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WORKING MEMORY IN ALZHEIMER DISEASE: A 5-YEAR SYSTEMATIC REVIEW OF EMPIRICAL EVIDENCES FROM BADDELEY'S WORKING MEMORY MODEL

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ABSTRACT

The Alzheimer's disease is the most common of the neurogenerative conditions associated with dementia. It is known as a pathological frame that comes with several impairments in cognitive and psychological processes. This study aimed to understand the relationship between Alzheimer's disease and Working Memory impairments. We adopted Baddeley's Working Memory Model to systematically review if impairments in the subcomponents of this theoretical model – phonological loop, visual sketchpad, episodic buffer and central executive – follow distinct or similar paths. The systematic review consulted Medline, Psycinfo and Scielo databases. From 329 articles, only 11 were accepted by the established criteria. Results suggested that episodic buffer and central executive, respectively, decline with AD severity. Phonological loop and visual sketchpad are the last of the Baddeley's Working Memory Model subcomponents impaired.

Kewords: Alzheimer Disease. Working Memory. Dementia. Systematic Review.

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1 INTRODUCTION

The Alzheimer's disease (AD) is a neurodegenerative condition related to abnormal aging from the dementia family. The main characteristic of the AD is the appearance of neurofibrillary tangles and plaques interfering normal neuronal action potential in the brain (LAMBERT; KINSLEY, 2006). Several researchers dedicate their careers to understand this pathology since its impacts are relevant in all aging people worldwide. The prevalence of this disease presents world rates of 0.9%, 4.2%, and 14.7% at ages 65, 75, and 85 years, respectively. In the future, giving the increase rating of AD prevalence, it is expected to have almost 106.2 million people with AD in the year 2050 (BROOKMEYER *et al.*, 2007).

Clinical evidence of memory loss of recent events in early stages of AD is the most common symptom and brings consequences to daily activities. In advanced stages, the AD patient can show impairments in other cognitive functions such as language, executive functioning, visuospatial tasks and other long-term memory losses (TEIXEIRA; CARAMELLI, 2008).

Regarding the working memory, it presents a decrease of functioning in normal aging people (YOKOTA *et al.*, 2001). Nonetheless, several evidences also point out impairments in working memory in AD when compared to normal aging controls (BADDELEY *et al.*, 2001). Despite of those findings, if this working memory impairment in AD is general or if there is a specific decrease in one of the WM subcomponent's functioning, the scientific literature still to discover. In this study, our goal is to review the last 5 years of experimental researches using AD and normal control to compare groups in working memory tasks. We will try to have a glimpse in which of Baddeley's working memory model subcomponents resides the impairment or if the loss is on overall WM.

2 THE WORKING MEMORY

The working memory (WM) is one of the most studied psychological constructs for the past five years. For example, in PubMed, the term "working memory" was used as keyword in 1,140 studies produced in 2008 against 1,843 studies published until December 2012 – an increment in

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academic production of 61,7%. More and more attention have been given by the scientific literature to WM since 1974 when A. Baddeley and G. Hicth proposed a model to explain the ability of retain information for a short period of time and process this novel information giving a satisfactory answer. This system design allowed researchers to explain several phenomenons associated to tasks such as learning, understanding and reasoning (BADDELEY; HITCH, 1974; BADDELEY, 1998). From this framework is possible to understand the empirical data using different methodological approaches – confirmatory factor analysis (CONTI-RAMSDEN; CRUTCHLEY; BOTTING, 1997; CONWAY *et al.*, 2002; ALLOWAY *et al*., 2004), clinical evidences (BISHOP; ROSENBLOOM, 1987; ARCHIBALD, 2006), and neuroimaging (SMITH; JONIDES, 1997; JONIDES *et al.,* 1993).

The concept of a system of limited attentional capacity that supervises the processing of information by few short-term storage systems is well accepted in the literature (BADDELEY, 2003). However, there are several discrepancies between the concepts of WM. From one perspective, Baddeley (1998, 2000, 2003) assumed that the WM is an independent system associated to the long-term memory (LTM) by one of its subcomponents. In the other hand, Cowan (1995) described the WM under an integrative framework proposing that it is one of several systems serving the LTM. Baddeley's WM model appears to have more solid evidence due to separation of LTM and short-term storage in different dimensions from factor analysis studies (STOPFORD *et al.,* 2007; MORRA; CAMBA, 2009). Nonetheless, there are no evidence to support that there is no relation between WM and LTM. Baddeley (2003) reminds that WM has an intimate relation to long-term memory since it organizes information in a shape that the human brain can understand.The episodic buffer, one of WM's subcomponents,links the WM to long-term memory to bind together information and build integrated episodes – allowing the interface between WM and LTM (BADDELEY, 2003).

Baddeley's WM model is divided by 4 subcomponents in a hierarchical organization: the central executive, phonological loop, visual sketchpad and the episodic buffer. According to Archibald (2006), the phonological loop and the visual sketchpad are short-term storage systems more related to the historical notion of short-term memory as conceptualized by Miller (1956, 2003).

The central executive is a supervisory system divided in two attentional processes: the control of the behavior by schemas previously learned and an attentional voluntary control when the schema does not suffice (NORMAN; SHALLICE, 1986; BADDELEY, 2003). This supervisory attentional system permits the WM to have access to the LTM by using three aspects of attention: dividing, switching and sustaining the attentional control (BADDELEY, 1996).

Finally, the episodic buffer was a recent proposition by Baddeley (2000, 2003) to solve several problems of his WM model. It is a limited-capacity storage and retrieval system linked to the LTM used to hold episodes whereby information is integratedacross space and potentially extended across time. However, the episodic buffer is assumed to be temporary and not a part of the LTM since patients with severely impaired LTM still have the ability to retain and rehearse responses for novel demands (BADDELEY, 2000).

3 ALZHEIMER’S DISEASE AND MEMORY IMPAIRMENT

Memory impairment of recent events happens in early stages of AD. It is followed by impairments in language, executive functions, visuospatial tasks and other long-term memory losses (TEIXEIRA; CARAMELLI, 2008). Daily activities such as remembering where the patient left the keys or remembering to throw away the kitchen’s garbage are impaired in AD and it brings consequences in the care and well being of the patient and his familiars. The advanced stages of AD, however, are worse since independence of the patient is severely compromised.These deficits are clearly associated to the WM and can be articulated with the notion of central executive as proposed by Baddeley (2003). The central executive’s first responsibility is to organize the information in schemas stored in the LTM. Once a daily activity is structured by a schema, such as throw away the garbage, if the central executive presents impairment, consequently, the activity will suffer. There is several evidence of this hypothesis.

Studies with AD patients were conductedby Baddeleyto understand the central executive and its associations with LTM (BADDELEY *et al.,* 1991; BADDELEY *et al.,* 2001, BADDELEY, 2003). The impairment of the WM, according to these studies, is strict to dividing and switching attention. Yokota *et al.* (2001) also find evidence of hierarchical and gradual decline of memory loss. According to their results,

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normal aging people memory functioning pertaining to verbal WM performance declined first. Visual span – WM's visual sketchpad – declined next; overall knowledge – related to LTM – declined after and was followed bymemoryof ordinary objects – LTM. This resultsuggests that the deterioration of memoryfunctions is probably affected differently by progressive risk of AD.

Nonetheless, impairments in global WM should not be discarded. Cairn *et al.* (2009) pointed out that episodic LTM declined before WM in an AD patientfrom a case study. In this study we will adopt the perspective of Alan Baddeley (2003) to understand the relationship between AD and possible decline on the WM activity. The main goal of this paper is to understand if, in the last five years, there is novel empirical evidence that points to impairments in one specific subcomponent of Baddeley's WM model or if it is a global decrement.

4 METHOD

The method used in this study was a systematic review conducted to gather information about empirical data regarding working memory in Alzheimer disease.

4.1 Literature Search

In order to identify publications on working memory in Alzheimer Disease (AD) patients, a systematic search was performed in Medline, Psycinfo and Scielo databases. We searched articles from the last 5 years published prior November 2012. The search was limited to four languages: English, Portuguese, Spanish and French – languages of authors' acquaintance. Four key terms were used in the various databases: Working Memory, Phonological Loop, Visual Sketchpad, Episodic Buffer and Alzheimer. For all databases, a specific combination of the key features was made to select relevant records:

a) working memory;
b) phonological loop;
c) visual sketchpad;
d) episodic buffer; e
e) alzheimer.

They were combined as follow: (a or b or c or d) and e.

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4.2 Inclusion and exclusion criteria

The search yielder a large set of publications which were further limited using the article title, abstract and a number of in- and exclusion criteria which are below detailed. We only included participants with age ranging from 65-or more years old. Studies using animal models of AD were excluded. Case studies and reviews of any kind were also excluded. Studies containing both AD and normal aging control groups were included. Eventually, some study included groups other than the control group, however the conclusions regarding these other groups were also considered in this study – for example, Franceschi *et al.* (2011) reported the results of AD and fronto-temporal dementia (FTD) groups for differential diagnose criteria.

In the regards of Working Memory, we only included studies using the model proposed in Alan Baddeley's (1998, 2000, 2003) studies. This decision is justified by the objective of this study. We intended to understand if there are novel contribution regarding impairments in the different subcomponents of Baddeley's working memory model – central executive, phonological loop, visual sketchpad and episodic buffer – and if these impairments follow distinct paths between AD and normal aging.

5 RESULTS AND DISCUSSION

Initial search – already applying the 5-years filter – found 175 articles in Medline database, 149 papers in Psycinfo and 5 studies in Scielo, a total of 329 articles. There was no article published in Portuguese, Spanish or French within the established criteria. After reading the abstracts, we excluded non-controlled trial studies, reviews of any kind, and experimental studies with participants younger than 65 years of age in the AD group and without AD *plus* a control group with healthy older adults. These limitations reduced the numbers of articles to: 9 in Medline, 5 in Psycinfo – 3 of them already found in Medline – and 3 in Scielo. Finally, we read the articles looking for the WM adopted model. Only 7 articles from Medline, 1 article from Psycinfo and 3 articles from Scielo – totalizing 11 studies – referred to Baddeley's WM model as theirs perspective. Table 1 depicts authors, year of the publication, the tasks involved in WM measurement, the experimental and control groups with the sample size, a brief description of the results and the possible conclusions based on the authors discussions.

According to ours study aim, we analyzed separately evidence for each Baddeley's WM model subcomponents (BADDELEY, 1996, 1998, 2000, 2003). We began with the short-term memory components associated with temporary storage – phonological loop and visual sketchpad. Then, we studied the effects of the central executive and finally the episodic buffer.

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Table 1 - Authos in alphabetical order, year of publication, WM-related task, subcomponents assessed, groups division, brief results and conclusions.

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Authors	Year	Task	Working Memory	Groups (Number of Subjects)	Results	Conclusions
Castel, Balota & McCabe	2009	Computation and Reading Complex Span	Phonological Loop, Central Executive and Episodic Buffer	Younger Adults (N=35); Healthy Older Adults (N=109); Very Mild AD (N=41); Mild AD (N=13)	All groups differ from each other in recall performance - phonological loop, however the selective index that measures the central executive and episodic buffer capacities showed no significant differences between younger and older healthy adults, and differences among all other groups.	AD leads to impairments in strategic control at encoding and directed remembering.
de Paula et al.	2012	Token Test; Semantic Verbal Fluency; Forward Digit Span; Corsi Blocks	Phonological Loop, Visual Sketchpad, Central Executive and Episodic Buffer, Language	Healthy Older Adults (N=80); Mild AD (N=80)	Both groups presented significant differences among all tasks.	Probably the language impairment in AD patients detected by the Token Test is associated with both verbal and non-verbal WM impairments.
Fernandez-Duque & Black	2008	Reaction Time Task; Trail Making; Digit Span; Rey-Osterrieth; Semantic and Verbal Fluency; Raven's Progressive Matrices (RPM)	Selective Attention, Perceptual Filtering, Attentional Set Switching, Language, Phonological Loop, Visual Sketchpad, Central Executive and Episodic Buffer	Younger Adults (N=32); Healthy Older Adults (N=31); Probable AD (N=31)	No evidence of impaired perceptual filtering probable AD. Early DAT patients did presented significant differences on tasks involved in attentional set switching consistent with an inability to maintain the goals of the task (mental set).	The impairment of WM in AD aperantly is associated with the central executive. Impairment is shown in the supervisory system previously than other neuropsychological aspects.
Gyurak et al.	2009	Stroop; Trail Making; Verbal Fluency; Digit and Spatial Span	Phonological Loop, Visual Sketchpad, Central Executive, Episodic Buffer, Executive Functions - Language, Attentional Set Switching, Inhibitory Control	Frontotemporal Lobar Degene-ration - FTLD (N=24); Probable AD (N=7); Healthy Older Adults (N=17)	No statistical difference was found between the three groups in both WM and Attentional Set Switching tasks. In the Inhibitory Control task - Stroop - AD groups reults were statistically worse than the other groups. On Verbal Fluency, Control had significant higher mean scores than the other two groups.	Inhibitory Control and Verbal Fluency are probably a key features associated with monitoring, controling and regulating own emotions when proceeding cognitive tasks.
Pereira et al.	2012	Philadelphia Brief Assessment of Cognition	Phonological Loop, Visual Sketchpad, Central Executive, Episodic Buffer, Language, Episodic LTM and Behavior	Younger Adults (N=100); Healthy Older Adults (N=100); Probable AD (N=30)	No statistical difference was found between the three groups in Language and Behavior tasks. However, AD showed significant lower mean scores in WM and Episodic LTM .	Patients with diagnosed AD from clinical assessment present poor performances in WM and Episodic LTM. Specifically the visuospatial tasks provided evidence that WM in AD is compromised as a whole.

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continuation

Authors	Year	Task	Working Memory	Groups (Number of Subjects)	Results	Conclusions
Pietrzak, Maruff & Snyder	2009	Groton Maze Learning Test - GMLT	Phonological Loop, Visual Sketchpad, Central Executive and Episodic Buffer	Healthy Older Adults (N=15); Mild AD (N=14)	The performance of the healthy older adults groups showed better performance than the Mild AD group. Also, the drug donepezil provided improvement on the performance of both groups when compared to baseline and placebo.	Donepezil is a good assett to AD treatment improving performance on cognitive tasks. Global WM in AD is impaired when compared to healthy older adults on maze tasks.
Sebastián & Hernández-Gil	2012	Direct Digit Span	Phonological Loop	Healthy Older Adults (N=25); Frontotemporal Dementia - FTD (N=9); Mild AD (N=25)	No significant differences was found between groups.	The direct digit span is a task associated with short-term memory and uses the phonological loop as a temporary storage of the information. This type of task relies little on the central executive and the episodic buffer allowing the AD patients to perform as good as any healthy older adult. Direct spans do not require full access to LTM or a constant attentional control, what can explain this data.
Sebastián & Hernández-Gil	2010	Digit Span; B-P task; Tracking task; Dual task (Tracking + Digit Span)	Divided Attention, Attentional Set Switching, Phonological Loop, Visual Sketchpad, Central Executive and Episodic Buffer	Healthy Older Adults (N=25); Frontotemporal Dementia - FTD (N=9); Mild AD (N=25)	In digit span forward task, no significant difference was found. Errors in B-P task was statistically similar between FTD and AD groups, however the control group presented better performance. Nonetheless, regarding perseveration in the B-P task, AD performed significantly poorer than FTD and control where FTD group also had worse results than healthy older adults. Finally, on Tracking Task (single task) and the Dual task, AD and FTD presented worse results than the control group, but no difference between them.	There are several alterations on executive functioning in both AD and FTD due to neurodegeneration. However, AD cognitive impariment is probably more associated with attentional set switching as AD peerseverated more than FTD. The neural circuitry involved in both pathologies are probably similar with just few differences.

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conclusion

Authors	Year	Task	Working Memory	Groups (Number of Subjects)	Results	Conclusions
Souza-Talarico et al.	2008	Digit Span - Forward and Backward	Phonological Loop, Central Executive and Episodic Buffer	Healthy Older Adults (N=40); Mild AD (N=40)	Statistical differences were found between groups in the digit span backwards task. Nevertheless, no significant difference was showed in the digit span forward task.	Probably the digit span forward demands few of the central executive and episodic buffer capacities. The phonological loop seems to maintain performance even in Mild AD patients. However, once this information needs manipulation based on self regulation, attentional control and more associations with the LTM, the AD patients do not show the same level of performance.
Stopford et al.	2012	Brown-Peterson Paradigm; Digit Span - Forward and Backward; Body part pointing test; Word length effect test; Phonological similarity effect test; Visual patterns test	Perceptual Filtering - Auditory and Visual, Attentional Set Switching, Language, Phonological Loop, Visual Sketchpad, Central Executive and Episodic Buffer	Typical Mild AD (N=20); Amnesic AD (N=18); FTD (N=26); Healthy Older Adults (N=26)	Typical AD performed poorer than Amnesic AD, FTD and control in all tests. FTD presented worse than Amnesic AD and control performance in all tasks except word leght effect test. Notably, the amnesic-AD group performed within normal limits across tasks.	The typical-AD group showed striking impairment of working memory. Performance on all tests were reduced. Remarkably, FTD patients too demonstrated reduced performance on all tasks excluding word span. Although both groups showed significant effects of distraction on themodified working memory task, only the AD group showed profound impairment even without delay or distraction,whereas the FTD group was impaired with distraction only. Probably the impairment in AD is more related to set switching than FTD.
Tse et al.	2010	Stroop; Simon Task; Switching Task	Attentional set switching, Selective Attention, Phonological Loop, Visual Sketchpad, Central Executive and Episodic Buffer	Young Adults (N=32); Healthy Older Adults (N=246); Very Mild AD (N=74)	In Stroop and Simon tasks, the AD group performed worse than Healthy Older Adults, which performed worse than Young Adults. Nonetheless, there was no significant difference between older and young adults regarding error in both tests. On switching task, AD presented poorer performance than the other groups. No statistical difference was found between Older and Young Adults.	Impairmets in WM are present even in early stages of AD. There is a normal decline of motor performance and reaction time with aging, however it probably is not associated with significant cognitive loss. Nevertheless, AD is quite impaired in set switching tasks.

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5.1 The Phonological Loop

Almost all studies used the phonological loop somehow. Archibald (2006) depicts that even visual tasks can be transformed in verbal tasks if the subject gives names to the stimuli. For example, a color span can easily switch to an oral span since the person recalls the nameof the color combined with the temporary memory of the colors tone.

Verbal span tasks in the forward form are considered a good index for the phonological loop since it does not require much of the episodic buffer and central executive's capacity (ARCHIBALD, 2006). Overall, there is little evidence that early stages of AD compromise short-term storages – specifically the phonological loop. In very mild and mild groups of AD, when compared to healthy older adults, there were no significant differences in quantity of spans on the studies of Fernandez-Duque & Black (2008), Gyurak *et al.* (2009), Sebástian & Henándes-Gil (2010, 2012) and Souza-Talarico *et al.* (2008).

However, the evidence presented by De Paula *et al.* (2012) and Stopford *et al.* (2012) demonstrated significant differences between AD and control group in similar tasks. Regarding this contradiction in the literature, we can hypnotize two aspects: the severity of AD and the assessment instrument. Huntley and Howard (2009) depicted the relevance of AD severity in the phonological loop impairment. There are several discrepancies about the classification of Mild AD. Nevertheless, the use of the Mini-Mental State Exam (MMSE) is a reference to consider severityof AD. De Paula *et al.* (2012) used the NINCDS-ADRDA criteria. Duboiset *et al.* (2007) discussed this criteria based on novel empirical evidence using PET and *f*MRI techniques. The revision of this criterion would probably interfere in De Paula's study regarding AD severity what may influence in the results.

Stopford *et al.* (2012) divided AD in two distinct groups, what is not usual on the selected studies. Separating the participants allowed overlooking that Mild AD with worse performance in phonological loop tasks than Amnesic AD. This result is probably due to little impairment in storage and more demand of the central executive. This hyphotesis works with Huntley and Howard's perspective in which AD starts to present impairment initially in divide attention and in attentional set switching – processes of the central executive (HUNTLEY; HOWARD, 2009).

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5.2 Visual Sketchpad

As Baddeley (2003) depicted, there are rare tasks involved in pure assessment of the visual sketchpad. The most used measure is the Corsi Blocks task. Only De Paula (2012) used this test in our review. We already saw that this study's results vary from the others regarding short-term storage systems and in this particular case it is not different. We can believe that visual sketchpad follow similar path than the phonological loop, however within the last 5-year period, it is not possible to affirm any evidence either way.

5.3 The Central Executive

All studies presented differences between performances of tasks involving the central executive. Baddeley (2003) and Baddeley *et al.* (1991, 2001) already showed that dividing attention and retrieving learned schemas are difficult processes in very mild and mild AD. Huntley and Howard (2009), Lambert and Kinsley (2006) and Teixeira and Caramelli (2008) remembers that AD is associated with impairments of the brain in metabolizing acetylcholine in frontal lobe regions. Desimore and Duncan (1995) suggested the importance of cholinergic neurotransmission on attentional processes – mainly selective and sustaining attention.

Self monitoring and self regulation, aspects of pivotal importance in the central executive system are clearly impaired in all evidence that we collected in this review. On attentional set switching tasks, the AD patients presented worse performance than controls (SEBÁSTIAN; HERNÁNDES-GIL, 2012; STOPFORD *et al.*, 2012; TSE *et al.*, 2010,). Pietrzak, Maruff and Snyder (2009) showed that donezepil, an inhibitor of cholinesterase, facilitate the acetylcholine concentration extracellular and improved performance of AD patients in complex WM tasks. This increase is probably due to better attentional system.

5.4 The Episodic Buffer

Finally, the episodic buffer is a temporary storage responsible for the manipulation of the information. It is the main filter of novel memories (BADDELEY, 2000, 2003). The episodic buffer impairment is associated with what probably is considered the first symptom of AD: loss of memory of recent events. To consolidate a schema or to organize information to be accessed in the LTM, the episodic buffer constitutes the more important asset to Baddeley's WM model (ARCHIBALD, 2006).

All articles demonstrated that the episodic buffer is impaired (DE PAULA *et al.,* 2012; FERNANDEZ-DUQUE; BLACK, 2008; GYURAK *et al.,* 2009; Pereira *et al.,* 2012; PIETRZAK; MARUFF; SNYDER, 2009; SEBÁSTIAN; HERNÁNDES-GIL, 2010, 2012; SOUZA-TALARICO *et al.,* 2008, STOPFORD *et al.,* 2012), even in early stages of AD (TSE *et al*., 2010).

Despite of also being impaired, factor analysis studies show that episodic buffer relies more in manipulation of the information and less in dividing attention or set switching (STOPFORD *et al.,* 2007; MORRA; CAMBA, 2009). Our hypothesis is that the episodic buffer is more associated with LTM and the central executive refers to the supervisory system responsible to allow cognitive processes not particularly with the episodic buffer itself, but also with the other subcomponents. In this case, if this hypothesis is correct, probably the first impairment of the Baddeley's WM model subcomponents is the episodic buffer, even before the central executive.

6 CONCLUSION

The WM present impairments in early stages of AD, however, due to the empirical findings in this review, the decline of the WM is first associated with decrement of the episodic buffer linking capacity with the LTM. The Central Executive appears to suffer in parallel since its functions decline regarding attentional set switching. Nevertheless, it decreases a little after the episodic buffer, since the short-term storages rely few, but significantly in the central executive and its impairments come last. Visual sketchpad and phonological loop decline after the other processes. This evidence suggests that subcomponents of Baddeley's WM model follow distinct paths in the progression of its decrements, nonetheless all are impaired in advanced stages of AD as well as other cognitive processes such as language and perception.

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MEMÓRIA DE TRABALHO NA DOENÇA DE ALZHEIMER: UMA REVISÃO SISTEMÁTICA DOS ÚLTIMOS 5 ANOS DE EVIDÊNCIAS EMPÍRICAS SOBRE O MODELO DE MEMÓRIA DE TRABALHO DE BADDELEY

RESUMO

A doença de Alzheimer é a mais comum das condições neurodegenerativas associadas à demência. É conhecida como um quadro patológico que vem acompanhado de diversos comprometimentos nos processos cognitivos e psicológicos. O presente estudo objetiva compreender as relações entre a doença de Alzheimer e comprometimentos da memória de trabalho. Foi adotado o modelo de Baddeley para memória de trabalho a fim de revisar sistematicamente se o comprometimento dos subcomponentes desse modelo teórico – alça fonológica, esboço visuoespacial, retentor episódico e executivo central – trilham caminhos distintos ou similares. A revisão sistemática consultou as bases de dados da Medline, Psycinfo e Scielo. Dos 329 artigos encontrados, somente 11 foram aceitos dentro dos critérios estabelecidos. Os resultados sugerem que o retentor episódico e o executivo central declinam na proporção em que a severidade da doença de Alzheimer aumenta. A alça fonológica e o esboço visuoespacial são os últimos subcomponentes comprometidos dentro do modelo de memória de trabalho de Baddeley.

Palavras-chave: Doença de Alzheimer. Memória de Trabalho. Demência. Revisão Sistemática.

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LA MEMORIA DE TRABAJO EN LA ENFERMEDAD DE ALZHEIMER: UNA REVISIÓN SISTEMÁTICA DE LOS ÚLTIMOS CINCO AÑOS DE EVIDENCIA EMPÍRICA SOBRE EL MODELO DE MEMORIA DE TRABAJO DE BADDELEY

ABSTRACT

La enfermedad de Alzheimer es una de las condiciones neurodegenerativas más comunes asociadas con la demencia. Se le conoce como una condición patológica que viene con diversas alteraciones en los procesos cognitivos y psicológicos. Este estudio tiene como objetivo comprender la relación entre la enfermedad y el deterioro de la memoria de trabajo en la enfermedad de Alzheimer. Adoptamos el modelo de Baddeley de memoria de trabajo con el fin de revisar sistemáticamente el déficit de los subcomponentes de este modelo teórico – el bucle fonológico, el esquema visuoespacial, el ejecutivo central y la retención episódica – pisando en caminos separados o similares. Una revisión sistemática examinó las bases de datos Medline, SciELO y PsycINFO. De los 329 artículos encontrados, sólo 11 fueron aceptadas dentro de los criterios establecidos. Los resultados sugieren que el retenedor episódico y el ejecutivo central tienen disminuciones en proporción a la severidad de la enfermedad de Alzheimer. El bucle fonológico y el esquema visuoespacial son los últimos subcomponentes acometidos en el modelo de memoria de trabajo de Baddeley.

Palavras clave: Enfermedad de Alzheimer. Memoria de Trabajo. Demencia. Revisión Sistemática.

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