Pain and Working Memory: How Factors Other Than Age Impact Cognitive Decline Jessica M. Katschke • Brian Follick, MS • Seyedeh Ahmadpanah • Kelly Decollibus , Michelle Chaker • Barbara J. Cherry, PhD.

California State University, Fullerton • Department of Psychology

Background/Introduction

- Chronic pain has been linked to cognitive deficits (Söderfjell et al., 2006). e.g.,
- Memory
- Concentration
- Abstract thinking
- Problem solving
- Working memory
- Even mild chronic pain contributes to declines in working memory (Sanchez, 2011)
- The present study explored chronic pain, age, and working memory performance in individuals with and without
- Fibromyalgia (chronic pain)
- Definitions
- Fibromyalgia (FM): Chronic pain condition
- Hypersensitivity to noxious and non-noxious stimuli
- FM may be one of several conditions (e.g., PTSD, CFS) referred to as Central Sensitivity Syndromes (Yunus, 2007)
- Prediction
- Chronic pain would be a better predictor of working memory performance than age

- Secondary analysis of a cross-sectional study conducted in 2008 older participants; younger participants tested in 2011
- Fibromyalgia Research & Education Center, California State University Fullerton
- Participants completed psychological, physical, and cognitive assessments
- Thirty-nine male participants (19.7%) and 158 female participants (80.2%), age range was 18 to 89 years old (M=49.14).

	FM	Non-FM	Young	
Ν	63	50	84	
Age Range (years)	50-87	52-89	17-29	
M _{age} (SD)	60.73 (8.08)	69.67 (8.15)	18.97 (1.96)	
MMSE, M (SD)	29.03 (1.09)	29.14 (1.26)	29.07 (1.07)	
Depression, M (SD)	16.66 (10.68)	2.94 (3.36)	11.33 (8.08)	

Table 2: Dependent variable classified by three categories

Category	Description
YesFM	Older participants diag
NoFM	Older participants not
Young	Younger participants n

Method

Participants

Table 1: Demographic Characteristics of Participants by Group (FM, Non-FM, & Young)

- *Note.* MMSE = Mini Mental State Examination, participants were excluded due to scores < 25; Depression = Beck Depression Inventory, lower mean scores indicate lower depression.

 - gnosed with Fibromyalgia
 - t diagnosed with Fibromyalgia
 - not diagnosed with Fibromyalgia

Measures and Procedures

Stroop Color/Word Test (Stroop CW; interference/inhibition) (Trenerry et al., 1989)

Red	Green
Tan	Blue
Blue	Red
Tan	Green
Red	Blue

 Digit Span Forward and Backward (DSF & DSB; working memory) (Weschler, 1997)



 The Brown Peterson Paradigm (BP; Executive Function) (Peterson & Peterson, 1959)



Blue	Tan
Red	Red
Tan	Green
Blue	Red
Green	Tan

 The Trail Making Test A & B (TMT A & B; response time) (Lezak, 1995)





Analysis

- Descriptive Statistics (Table 1)
- Pain measure used was a survey question taken from a Health and General Information Survey where participants answered on a scale of 1 to 10 the amount of pain they experience
- Correlations:
- Pain and Brown Peterson Total Score
- Pain was not significantly associated with other cognitive measures
- Stepwise Multiple Regression
- Used to assess which was the best predictor of a participant's Brown Peterson Total Score. • Pain was found to be the most parsimonious predictor

Results

- Correlation found between pain and Brown Peterson Total Score • *r* = -.25, *p* < .001.
- Stepwise regression identified pain as the best predictor of cognitive performance.
- Once pain was taken into account, age predicted no additional unique variance.

Table 3: . Summary of Stepwise Regression in SPSS

Variable	В	SE	β	t	p	F	р
Step 1							
Pain	-0.105	0.03	-0.245	-3.491	0.001	12.189	0.001
R ²				0.060			
ΔR^2				0.060			

Note. Dependent variable: BP total, Predictors in the model: (Constant) and pain, Predictors (not entered): age, stiffness in the morning, and staying asleep

Conclusions

 Our results suggest that chronic pain is a better predictor of working memory performance than age.

Future Directions

- The identified relationship between pain and cognitive decline in patients with fibromyalgia should be examined in other pain disorders as well as other cognitive domains
- Participants with other chronic pain disorders (e.g. arthritis) could be recruited to investigate the relationship between pain levels and cognition

Selected References

- Moriarty, O., McGuire, B. E., & Finn, D. P. (2011). The effect of pain on cognitive function: A review of clinical and preclinical research. *Progress in Neurobiology*, (93), 385–404.
- Sanchez, C. A. (2011). Working through the pain: Working memory capacity and differences in processing and storage under pain. Psychology Press, *19*(2), 226. doi: 10.1080/09658211.2010.547861
- Söderfjell, S., Molander, B., Johansson, H., Barnekow-Bergkvist, M., & Nilsson, L. -. (2006). Musculoskeletal pain complaints and performance on cognitive tasks over the adult life span. Scandinavian Journal of Psychology, 47, 349–359. doi: 10.1111/j.1467-9450.2006.00540.x
- Yunus, M.B. (2007). Fibromyalgia and overlapping disorders: The unifying concept of central sensitivity syndromes. Seminar of Arthritis and Rheumatism, 36, 339-356. doi: 10.1016/j.semarthrit.2006.12.009