Longitudinal Change in Cognitive and Physical Measures in Fibromyalgia

Cortez, F.* ◆ Melendez, J.* ◆ Rutledge, D.N.** ◆ Jones, C.J.ᵗ ◆ Zettel-Watson, L.* ◆ & Cherry, B.J.*

California State University, Fullerton

*Department of Psychology ◆ **School of Nursing ◆ ᵗDepartment of Health Science

Fibromyalgia

- Chronic widespread pain syndrome
  - Central sensitivity syndromes (Yunus, 2006)
- 5-6 million U.S.; 3-6% worldwide affected
  - (75-95% women)
- Potential cognitive and physical functional decline, as well as increased risk for falls (Rutledge et al., 2010)

Research Questions

- Over a four year period, are there changes in cognitive and physical performance?
- Are changes different for FM versus non-FM participants 50 years of age and older?

Longitudinal Study Overview

- Participants
  - 2008 70 FM76 non-FM
  - 2010 64 FM51 non-FM
  - 2012 46 FM57 non-FM
- Measures
  - Medical history, medications, BMI, physical activity level (RAPA), MOS social support survey
  - 19 symptoms (NFMAQ), Composite Physical Function, Beck Depression Inventory
  - Cognitive, physical performance

Methods: Participants

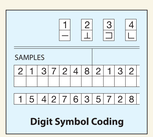
Table 1. Demographic Characteristics at Baseline (first of at least two time points)

	FM				Non-FM			
Characteristics	n	Mean	SD	Range	n	Mean	SD	Range
Age (years)	97	59.63	7.41	50-97	87	67.82	8.57	50-87
Education (years)	97	16.21	2.69	12-20	87	16.94	2.59	12-20
Body mass index	95	29.39	7.39	16.30-54.90	86	27.31	4.84	18.70-45.00
Female (%)	97	94.85			87	71.26		
Race (%)	94				87			
Caucasian		89.36				88.51		
African American		2.13				0.00		
Asian/Pacific Islander		0.0				10.34		
Other		2.13				0.00		
Multiracial		6.38				1.15		

Cognitive Assessments

- Mini-Mental State Examination
- Everyday Problem Test
- Stroop Color/Word
- Digit Span Forward
- Digit Span Backward
- Trail Making Test A
- Trail Making Test B
- Digit Symbol Coding
- Brown Peterson (2)
- Category fluency (2)
- CERAD 10-item word list (1)

EPT: Questions on
Health/medication
Finances
Transportation



Digit Symbol Coding

Stroop Color-Word Test

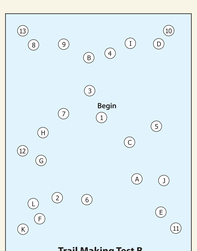
Name the color of the ink in which the word is printed.
Stroop (1935)

BLUE	GREEN	YELLOW
PINK	RED	ORANGE
GREY	BLACK	PURPLE
TAN	WHITE	BROWN

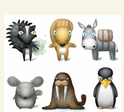
Digit Span

71504
284936
8351609
25736184
940627135
2753180649

XTZ
768 – 3….



Trail Making Test B



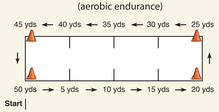
CERAD 10-item word list
Immediate recall
Delayed recall
Recognition

Physical Assessments

- 30-second chair stand
- 8-foot up and go
- 6-minute walk
- Three of five measures from the Senior Fitness Test (Rikli & Jones, 2001)
- Fullerton Advanced Balance scale
- Walk velocity (30 feet)
  - Fast; Preferred
  - Not reported here

30-second chair stand
(lower body strength/endurance)

6-minute walk
(aerobic endurance)



8-foot up and go
(agility and balance)

Fullerton Advanced Balance (FAB) Scale

- Measures static and dynamic balance
  - 10-items
  - Up to 40 points
  - ↑ scores → better balance
- **Step up and over**
- **Tandem walk**
- **Stand on one leg, eyes open**
- **Stand on foam, eyes closed**
- Stand with feet together, eyes closed
- Reach forward to retrieve object
- Turn in a full circle
- **Two footed jump for distance**
- Walk with head turns
- Unexpected backward release

■ *best predictors of fall status*

30-foot walk
(gait)

Procedure

- 2008: Two 60 min. sessions, tested individually
  - ***Day 1***
  - Informed consent
  - Demographics, medications, symptoms
  - ***Day 2***
  - Beck Depression Inventory
  - Cognitive tasks
  - Physical tasks
- 2010, 2012: Two to three hour sessions on one day

Data Analysis

- Covariates associated with outcome variables
  - Cognitive, Physical—Age, Education
  - Symptoms—Body mass index (BMI)
- Missing data
  - PROC MIXED analysis in SAS
- Repeated measures analyses of covariance
  - Group (FM versus nonFM); Time main effects
  - Group by Time interaction

Results

Table 2. Results: Cognitive

	Non-Fibromyalgia group: M (SE)			Fibromyalgia group: M (SE)		
Cognitive	Baseline	2 years	4 years	Baseline	2 years	4 years
EPT ratio (#/min.)	1.31 (0.05)	1.40 (0.05)	1.42 (0.06)	1.12 (0.05)	1.23 (0.05)	1.24 (0.06)
Stroop C (s)	60.59 (1.36)	58.25 (1.39)	60.04 (1.75)	62.06 (1.37)	60.41 (1.33)	62.47 (1.73)
Stroop CW (s)	146.56 (3.99)	137.07 (4.30)	140.73 (6.09)	154.66 (4.06)	149.12(4.05)	149.26 (5.87)
DSF (#)	9.68 (0.23)	10.33 (0.30)	9.57 (0.36)	9.92 (0.24)	9.93 (0.30)	10.13 (0.37)
DSB (#)	6.94 (0.24)	6.84 (0.27)	6.63 (0.35)	6.55 (0.24)	6.93 (0.27)	6.52 (0.36)
Trails A (s)	35.40 (1.61)	31.62 (1.91)	30.84 (2.63)	39.50 (1.62)	32.71 (1.87)	32.75 (2.75)
Trails B (s)	86.00 (4.06)	87.06 (5.99)	88.18 (8.59)	86.48 (4.25)	86.88 (5.85)	87.95 (8.67)
DSS (#)	63.58 (1.72)	70.20 (1.59)	70.17 (1.87)	59.34 (1.73)	65.39 (1.49)	66.04 (1.82)
Animals (#)	21.29 (0.59)		20.43 (0.94)	19.33 (0.66)		18.80 (1.00)
BP 0 (#)		4.82 (0.08)	4.99 (0.03)		4.98 (0.08)	4.93 (0.04)
BP distr (#)		2.70 (0.17)	2.93 (0.18)		2.10 (0.17)	2.25 (0.19)

Table 3. Results: Physical

	Non-Fibromyalgia group: M (SE)			Fibromyalgia group: M (SE)		
Physical	Baseline	2 years	4 years	Baseline	2 years	4 years
FAB*	34.19 (0.51)	33.41 (0.56)	33.40 (0.80)	30.28 (0.52)	30.51 (0.55)	30.22 (0.85)
30 Second Chair Stand (# of stands)	13.22 (0.41)	13.98 (0.43)	13.29 (0.54)	9.84 (0.41)	10.43 (0.42)	10.74 (0.54)
8 Foot Up and Go (time in sec.)	5.55 (0.20)	4.94 (0.18)	5.76 (0.22)	6.38 (0.20)	5.98 (0.18)	6.86 (0.21)
6 Minute Walk (# of yards)	600.33 (10.04)	604.21 (11.84)	600.04 (13.20)	517.67 (10.52)	504.27 (11.84)	503.90 (13.20)

*FAB = Fullerton Advanced Balance Scale—0 to 40; higher score = better balance

Table 4. Results: Symptoms

	Non-Fibromyalgia group: M (SE)			Fibromyalgia group: M (SE)		
Measures*	Baseline	2 years	4 years	Baseline	2 years	4 years
Pain	1.97 (0.23)	2.45 (0.31)	1.49 (0.32)	6.14 (0.22)	5.68 (0.32)	5.88 (0.35)
Fatigue	2.01 (0.23)	1.98 (0.29)	1.95 (0.32)	6.23 (0.22)	6.38 (0.30)	6.42 (0.37)
Not feeling rested after sleep	2.74 (0.30)	2.59 (0.33)	2.63 (0.42)	6.36 (0.28)	6.07 (0.34)	5.18 (0.47)
Morning stiffness	2.54 (0.27)	2.56 (0.35)	2.16 (0.41)	6.48 (0.26)	5.98 (0.36)	6.32 (0.45)
Forgetfulness	2.03 (0.25)	2.00 (0.29)	2.11 (0.32)	5.37 (0.24)	5.68 (0.30)	5.26 (0.35)
Concentration problems	1.35 (0.25)	1.26 (0.29)	1.24 (0.33)	5.43 (0.24)	5.58 (0.29)	5.23 (0.36)
Postural instability	1.25 (0.24)	1.11 (0.24)	1.27(0.38)	3.00 (0.23)	2.65 (0.25)	3.67 (0.42)

*0 to 10 scale, higher scores = worse symptoms

Conclusions

- Cognitive
  - Executive function (Stroop Color/Word test, fluency, problem solving) and
  - Processing speed (Digit Symbol, Trails A) showed both Group and Time main effects
  - Poorer performance FM versus non-FM
  - Change over time
  - No Group by Time interactions
- Physical
  - Balance (FAB)
  - Agility and balance (8-foot up and go) showed both Group and Time main effects
  - Poorer performance FM versus non-FM
  - Poorer performance over time
- Symptoms
  - FM versus non-FM reported higher symptoms over time on all items
- Limitations
  - Small sample size
  - Generalizability
- Future directions
  - Additional data points (e.g., 2014)

Selected References

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