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polanco.roberto@gmail.com

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Suárez-Bagnasco, Mariana

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Resilience and executive dysfunction in healthy adults between 30 and 60 years old.

Resiliência e disfunção executiva em adultos entre 30 e 60 anos de idade.

Resiliencia y disfunción ejecutiva en adultos entre 30 y 60 años de edad.

[1] PhD. Catholic University of Uruguay. Contacto: mariansb@gmail.com

ABSTRACT

Objectives: To study of the possible associations between resilience and age, executive dysfunction and age, resilience and executive dysfunction, in healthy adults between 30 and 60 years old.

Methods: A pilot, transversal study involving 180 subjects who met the inclusion and exclusion criteria. CD-RISC was use to assess resilience. DEX-sp was use to assess executive dysfunction.

Results: When testing bivariate associations between age, resilience and executive dysfunction, we found statistically significant associations between age and resilience ($p = 0.001$); age and executive dysfunction ($p = 0.001$); resilience and executive dysfunction ($p = 0.001$).

Conclusions: The present study found significant associations between age and resilience, between age and executive dysfunction and between resilience and executive dysfunction, in healthy adults between 30 and 60 years. Future studies might explore mediating variables among these associations and describe interactions between variables over time.

Keywords: resilience; executive dysfunction; healthy adults; neuropsychology; cognitive decline; empirical research.

RESUMEN

Objetivos: Estudiar la posible asociación entre resiliencia y edad, disfunción ejecutiva y edad, resiliencia y disfunción ejecutiva, en adultos entre 30 y 60 años.

Métodos: Estudio piloto, transversal. Participaron 180 sujetos que cumplieron los criterios de inclusión y exclusión. La resiliencia y la disfunción ejecutiva se evaluaron mediante CD-RISC y DEX-sp, respectivamente.

Resultados: Ensayando asociaciones bivariadas entre edad, resiliencia y disfunción ejecutiva hallamos asociaciones estadísticamente significativas entre edad y resiliencia ($p = 0.001$); edad y disfunción ejecutiva ($p = 0.001$); resiliencia y disfunción ejecutiva ($p = 0.001$).

Conclusiones: Encontramos asociaciones significativas entre edad y resiliencia, edad y disfunción ejecutiva, resiliencia y disfunción ejecutiva, en adultos entre 30 y 60 años.

Estudios futuros podrían explorar las variables que median en estas asociaciones y describir las interacciones entre las variables en el tiempo.

Palabras clave: resiliencia; disfunción ejecutiva; adultos; neuropsicología; declive cognitivo decline; investigación empírica.

RESUMO

Objetivos: Estudar a possível associação entre resiliência , idade e disfunção executiva em adultos entre 30 e 60 anos.

Métodos: Estudo piloto, transversal. Participaram 180 sujeitos que cumpriram os critérios de inclusão. A resiliência e a disfunção executiva se avaliaram mediante CD-RISC e DEX-sp, respectivamente.

Resultados: Testando associações bivariadas entre idade, resiliência e disfunção executiva, achamos associações estatisticamente significativas entre idade e resiliência ($p = 0.001$); idade e disfunção ($p = 0.001$); resiliência e disfunção executiva ($p = 0.001$).

Conclusões: Encontramos associações significativas entre idade e resiliência, idade e disfunção executiva,

resiliência e disfunção executiva, em adultos entre 30 e 60 anos.

Estudos futuros poderiam explorar as variáveis que mediam nestas associações e descrever as interações entre as variáveis no tempo.

Palavras-chave: resiliência, disfunção executiva, adultos, neuropsicologia, diminuição cognitivo, investigação empírica.

Recent studies provided evidence about the presence of cognitive decline and about the association between age, brain structure and neuropsychological functioning in healthy adults under 60 years old (1-5).

A prospective study that assess verbal and mathematical reasoning, verbal short-term memory, verbal fluency and vocabulary at three times over ten years in healthy subjects between 45 and 49 years (1) reports a decline in performance except for vocabulary. A previous study reports a positive correlation between age and vocabulary performance, and a negative correlation between age and episodic memory and processing speed performances, in healthy subject between 18 to 84 years (2). However, another study that assess attention, memory, language and executive functions performances in adults between 21 and 82 report better performance in memory between 26 and 49 years (3).

A transversal study that assess attention, memory, executive functions, language and processing speed and also include neuroimaging studies in healthy adults between 40 and 50 years, reported cognitive deficits mainly in executive functions and to a lesser extent in processing speed. These authors found an association between less cerebral gray matter volume, lower scores and older age (4). Other authors suggest that decline in executive functions and memory performances is in part mediate by a relative age-related reduction in frontal white matter in subjects between 21 and 79 years (5).

Regarding the relationship between age and resilience in healthy adults, there are conflicting results; some studies found no correlation between these variables and others reported positive and negative correlations (6-7).

Concerning to the relationship between resilience and neurocognitive functioning in healthy adults we found only one paper. It examines the association between resilience and math performance, finding a positive correlation between resilience and math performance (8).

We did not find papers that explore the association between resilience and executive dysfunction.

Given the results summarized above, we decided to make a preliminary study of the possible associations between resilience and age, executive dysfunction and age, resilience and executive dysfunction, in healthy adults between 30 and 60 years. The purpose of the present paper is to give a brief report and discussion of the obtained data.

Materials and methods

A pilot, transversal study is done.

Adults between 30 and 60 years old who met inclusion and exclusion criteria were included.

Inclusion criteria: outpatient consultation for general health check, completed university studies, gainful employment.

Exclusion criteria: subjects with psychiatric disorders, neurological, cerebrovascular, metabolic, endocrine, immune, and head trauma.

A clinical physician specialized in psychiatry evaluates and invites adults who met the inclusion and exclusion criteria. A psychologist gives the participants an inform consent form and answers questions about this study. Tests used to assess resilience and executive dysfunction were explain to participants who gave informed consent.

CD-RISC (6, 9) was use to assess resilience. It is a self-administered scale consisting of 25 items with Likert scale: 0: not true at all, 1: rarely true, 2: sometimes true, 3: often true, 4: true nearly all of the time. The scale range of 0 to 100. The higher the scores, the greater resilience.

DEX-sp was use to assess executive dysfunction. It is a valid and reliable instrument to assess executive dysfunction in non-clinical adults (10-12). It is a self-administered questionnaire consisting of 20 items. Each item is score on a Likert scale of 5 points, between 'never' and 'very often'. Higher scores more executive dysfunction.

Descriptive and inferential statistics were calculate using SPSS. ANOVA was used to analyses if there are differences between groups. Associations between age and resilience, age and executive dysfunction, resilience and executive dysfunction were examine using Pearson coefficient. In all cases, p value <0.05 was considered as indicator of statistical significance.

Results

180 adults, mean age 45.14 ± 8.5 years old, 90 women and 90 men, mean age women 45 ± 7 and mean age men 46 ± 6 , participated.

Resilience scores ranged between 69 and 89, mean 80.64 ± 4.14 . Mean resilience scores 80.3 ± 3 in women and 79.2 ± 5 in men.

Executive dysfunction scores ranged between 10 and 16, mean 12.84 ± 1.64 . Mean executive dysfunction scores 13 ± 2 in women and 12 ± 2 in men.

The sample was divide into three groups: group 1, group 2 and group 3. See table 1.

Table 1. Sample characteristics.

	group 1, n=60	group 2, n=60	group 3, n=60
mean age	34.85 ± 1.67	45.18 ± 1.94	55.09 ± 1.56
mean resilience score	77.12 ± 3.67	80.06 ± 2.26	84.62 ± 2.10
mean executive dysfunction score	11.09 ± 1.03	13.27 ± 1.1	14.18 ± 1.06

Group 1 includes 60 subjects between 30 and 40 years old, mean age 34.85 ± 1.67 years old. Resilience scores ranged between 69 and 82, mean resilience scores 77.12 ± 3.67 . Executive dysfunction scores ranged between 10 and 14, mean scores 11.09 ± 1.03 .

Group 2 includes 60 subjects between 41 years and 50 years old, mean age 45.18 ± 1.94 years. Resilience

scores ranged between 76 and 85, mean resilience scores 80.06 ± 2.26 . Executive dysfunction scores ranged between 11 and 14, mean scores 13.27 ± 1.1 .

Group 3 includes 60 subjects between 51 years and 60 years old, mean age 55.09 ± 1.56 years old. Resilience scores ranged between 80 and 89, mean resilience scores 84.62 ± 2.10 . Executive dysfunction scores ranged between 12 and 16, mean scores 14.18 ± 1.06 .

We found no statistically significant differences between men and women for age, resilience and executive dysfunction.

We found statistically significant differences between groups for resilience: $F = 62.64$, $p = 0.001$, and executive dysfunction: $F = 97.25$, $p = 0.001$.

When testing bivariate associations between age, resilience and executive dysfunction, we found statistically significant associations between age and resilience: Pearson's $r = 0.758$, $p = 0.001$; age and executive dysfunction: Pearson's $r = 0.771$, $p = 0.001$; resilience and executive dysfunction: Pearson's $r = 0.622$; $p = 0.001$.

Discussion

The present study reports associations between age and resilience, between age and executive dysfunction and between resilience and executive dysfunction, in healthy adults between 30 and 60 years.

The obtained results suggest that the older is the subject (between 30 and 60 years old) the more likely is to have experienced adverse events that stimulated the development of resilience. In addition, in adults between 30 and 60 years old, often occur several crises, usually one in each decade. Overcoming each of these crises can also foster resilience in adulthood. However, resilience scores reflect the dynamic process of resilience throughout life that begins in childhood and in this case with a cutoff in adulthood when subjects completed the CD-RISC scale.

In addition, we observed an increase in frontal symptoms between 30 and 60 years old. This does not

mean that participants have a dysexecutive syndrome but have some symptoms of poor executive functioning. As could be expected, older participants have more symptoms of poor executive functioning than younger participants. The presence of dysexecutive symptoms can result in small daily malfunctions (such as forgetting where objects were left and difficulties in making decisions), which may be increased under stress.

In addition, people with dysexecutive symptoms may have more difficulties in coping stress and may often have repetitive acute stress and / or chronic stress. Since chronic stress is associated with prefrontal cortex gray matter decrease (13) and this last one with executive dysfunctions, we might expect a vicious circle where people who have these structural changes report later more dysexecutive symptoms. Older people (within the considered age interval) could have brain structural changes that are associated with age and could have cognitive deficits that are associated with these brain structural changes. These brain structural changes could enhance difficulties in coping daily stress that at its turn could be associated with further brain structural changes that could lead to more dysexecutive symptoms reports.

The daily presence of the mentioned malfunctions and awareness about them could lead to develop strategies to compensate deficits. According to the results of this study, older participants have higher resilience scores and more dysexecutive symptoms (comparing with younger participants). We may conjecture that if older participants did not have higher resilience scores they probably could have more dysexecutive symptoms.

The present study has some limitations. Amongst them the sample size and no use of neuropsychological classic tests to assess cognitive performance.

However, this preliminary study explores the relationship between resilience and executive dysfunction in healthy adults in a period of life amongst the least studied by cognitive neurosciences and neuropsychology: between 30 to 60 years old. It would be advisable to conduct further and more detailed studies with larger

samples sizes, using prospective designs. Future studies might explore mediating variables among these associations and describe interactions between variables over time.

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Conflict of interest: The author declare that they have no conflict of interest

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study. 

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