Quality of life and cognition in elderly: A systematic review

Qualidade de vida e cognição em idosos: uma revisão sistemática

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Abstract

Population aging is a progressive phenomenon and it is currently a great challenge. The aim of this Systematic Review study was to present/a research panorama on the relationship between quality of life and cognition in the elderly. We used the Medical Literature Analysis and Retrieval System Online databases, and the Latin American and Caribbean Literature in Health Sciences and the Scientific Electronic Library Online. The NodeXL software was used for keyword analysis. Fourteen articles met the eligibility criteria and were categorized. Most of the studies were conducted and published in Brazil. The mini-mental state exam was the most widely used research instrument in the studies and the term 'quality of life' occurred more frequently and had more connections in the network. The research provides information on the existing studies and contributes to actions that involve care in the area of Gerontology.

Keywords: Cognition; Elderly; Literature review; Quality of life.

Resumo

O envelhecimento populacional é um fenômeno progressivo e constitui um desafio atual. Este estudo de Revisão Sistemática objetivou construir um panorama de pesquisas sobre a relação entre qualidade de vida e cognição em idosos. Foram utilizadas as bases de dados Medical Literature Analysis and Retrieval System Online, *Literatura Latino-Americana e do*

Caribe em Ciências da Saúde e Scientific Electronic Library Online. *Foi utilizado o* software NodeXL *para a análise da rede das palavras-chave. Catorze artigos obtidos atenderam aos critérios de elegibilidade e foram categorizados. A maioria dos estudos foram realizados e publicados no Brasil. O Miniexame do Estado Mental foi o instrumento de pesquisa mais utilizado nos estudos e o termo qualidade de vida teve maior ocorrência e conexões na rede. A pesquisa proporcionou o conhecimento dos estudos existentes e que contribua para ações que envolvem cuidado na área da Gerontologia.*

Palavras-chave: *Cognição; Idoso; Revisão de literatura; Qualidade de vida.*

World population aging is an indisputable fact and it is currently a challenge. The aging process in the coming decades will be particularly accelerated in developing countries such as Brazil. Most countries have been facing or have faced a period of demographic transition characterized by a shift from high rates of mortality and fertility to significant low ones. Population aging is a direct consequence of the proportional reduction of young people and increase in life expectancy caused by these demographic transformations, which causes an inversion of the relationship between young and old (Miranda, Mendes, & Silva, 2016; Saad, 2016).

The *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics) states that the current Brazilian aging process is characterized by increased longevity. Life expectancy of Brazilians is around 76 years and, as people are living longer, the number of elderly people is progressively increasing. Currently, there are 28 million elderly people in the country, which represents 13.4% of the total population. A projection for the year 2060 reports that there will be 58.4 million senior citizens, totaling 26.7% of the population. Thus, life expectancy in 2060 will be 81.2 years, that is, 78 years for men and 84.2 years for women.

In view of this demographic context, the need to understand Quality of Life (QoL) is important and directly related to the aging process. The concept of and the approaches to QoL have been widely discussed over the years in national and international studies. The literature points to the great social and scientific relevance of QoL due to its different individual meanings but, despite intense debates on the subject, its definition has not yet been established (Luz, Sampaio, Barros, & Santana, 2016; Pereira, Texeira, & Santos, 2012).

The most relevant concepts on quality of life seek to account for the multiplicity of dimensions discussed in the so-called general or holistic approaches. According to the definition of the concept by the *Organización Mundial de la Salud* (1998), QoL references the individuals' perception of satisfaction or denied opportunities to achieve happiness and self-realization, regardless of their state of physical health or social and economic conditions.

In this regard, some modifications that come with the aging process may interfere in the QoL. One of the main changes that elderlies experience is their functional capacity, which is defined as the ability to perform necessary daily tasks independently and autonomously (Chaves et al., 2017; Lopes & Santos, 2015). One of the domains that influences functional capacity is cognition, which undergoes natural changes related to the physiological process of aging (senescence), but it may also be associated with pathophysiological processes, due to a significant decrease in cognitive functions in the aging process (senility), for example, that is characterized by recent memory loss or recall difficulties in mild to severe dementia, which directly impact QoL (Ferreira, Pinho, Pereira, & Ferreira, 2014).

In this sense, in view of the rapid increase in population aging and real challenges to society, QoL and cognitive functions of those who experience the transition must be better understood as they are a concern for society. Therefore, the aim of this systematic review of the literature was to present a research panorama of the relationship between QoL and cognition of the elderly. Thus, the research was based on the assumption that it is important to know what the national and international literature has been producing and discussing on the subject, understand the networks of the keywords identified in the articles, point out

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the specificities of these investigations and what they have in common as well as identifying possible gaps for future research.

Method

The present literature review used the Medical Literature Analysis and Retrieval System Online (MedLine), Latin American and Caribbean Literature in Health Sciences (Lilacs) and Scientific Electronic Library Online (SciELO) databases. The publications were limited to English and Portuguese papers published from January 2008 to June 2018. To determine the descriptors for the study, the structured and trilingual vocabulary Descriptors in Health Sciences (DeCS), developed by the Latin American and Caribbean Health Sciences Information Center (BIREME), were as follows: "elderly", "elderlies", "elderly person", "elderly people", "elderly population", "centenarians", "nonagenarians", "octogenarians", "old-aged", "senior citizens aged 80 years or older", "seniors aged 80 years or older", "aged 80 years or older", "quality of life", "health-related quality of life", "cognition", "cognitive aging".

The search strategy used the following boolean descriptors: (elderly OR elderlies OR elderly person OR elderly people OR elderly population OR centenarians OR nonagenarians OR octogenarians OR old-aged OR senior citizens aged 80 years or older OR seniors aged 80 years or older OR aged 80 years or older AND (quality of life OR health-related quality of life) AND (cognition OR cognitive aging); and (aged OR aged 80 years or older) AND (quality of life) AND (cognition OR cognitive aging).

The inclusion criteria were as follows: original empirical article in Portuguese or English using an exclusively elderly sample; contain 'quality of life' and 'cognition' and/or equivalent terms in the title and/or general objective of the research; publishing date from January 2008 to June 2018; full article and available for free in full text; and peer reviewed. Articles related to the development and/or validation of instruments; systematic reviews of the literature, reviews, trials, literature reviews and experience reports; repeated articles; studies that did not explicitly state the stages of development of the participants and/or those that did not define the subjects' ages were excluded.

In order to select articles, two reviewers independently evaluated the articles and excluded those that did not meet the eligibility criteria and selected those that could be included. Disagreement between the reviewers was resolved by consulting a third reviewer.

In this study, we decided to follow the 7 steps proposed by the Cochrane Collaboration, which is internationally recognized for its methodological rigor in planning and conducting systematic review of the literature: (1) Defining the review question/problem; (2) Searching for and selecting studies in databases; (3) Critically evaluating studies; (4) Collecting data in the articles; (5) Analyzing and presenting data; (6) Interpreting data; and, (7) Improving and updating the review (Bento, 2014; Galvão & Pereira, 2014; Higgins & Green, 2011).The criteria of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prisma) were also used as reference. To analyze the selected articles, an instrument based on Population, Exposition/intervention, Control and Outcome Domains (PECO) was developed (Moher, Liberati, Tetzlaff, Altman, & Prisma Group, 2009).

For the keyword network analysis of the articles included in the research, we used the NodeXL tool, version 1.0.1.251, which is an open-source template for Microsoft Excel 2007, 2010 and 2013, that has a graphical user interface. NodeXL is used to investigate the behavior and structure of different types of network and to develop graph theory, social network analysis, and complex network theory. The nodes, or pairs of vertices, in the structure are words selected by their intrinsic meanings; the relationship, or edges, occur among all the keywords. Each vertex is a representation of an entity in the network and each edge connecting two vertices is a representation of a relationship that exists between them (Fadigas, Henrique, Senna, Moret, & Pereira, 2009).

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For the current study, the data were analyzed and metric calculations were found to highlight two measures of centrality: closeness centrality, which is the distance from one node to all the others in the network; and betweenness centrality that interconnects all nodes who have larger or relevant connections (Borba, 2013; Newman, 2005).

Results

This review identified 512 articles in the databases, as follows: 109 articles in SciELO, 4 articles in MedLine, and 399 articles in Lilacs. After excluding 138 duplicate articles, 374 were selected and the titles and abstracts were read. Of these articles, 357 articles were excluded for the following reasons: the research samples were not exclusively composed of elderly aged 60 years; did not contain the terms 'quality of life' and 'cognition' and/or equivalent terms in the title and/or general objective of the research; were not available in full text; or they were systematic reviews of the literature, reviews, trials, literature reviews or experience reports. At the end, 17 articles were read in full and only 14 studies met all the inclusion criteria (Figure 1).

Among the studies included, 21% were published in the *Revista Brasileira de Geriatria e Gerontologia* (Brazilian Journal of Geriatrics and Gerontology) and 14% were published in the journal *Estudos de Psicologia* (*Campinas*) (Psychology Studies); only one article was published in other the journals; 36% of the research were published in 2012, 21% in 2014, 14% in 2011, and only one article was published in 2010, 2013,
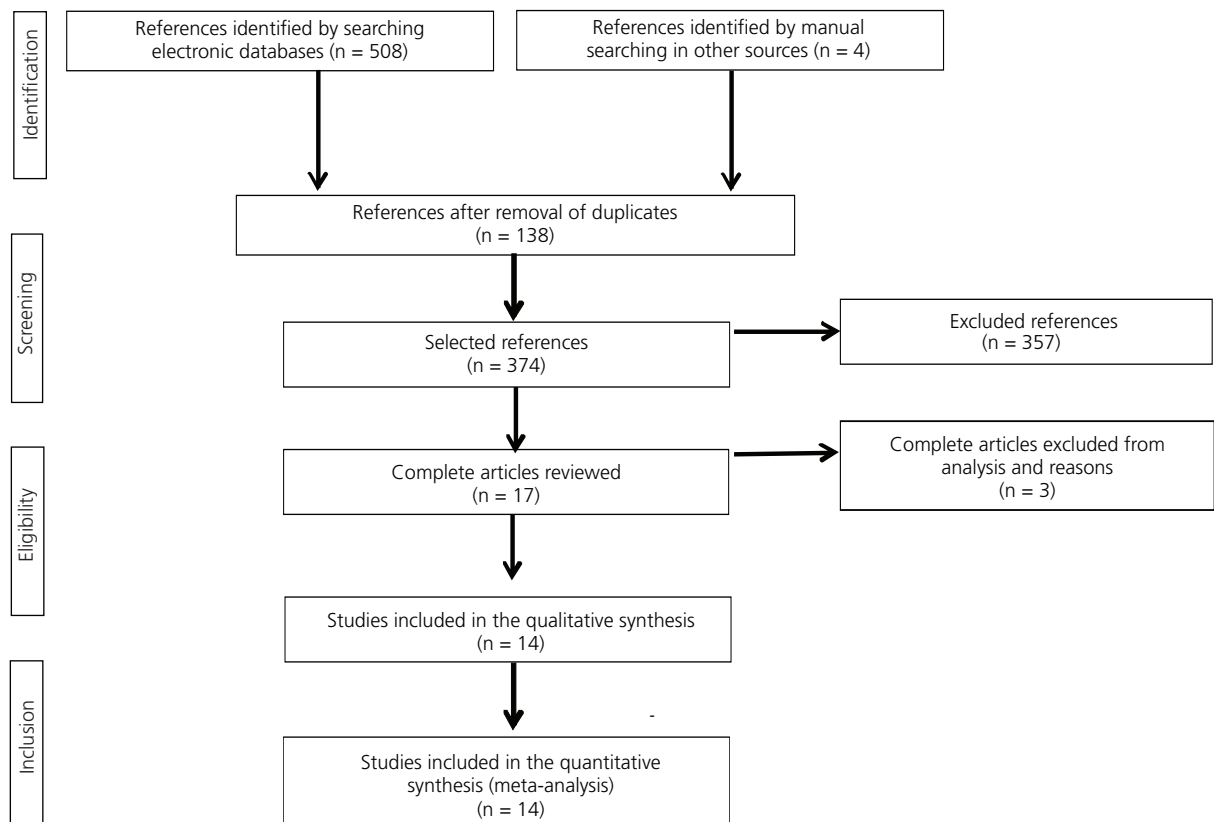
Figure 1. Flowchart of data inclusion and exclusion. *Belém* (PA), 2018.

2015 and 2017; 71% of the studies were conducted in Brazil, followed by 7% in Argentina, Australia, Canada and the Middle East. A total of 29% of the studies contained the term 'quality of life' and 'cognition' in the title and/or general objective of the research, however the term WHOQoL Bref was included in the term quality of life; and the terms deficit, decline, problems, symptoms, level, training and cognitive speed, and reminiscence were all included in the term cognition. The sample size in each study ranged from 21 to 135 participants with a mean of 72.8 and standard deviation of 38.1. Regarding the research instruments, 71% of the studies mentioned using the Mini-Mental State Examination (MMSE), 64% used the Geriatric Depression Scale (GDS), 50% used sociodemographic and/or clinical instruments, and 43% used the World Health Organization's Quality of Life Scale Abbreviated Version (WHOQOL-BREF) (Table 1).

As for the result of the analysis of the data using NodeXL, after the collection of keywords from each article, the pairs of descriptors were matched. Some of the descriptors were considered a single term to group words with the same semantic value. The term 'cognitive decline' was used to include the terms 'cognitive impairment', 'mild cognitive impairment' and 'cognitive decline'. The acronyms DHA and EPA were written in full (Docosahexaenoic Acid and Eicosapentaenoic Acid, respectively). In all, a total of 39 keywords and 127 word-pair combinations were found.

Table 1
Summary of studies selected for review. Belém *(PA), 2018*

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Author	Journal	Year	Place of research	Number of participants	Objectives	Research instruments used
Azcurra	Revista Brasileira de Psiquiatria	2012	Rosário, Santa Fé, Argentina;	135	To researcha specific program ofreminiscence is associated with higher levels of quality of life in dementia residents in long-term care.	SES; SRQoL.
Silveira et al.	Estudos de Psicologia	2017	Passo Fundo, Rio Grande do Sul, Brasil;	120	To analyze the quality of life and verify the prevalence of cognitive decline, anxiety, and depressive symptoms of participants incommunity groups.	QSDC; GDS; BAI; WHOQOL-BREF; ACE-R.
Chaves et al.	Revista Brasileira de Geriatria e Gerontologia	2015	São Luís, Maranhão, Brasil;	125	To analyze the association between cognitive decline and the quality of life of hypertensiveelderly patients.	MMSE; SF-36.
Blay et al.	Cadernos de Saúde Pública	2011	São Paulo, São Paulo, Brasil;	90	To investigate the impact of psychiatric morbidity, depression, cognitive deficit, number of self-reported diseases and sociodemographic variables in the WHOQOL Bref domain scores.	WHOQOL-BREF; SRQ; BDI; MSQ; QSDC.
Langlois et al.	Psychological Sciencesand Social Sciences	2012	Montreal, Quebec, Canadá;	83	To assess the effects of physical training on cognition and quality of life in the most frail and non-frail elderly persons.	QSDC; MMSE; GDS; RPE.
Irigaray	Psicologia: Reflexão e Crítica	2010	Porto Alegre, Rio Grande do Sul, Brasil;	76	To investigate the effects of cognitive training on the quality of life and psychological well-being of the elderly.	QSDC; MMSE; GDS; BAI; NEUPSILIN; WHOQOL-BREF; EDEP.

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Table 1
Summary of studies selected for review. Belém *(PA), 2018*

| Author	Journal	Year	Place of research	Number of participants	Objectives	Research instruments used
Viola et al.	Clinical Science	2011	São Paulo, São Paulo, Brasil;	41	To evaluate the effects of a multidisciplinary rehabilitation program on cognition, quality of life and neuropsychiatric symptoms in patients with mild Alzheimer's disease.	MMSE; SKT; NPI; QoL-AD; GDS.
Caramelli et al.	Arquivos de Neuro-psiquiatria	2014	Minas Gerais, Rio de Janeiro, Rio Grande do Sul e São Paulo – Brasil;	21	To compare galantamine and nimodipine vs. galantamine alone in cognitive speed and quality of life measures in patients with mixed dementia.	CNTB; QoL-AD; ADAS-Cog; CGI-I; NPI; MMSE.
Sinn et al.	British Journal of Nutrition	2012	Adelaide, Austrália Meridional e Brisbane, Queensland – Australia;	50	To investigate the benefits of diet supplementation withfish oil rich in EPA and DHA, or control (safflower oil - LA) for depressive symptoms, quality of life and cognition in elderly with CCL.	MMSE; VPA; GDS.
Santos et al.	Dementia & Neuropsychologia	2014	São Carlos, São Paulo, Brasil;	23	To assess the relationship of sociodemographic factors, depressive symptoms, and cognitive factors in the quality of life of elderly persons attending education programs for adults in the city of São Carlos-SP.	MMSE; GDS; WHOQOL-BREF; WHOQOL-old; QSDC.
Karni et al.	Occupational Therapy International	2013	Jerusalém, Israel, Oriente Médio;	60	To identify the impact of cognitive problems on the participation and quality of life of elderly women after hip fracture.	FIM; GDS; QSDC; SF-12.
Leite et al.	Revista Brasileira de Geriatria e Geron-tologia	2012	Palmeira das Missões, Rio Grande do Sul, Brasil;	85	To assess the quality of life and cognitive levelof elderly participants of senior groups in a city of Rio Grande do Sul, Brazil.	QSDC; MMSE; SF-36.
Beckert et al.	Estudos de Psicologia	2012	Porto Alegre, Rio Grande do Sul, Brasil;	88	To investigate the association between quality of life, cognition and performance in executive functions of the elderly.	QSDC; MMSE; GDS; BAI; NEUPSILIN; WCST; WHOQOL-BREF.
Rocha et al.	Revista Brasileira de Geriatria e Geron-tologia	2014	Passo Fundo, Rio Grande do Sul, Brasil.	23	To identify possible changes in the quality of life, cognition and depression arising from gerontological education workshops mediated by a radio-post in long-term care institutions for the elderly.	WHOQOL-BREF; WHOQOL-old; EQVF; GDS; MMSE.

Note: SES: Social Commitment Scale; SRQoL: Self-reported Quality of Life Scale; QSDC: Socio-demographic and/or Clinical Questionnaire; GDS: Geriatric Depression Scale; BAI: Beck Anxiety Inventory; WHOQOL-BREF: World Health Organization's Quality of Life abbreviated version; ACE-R: Addenbrooke Cognitive Exam - Revised; MMSE: Mini-Mental State Examination; SF-36: 36-item short form Health Survey; SRQ: Self-Report Questionnaire; BDI: Beck Depression Inventory; MSQ: Mental Status Questionnaire; RPE: Borg ratings of Perceived Exertion Scale; NEUPSILIN: Brief Neuropsychological Assessment Instrument; EDEP: Personal Development Scale; SKT: short brief Cognitive Performance Test; NPI: Neuropsychiatric Inventory; QoL-AD: Quality of Life Scale in Alzheimer's Disease; ADAS-Cog: Alzheimer's Disease Assessment Scale-Cognitive Subscale; CGI-I: Clinical Global Impression of Improvement; VPA: Verbal Paired Associates test; WHOQOL-old: World Health Organization Quality of Life for the elderly; FIM: Measure of Functional Independence; SF-12: 12-item short form Health Survey; WCST: Wisconsin Card Sorting Test; EQVF: Flanagan Quality of Life Scale.

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Table 2 shows the classification and occurrence of keywords. The term 'quality of life'was more frequent and had more connections in network (25), followed by the descriptors depression (14), cognition (13), aging (13), cognitive decline (10), dementia (9), Alzheimer's disease (7) and elderly (6).

Figure 2 is a multigraph representing the associations among the 39 different keywords that were identified in the articles regarding the relationship between quality of life and cognition in the elderly. Each point (vertex) represents a keyword and each line (edge) represents the links between the keywords, that is, it indicates the frequency between a pair of keywords in the articles. No isolated terms were found, since all words are connected to others.

Table 2
Classification and occurrence of keywords

Classification	Occurrence	Keywords (total 39)
1	25	Quality of Life
2	14	Depression
3	13	Cognition / aging
4	10	Cognitive decline
5	9	Dementia
6	7	Alzheimer's disease
7	6	Elderly

Created with NodeXL (http://nodexl.codeplex.com)
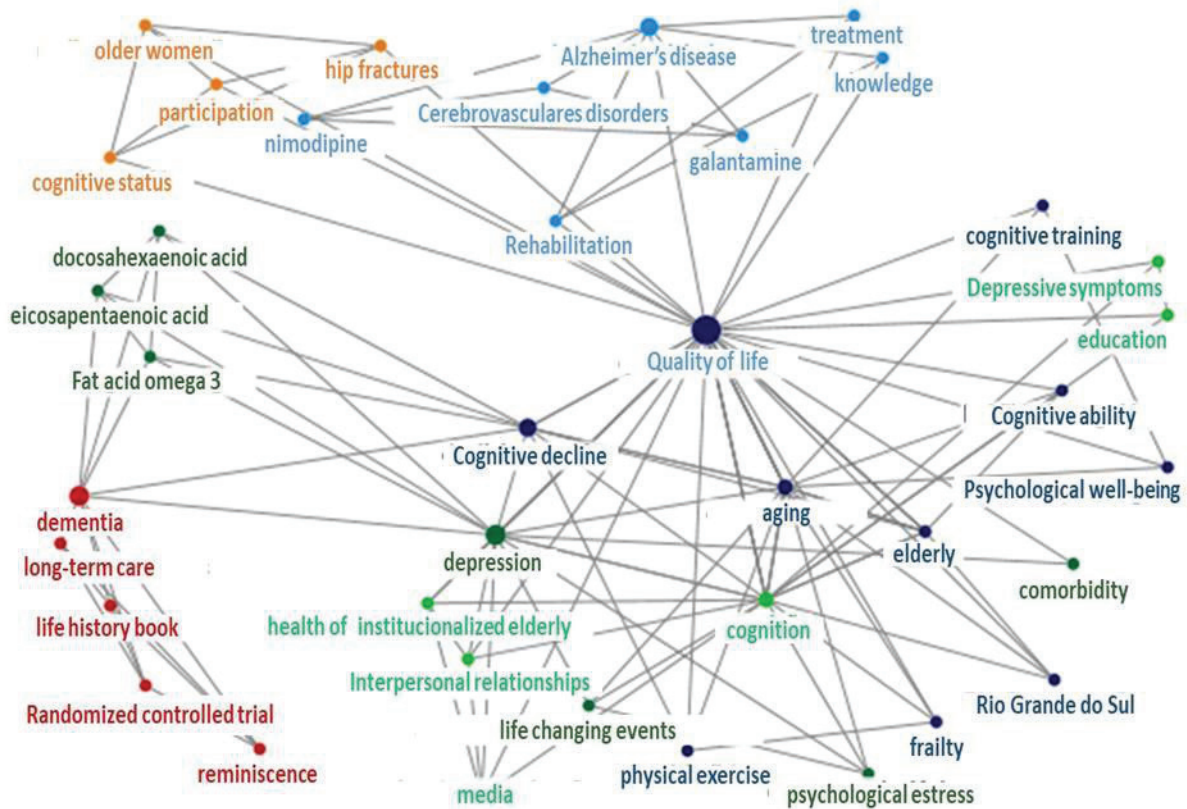
Figure 2. Network of keywords in the articles. *Belém* (PA), 2018.

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The multigraph presented six groups represented by their most important terms, highlighted by color. Regarding the closeness of the elements that compose the graph, those that showed a greater degree betweenness centrality were quality of life (412.400), depression (154.400) and dementia (136); these terms are the ones with most connections between the groups. As for closeness centrality, quality of life (0.018) and depression (0.015) have a greater capacity for interaction with the keywords (Figure 2).

Discussion

As previously discussed in the results of the present review, although the search in the databases took place nationally and internationally, ten studies were conducted in Brazil and the journals with the largest number of publications were Brazilian. Brazilian science has significantly increased in both quantitative and qualitative terms. This increase in the number of publications is the result of long-term efforts to systematize and internationalize the country's scientific activity, such as the intense participation of graduate programs (Almeida & Guimarães, 2013; Santin, Vanz, & Stumpf, 2016).

The goal of the last few years was not to increase the number of articles, but rather their quality. Although the Brazilian scientific production has grown above the world average in recent years, particularly in the 1990s, the country's participation in international scientific production increased from 1.0% to 2.5% in 2013. However, the number of citations of Brazilian articles in the international literature remained stable, confirming the findings of current research that has shown increase as of 2011 (Barata, 2015).

As for cognition, several terms were considered as synonyms in the research findings. This may be explained due to the complexity of cognition in human learning as a result of multiple functions, capacities, faculties or interconnected cognitive abilities of reception, integration, planning, execution or expression of information. Cognition, mental process and execution are part of the most imperceptible and higher faculties of the human being, and it is impossible to separate the function of the nervous system from natural, simple and non-verbal learning and cultural, complex and verbal learning (Fonseca, 2014).

Regarding the research samples, the mean number of participants was 72.8 with a standard deviation of 38.1. Miot (2011) argues that clinical-epidemiological or experimental studies describe phenomena or compare the behavior of variables in subgroups of a population. Therefore, there is no need to study the whole population, since a representative sample of the population suffices to make inferences of the target population. Biostatistical tests suggest that the sample surveyed is probabilistically represented in the population.

The most cited research instruments in the articles were MMSE, GDS, sociodemographic and/or clinical instruments and WHOQOL-BREF. These data do not differ from what was observed in the current literature, since many studies use the same instruments in geriatric assessments (Anacleto, Aquino, & Rebustini, 2017; Araújo et al., 2017; Bourscheid, Mothes, & Irigaray, 2016; Rodrigues et al., 2017; Santos et al., 2017; Silveira & Portuguez, 2017).

A systematic review of the literature conducted by Brigola et al. (2015), which aimed to analyze the relationship between cognition and frailty in the elderly, used the databases Lilacs, Scopus, SciELO, PsycINFO, PubMed and Web of Science to select 19 studies and found that the cross-sectional and longitudinal studies included the Mini-Mental State Examination in their cognitive assessment, with the exception of two studies. These data corroborate the finding of the present study that the MMSE was the most common research instrument to assess the cognitive aspect.

Cheung et al. (2015) criticized the use of MMSE in longitudinal studies. They pointed out that the assessment of cognitive status and changes over time in the elderly were imprecise when the age-related

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normative values of the assessment were considered. They further argue that population-based normative data on changes in the assessment scores over time were scarce because they did not include specific norms forage and education.

In the findings of the current research, the term quality of life was the one with the highest number of links in the keyword network. The literature shows great social and scientific relevance of QoLand the most precise explanation is that QoL has subjective meanings due to multidimensional differences of the term and science should consider it from different perspectives. The theoretical-methodological efforts have contributed to the explanation and relative development of the concept, mainly the application of knowledge to improve the quality of life of the population (Pereira et al., 2012; Seidl & Zannon, 2004).

According to this systematic review of the literature and the methodologically selected databases, it may be concluded that cognition is associated with quality of life, particularly when it is related to cognitive dysfunctions in the elderly. However, QoL has different subjective dimensions and it is important to specify the relationship between this term and its cultural meanings in future research.

This review identified a significant number of Brazilian studies, confirming the accomplishment of publications in this geographical area. However, a lack of studies on the subject limited the discussion of the results. In this regard, the present results indicate the need for further research on the relationship between quality of life and cognition in the aging process, and we expect that this study may help the development, evaluation and discussion of actions that require attention and care in the area of Gerontology.

Contributors

All authors contributed to the study design, analysis and interpretation of the data, review and approval of the final version of the article.

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