Chronic pain exacerbates age-related cognitive decline

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Introduction

Older adults often report chronic pain, negatively impacting daily function and quality of life (Domenichiello & Ramsden, 2019). Moreover, it is well known that chronic pain accelerates brain aging process (Cruz-Almeida et al., 2019), which is linked to an age-related cognitive decline. Despite this, few research has directly analyzed how chronic pain affects to neuropsychological performance in the older population. Therefore, this study aimed to examine the effect of chronic pain in different cognitive domains, such as attention, executive functions and memory in older adults, to explore if the interaction between aging and chronic pain leads to a cognitive impairment.

Materials and Methods

Participants. 58 older adults with musculoskeletal chronic pain (70,21±5.83 years; 21 males), 57 pain-free older adults (69.81±5.18 years; 21 males), and 61 pain-free younger adults (20.31 ±2.05 years; 26 males).

Neuropsychological assesment: All participants completed a neuropsychological battery covering tests of attention and working memory (Digit span test, Trail Making Test (TMT) A and B)), executive functions (Stroop test, Wisconsin Card Sorting Test (WCST)), verbal fluency (FAS and animals) and memory, Furthermore, participants completed a semi-structured interview about their medical and pain history.

Data analysis. Data were analyzed with a univariate ANOVA (young vs. older vs. older with pain).

Results

In comparison to pain-free older, chonic pain older adults showed reduced performance in the following tests: direct span (p = 0.007, Fig. 1), TMT-A (p = 0.048, Fig.2), Stroop interference (p = 0.026, Fig. 5), WCST (total (p = 0.002) and perseverative errors (p = 0.028), Fig. 3), FAS (p < 0.001, Fig. 4) and WMS total immediate recall p = 0.004, Fig. 6). Moreover, in comparison to the younger group, all older participants displayed a reduced performance during the backward span (p < 0.010), Stroop interference, TMT-B ((p < 0.001), WCST (total (p < 0.001) and perseverative errors (p < 0.001) ,animal fluency subscale (p < 0.001), WMS long-delay recall (p < 0.001) and retention (p < 0.001).

Fig. 1. Digit span performance

Repeat the digit span without looking

Forward	Backward
Sequences	
5, 8, 2	6, 2, 9
6, 9, 4	4, 1, 5
6, 4, 3, 9	3, 2, 7, 9
7, 2, 8, 6	1, 9, 6, 8
4, 2, 7, 3, 1	1, 5, 2, 8, 6
7, 5, 8, 3, 6	6, 1, 8, 4, 3
6, 1, 9, 4, 7, 2	5, 3, 9, 4, 1, 8
3, 9, 2, 4, 8, 7	7, 2, 4, 8, 5, 6
5, 9, 1, 7, 4, 2, 8	8, 1, 2, 9, 3, 6, 5
4, 1, 7, 9, 3, 8, 6	4, 7, 3, 9, 1, 2, 8
5, 8, 1, 9, 2, 6, 4, 7	9, 4, 3, 7, 6, 2, 5, 6
3, 8, 2, 9, 5, 1, 7, 4	7, 2, 8, 1, 9, 6, 5, 2
2, 7, 5, 8, 6, 2, 5, 8, 4	
7, 1, 3, 9, 4, 2, 5, 6, 8	

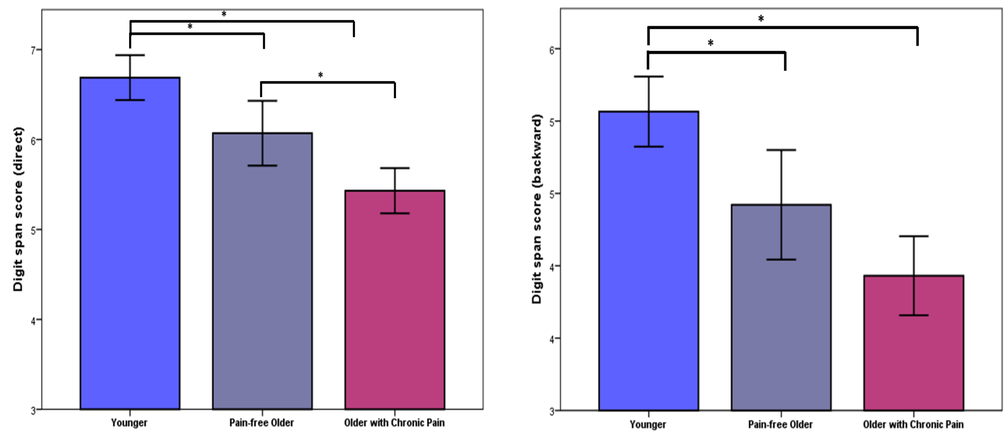
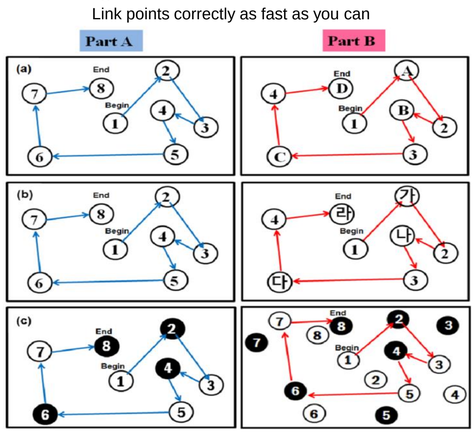


Fig. 2. TMT performance

Link points correctly as fast as you can



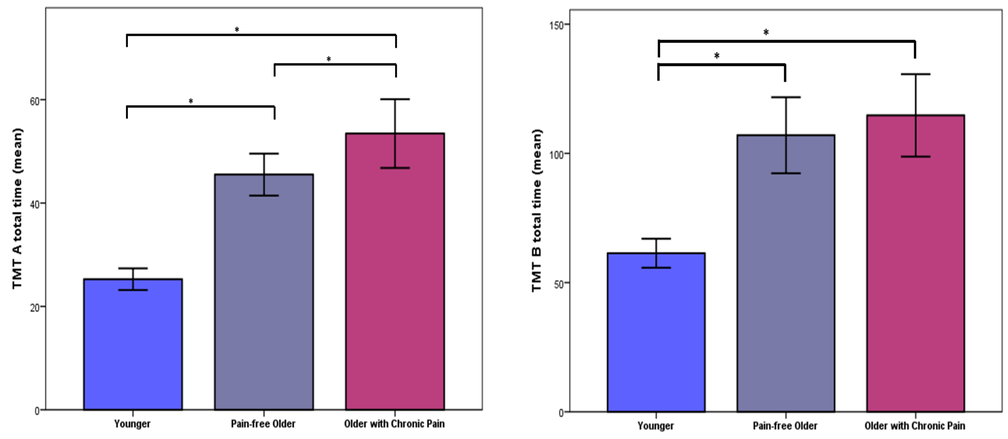
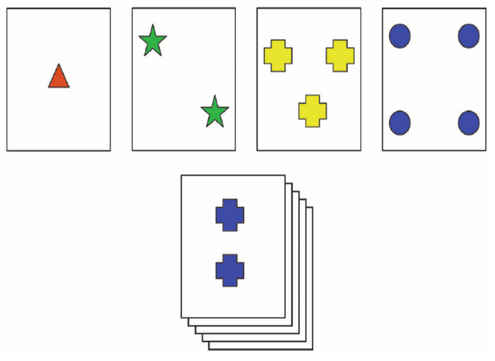


Fig. 3. WCST performance

Order the cards in the proper category



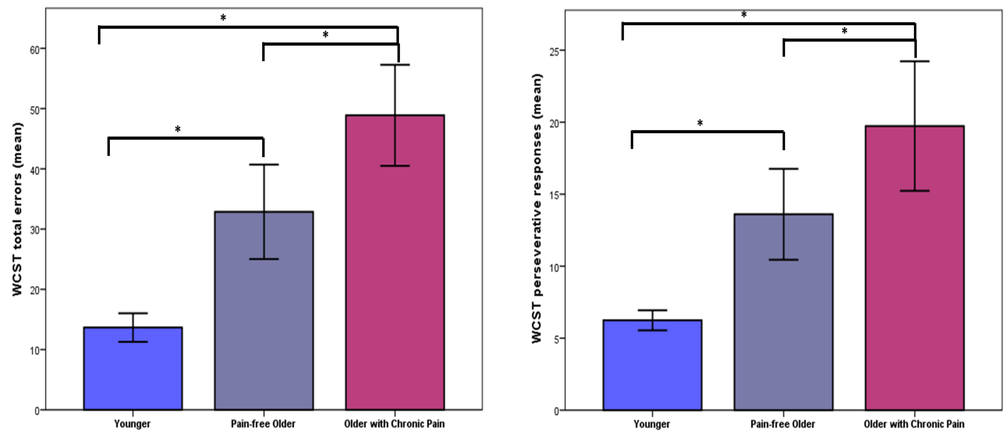


Fig. 4. Verbal fluency performance

Say as much words as you can following the clue

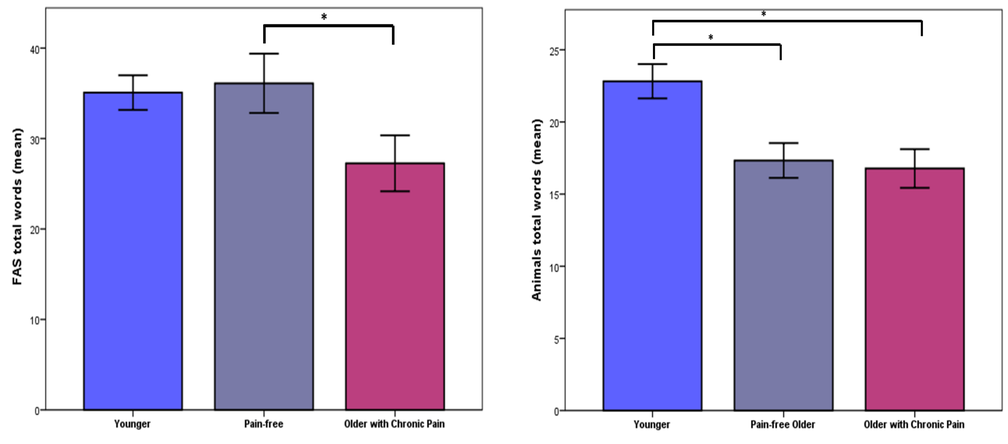


Fig. 5. Stroop test

Say the color correctly as fast as you can

RED	RED
GREEN	YELLOW
BLUE	GREEN
YELLOW	BLUE
RED	RED
GREEN	YELLOW
RED	RED
BLUE	BLUE
GREEN	GREEN
YELLOW	YELLOW
BLUE	GREEN
YELLOW	BLUE

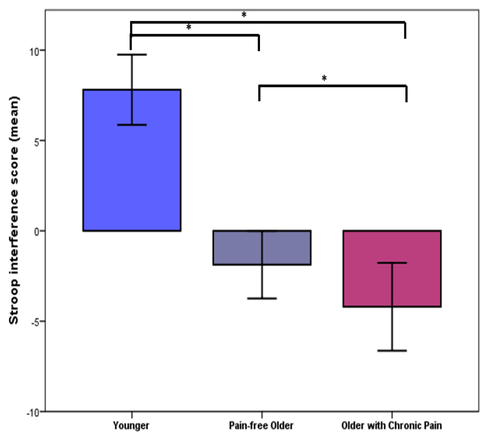
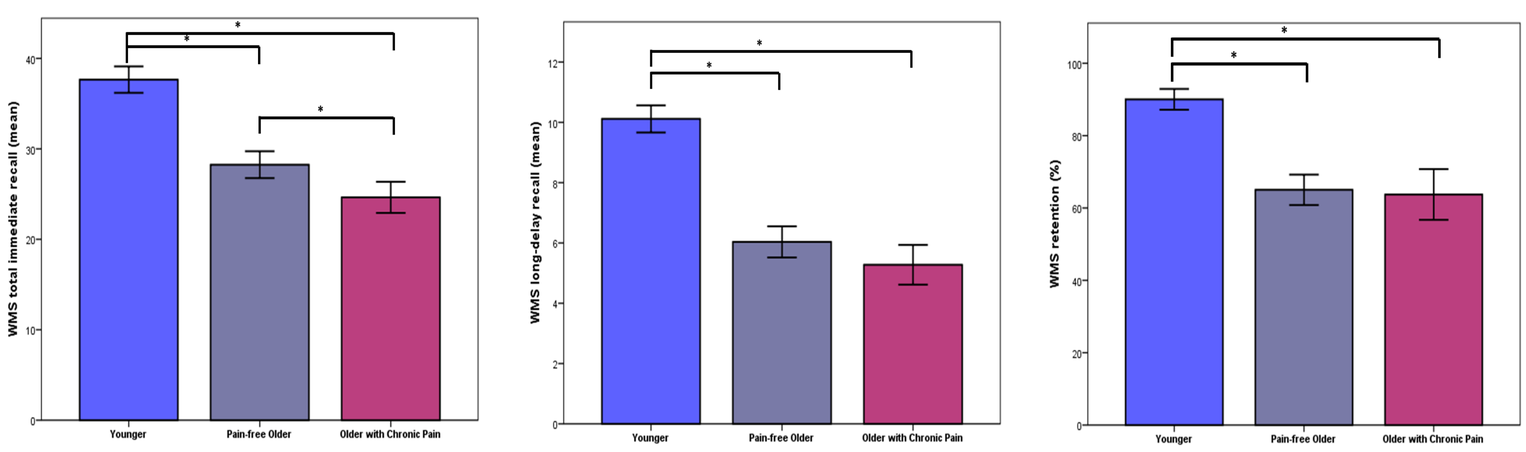


Fig. 6. WMS word list performance

Remember as much words as you can

Word list	Trial 1	Trial 2	Trial 3	Trial 4
Diana				
Finger				
Sun				
Crocodile				
Coin				
Subway				
Sun				
Student				
Traffic				
Tree				
Sea				
Arm				
Fairy				



Conclusions

Older adults with chronic pain showed a significantly reduced performance compared to pain-free older adults in all tests. Our results suggest that suffering long-lasting pain exacerbates the cognitive decline related to the aging process, especially in executive processes. These results are in line with studies suggesting that chronic pain accelerates brain aging in older individuals (Cruz-Almeida et al., 2019) and invite further investigation into the detailed relationship between chronic pain, aging and cognitive decline.

References

- Domenichiello, A. F., & Ramsden, C. E. (2019a). The silent epidemic of chronic pain in older adults. Progress in Neuro-Psychopharmacology and Biological Psychiatry, 93(April), 284–290. https://doi.org/10.1016/j.pnpbp.2019.04.006
- Cruz-Almeida, Y., Fillingim, R. B., Riley, J. L., Woods, A. J., Porges, E., Cohen, R., & Cole, J. (2019). Chronic pain is associated with a brain aging biomarker in community-dwelling older adults. Pain, 160(5), 1119–1130. https://doi.org/10.1097/J.PAIN.0000000000001491

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