decision making of the person about their health.

The sixth dialogic principle was contextualized in the studies (4, 10, 12, 14, 15, 16, 18, 20, 22, 24, 25, 28, 29, 30, 26, 37, 38, 41, 43, 45, 49, 50, 51, 52, 53 and 54) at the level of ideas, situations, environments or characteristics that, although antagonistic, had interdependence and even mutually exclusive, are complementary. Unlike the dialectic word, which implies contradiction of principles or phenomena, which, through the dialectical method, make the difficulties disappear, the dialogical principle, on the contrary, is the elimination of the difficulty of combat among antagonists, since antagonists are required.[8] This principle allows us to maintain duality in unity, associating two terms, both complementary and antagonistic, rationally assuming the inseparability of contradictory notions to conceive the same phenomenon.[5,9] This principle allows us to observe how the system deals with conflicts, uncertainties and microstructural (individual, health professionals) and macrostructural (organizational structure, public policies, socioeconomic conditions) instabilities. However, this dialogical relationship of system instability/stability is necessary to achieve its organization and, consequently, integral health care.

The seventh principle, the reintroduction of knowledge into all knowledge, was conceptualized as knowledge that can be understood through different forms, situations or people that are involved in it through interactions, and from these knowledge will be constructed and reconstructed (studies 10 and 18). Thus, the observer must be integrated in his observation and conception, that is, the restoration of the subject in the reconstruction of knowledge.[8,9] Brazil is a country with different socioeconomic and cultural characteristics, so it is extremely important to use this principle to consider that, in each region, the health system will be organized in different ways. It is assumed that knowledge of the health situation can be understood in different ways, depending on the situations and people involved and the interaction between them, so knowledge can be constructed and reconstructed.

Edgar Morin also established articulations within the complexity of some themes: ecological/planetary care, order/disorder/organization and transdisciplinary action. Data on transdisciplinarity made this concept explicit by crossing disciplinary boundaries, approaching a fusion and unification point that leads to a holistic perspective, as it is a leap in relation to multi, inter and pluridisciplinarity (studies 1, 7, 11, 13, 22, 23, 35, 42, 47, 52 and 54). Thus, one must consider everything that is contextual to them, including cultural and social conditions, to see in what media they are born, raise problems, become sclerotic and transform themselves. At the same time, one cannot demolish what the disciplines created. It must be open and closed at the same time.[9] Thus, transdisciplinarity is rises to enable cognitive schemes that can cross disciplines, sometimes with such virulence that leave them in a trance.[9] From a transdisciplinary perspective, the work of professionals from different areas working in health should be permeated by teamwork based on the recognition of the competences of its components. In addition, there is a need for cooperation to solve the health problems of the population, with an articulation between the areas of knowledge to perform health care. In this approach, we discuss the importance of collaborative and interprofessional practices in health education and practice, with a view to meeting local health needs.[24,25]

Regarding the order/disorder/organization theme, the studies 1, 4, 7, 20, 22, 30, 37, 40, 51 and 54 highlighted this concept by mentioning that the universe is the result of the phenomena of order and disorder in search of systemic self-organization. It is noteworthy that the complexity of the relationship of this triad arises, therefore, when it appears that disordered phenomena are necessary, in certain cases, for the production of organized phenomena, which contribute to the growth of order; thus, organizations need order and disorder.[5] Thus, with the need to think together, in their complementarity, their competition, and their antagonism, the notions of order and disorder have raised precisely the question of thinking about the complexity of physical, biological, and human reality.[8] In the field of health, this principle materializes at different levels: in the individual field, as a living organism, in its relations with the environment, or in its relations with the health system, countless phenomena of order and disorder interact with each other reach a certain balance, with a view to a health organization.

Finally, regarding ecological/planetary care, studies 5 and 16 focused on the importance of human understanding the ecosystem complexity of the universe, protecting and caring, as this would also ensure the future of humanity. For the author, the notion of ecosystem means the set of interactions between living populations within a given geophysical unit, constituting a complex unit of an organizing character,[9] therefore, nature and humanity coexist in complex interactions, and the way they occur will impact on the future of the planet and, consequently, on the survival of humanity. It is understood that humanity and the environment coexist in complex interactions, since the way they occur, affects the health issues of the population through the imbalances in this binomial, as well as the conditioning and determining factors in health that have intrinsic relationship with the environment. This look at ecological and planetary care supports the theme of global health, underlining the importance of the health approach being more comprehensive and centered on people and environments.[26,27]

CONCLUSION

This review made it possible to know the current state of the art on the subject, being the articles mostly analyzed in Brazil, in which most researchers used at least some concept of the paradigm of complexity in empirical studies, conducted by the qualitative method, especially with researchers in the professional nursing category.

In general, although generally mentioned, it was observed still a light use of the complexity paradigm in health research, so that research using this framework needs further study, as the theoretical framework of complexity encourages substantial reflections regarding with understanding health as a complex phenomenon, perceiving it as a network formed by various social actors, which interact with each other and with the environment.

The study limitations include the non-inclusion of articles in the French language, the author's native language, by a translation barrier of the authors, as well as articles in other languages; In addition, the focus given to the objective of the study, in line with the methodological design, did not include other specific analyzes, which become a suggestion for future studies, with other methodological features, such as which phenomena are being studied in health in light complexity and how the reference has helped in its understanding.

Therefore, the complexity paradigm is perceived as a very promising theoretical framework to subsidize research in health area, since understanding how this framework is used in research allows us to reflect that there is a need for theoretical improvement for its use, as well as its principles can be contextualized in the training of health professionals to produce multidimensional practices that address the real needs of individuals, families and communities.

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AUTHORS' CONTRIBUTIONS

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ASSOCIATED EDITOR

Marta Sauthier

REFERENCES

1. Tesser CD, Poli No P. Atenção especializada ambulatorial no Sistema Único de Saúde: para superar um vazio. Cien Saude Colet. 2017;22(3):941-51. http://dx.doi.org/10.1590/1413-81232017223.18842016.
2. Organização Mundial de Saúde. Conferência mundial sobre determinantes sociais da saúde: diminuindo diferenças: a prática das políticas sobre determinantes sociais da saúde. Rio de Janeiro: Organização Mundial de Saúde; 2011.
3. Thompson DS, Fazio X, Kustra E, Patrick L, Stanley D. Scoping review of complexity theory in health services research. BMC Health Serv Res. 2016;16(87):1-16. http://dx.doi.org/10.1186/s12913-016-1343-4. PMid:26968157.
4. Kuhn TS. The structure of scientific revolutions. In: Neurath O, International Encyclopedia of Unified Science. Chicago: The University of Chicago; 1962.
5. Morin E. Introdução ao pensamento complexo. 5. ed. Porto Alegre: Sulina; 2015.
6. Morin E. O Paradigma Perdido: a natureza humana. 6. ed. Lisboa: Publicações Europa-América; 2000.
7. Morin E. A religação dos saberes: o desafio do século XXI. 3. ed. Rio de Janeiro: Bertrand Brasil; 2002.
8. Morin E. Ciência com consciência. 16. ed. Rio de Janeiro: Bertrand Brasil; 2014.
9. Morin E. A cabeça bem-feita: repensar a reforma, reformar o pensamento. 22. ed. Rio de Janeiro: Bertrand Brasil; 2015.
10. Arksey H, O'malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005;8(1):19-32. http://dx.doi.org/10.1080/1364557032000119616.
11. Levac D, Colquhoun H, O'brien KK. Scoping studies: advancing the methodology. Implement Sci. 2010;5(69):1-9. PMid:20854677.
12. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467-73. http://dx.doi.org/10.7326/M18-0850. PMid:30178033.
13. Peters MDJ, Godfrey CM, McInerney P, Soares CB, Khalil H, Parker D. The Joanna Briggs Institute reviewers' manual 2015: methodology for JBI scoping reviews [Internet]. Adelaide: JBI; 2015 [citado 2019 maio 20]. Disponível em: http://joannabriggs.org/assets/docs/sumari/Reviewers-Manual_Methodology-for-JBI-Scoping-Reviews_2015_v2.pdf
14. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. J Clin Epidemiol. 2009;62(10):1006-12. PMid:19631508.
15. Arruda C, Lopes SGR, Koerich MHAL, Winck DR, Meirelles BHS, Mello ALSF. Redes de atenção à saúde sob a luz da teoria da complexidade. Esc Anna Nery [Internet]. 2015 mar; [citado 2019 julho 23];63:93-127. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452015000100169&lng=en
16. Copelli FHDS, Oliveira RJTD, Oliveira CMSD, Meirelles BHS, Melo ALSFD, Magalhães ALP. O pensamento complexo e suas repercussões na gestão em enfermagem e saúde. Aquichan. 2016 Oct;16(4):501-12. http://dx.doi.org/10.5294/aqui.2016.16.4.8.
17. Gallegos M. Una cartografía de las ideas de la complejidad en América Latina: la difusión de Edgar Morin. Latinoamérica. 2016;63:93-128. http://dx.doi.org/10.1016/j.larev.2016.11.006.
18. Resolução CNE/CES nº 3, de 7 de novembro de 2001 (BR). Institui Diretrizes Curriculares Nacionais do Curso de Graduação em Enfermagem. Diário Oficial da União [periódico na internet], Brasília (DF), 9 nov 2001: 3915-24 [citado 12 junho 2019]. Disponível em: http://portal.mec.gov.br/cne/arquivos/pdf/CES03.pdf
19. Rangel CN, Nunn R, Dysarz F, Silva E, Fonseca AB. Taching and learning about food and nutrition through science education in Brazilian schools: an intersection of knowledge. Cien Saude Colet. 2014 Sep;19(9):3915-24. http://dx.doi.org/10.1590/1413-81232014199.12552013.
20. Salci MA, Meirelles BHS, Silva DMGV. Primary care for diabetes mellitus patients from the perspective of the care model for chronic conditions. Rev Lat Am Enfermagem. 2017;25:e2882. http://dx.doi.org/10.1590/1518-8345.1474.2882. PMid:28301037.
21. Carlos DM, Silva LMP, Beserra MA, Aragão AS, Gregory A, Ferriani MDGC. Social support network of family members of abused children and adolescents: perspectives and possibilities. J Clin Nurs. 2019 mar;28(5-6):814-27. PMid:30184282.

22. Morin E, Le Moigne JL. A inteligência da complexidade. São Paulo: Petrópolis; 2000.
23. Galvão TF, Silva MT, Garcia LP. Ferramentas para melhorar a qualidade e a transparência dos relatos de pesquisa em saúde: guias de redação científica. Epidemiol Serv Saude. 2016 jun;25(2):427-36. PMid:27869961.
24. Casanova IA, Batista NA, Moreno LR. A Educação Interprofissional e a prática compartilhada em programas de residência multiprofissional em Saúde. Interface. 2018;22(Suppl 1):1325-37. http://dx.doi.org/10.1590/1807-57622017.0186.
25. Barros NF, Spadacio C, Costa MV. Trabalho interprofissional e as práticas integrativas e complementares no contexto da Atenção Primária à Saúde: potenciais e desafios. Saúde Debate. 2018 Sep;42(1):163-73. http://dx.doi.org/10.1590/0103-11042018s111.
26. Biehl J, Petryna P. Peopling global health. Saude Soc. 2014 jun;23(2):376-89. http://dx.doi.org/10.1590/S0104-12902014000200003.
27. Fortes PAC, Ribeiro H. Saúde Global em tempos de globalização. Saude Soc. 2014 jun;23(2):366-75. http://dx.doi.org/10.1590/S0104-12902014000200002.