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Modifiable Predictors of

Perceived Cognitive Abilities

in

Persons with Longstanding MS

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Background

Cognitive Impairment in MS

- Prevalence 43 ~ 70%
- Domains most commonly impaired
  - *Attention, memory, information processing*, planning, organization, problem solving, visual and spatial perception, and language use
- Consequences
  - DMD adherence, social and personal relationships, family roles, safety (driving accidents and falls), self-esteem and employability
- Significance
  - Under diagnosed
  - Poorly managed
  - Currently no definitive pharmacological or non-pharmacological treatments for cognitive deficits in MS

Amato et al., 2013; Benedict & Zinvadinov, 2011; Bobholz & Rao, 2003; Chiaravalloti & DeLuca, 2008; Kalmar et al., 2008; Langdon, 2011; Schultheis et al., 2001

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Study Variables

Stress

•Higher levels of stress have been associated with increased risk for MS relapses, exacerbations and disease activity on MRI

•Stress management interventions have been demonstrated to produce benefits including improved mood, fatigue, and quality of life among people with MS

Depression

•Lifetime prevalence 36 – 54%

•Profound impact on cognitive and psychosocial functioning

•Represents the single most important predictor of QoL

•Frequently under diagnosed and left untreated

•Evidence supporting the effectiveness of pharmacologic and cognitive-behavioral therapies in the treatment of depression in MS is equivocal

Goretti et al., 2010; Lovera & Reza, 2013; Lupien et al., 2007; Minden et al., 2014; Mitsonis et al., 2009; Mohr et al., 2012; Siegart & Abernethy, 2005

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Study Variables

Fatigue

- Leading symptom in MS
- Prevalence 50 ~ 90%
- Negatively impacts social, emotional, cognitive, and physical functioning
- Related to lower health-related quality of life and unemployment
- Therapeutic regimens lack robust effects

Pain

- Prevalence 40 to 80%
- One of the worst, most debilitating symptom for many
- Uncontrolled, ongoing pain experienced by large proportion
- Evaluation of pain severity and interference is complex
- Biomedical treatments result in only modest reductions in pain severity

Amato et al., 2003; Beard et al., 2003; Brown & Kraft, 2005; Foley et al., 2013; Harrison, 2014; Kerns et al., 2002; Kluger, Krupp, & Enoka, 2013; Krupp, 2003; Reitberg et al., 2011; Stenager et al., 1991
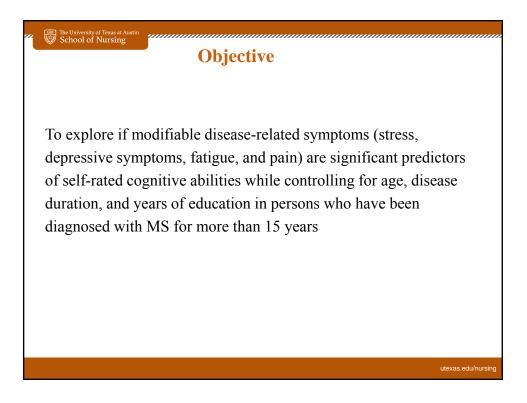
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Objective

To explore if modifiable disease-related symptoms (stress, depressive symptoms, fatigue, and pain) are significant predictors of self-rated cognitive abilities while controlling for age, disease duration, and years of education in persons who have been diagnosed with MS for more than 15 years

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Methods

Data were derived from the 2014 survey of a longitudinal health promotion study of persons with MS

Original survey study conducted in 1996
- Letters were sent to 2,772 addresses from the South East Chapter of the NMSS
- 936 responded
- 834 returned surveys (89%)

The longitudinal study started in 1999
- Follow-up to the 1996 study
- 621 of those eligible and reachable re-consented and entered the study
- Surveys are mailed to active participants annually via USPS
- Response rates have been > 80% throughout the study

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Instruments

Perceived Stress Scale (Cohen, 1988)
- Degree that life circumstances are appraised as having been stressful in the previous 4 weeks
- 10-item summated scale
- 0 (never) to 4 (very often)

Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977)
- 10-item summated scale
- 1 (Rarely or none of the time/less than 1 day) to 4 (Most or all of the time/5-7 days)
- Measure of depressive symptoms experienced over past week
- Scores $\geq$10 are considered indicative of symptoms of depressive mood (Andresen, 1994)

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Instruments

NIH Patient Reported Outcomes Measurement Information System (PROMIS®) Scales

Higher scores reflect more of the concept being measured over the 7 days prior to testing

Cognitive Abilities
- 8 items
- 1 (Not at all) to 5 (Very much)

Fatigue
- 8 items
- 1 (Not at all/Never) to 5 (Very much/Always)

Pain – Intensity
- 3 items – Worst/Average/Now
- 1 (No pain) to 5 (Very severe)

http://www.nihpromis.org

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Demographics
N=300

88% Female
63% Married

Age
- Mean 64.3 $\pm$ 9.0
- Range 39 to 90

Disease Duration
- Mean 27.3 $\pm$ 6.6
- Range 18 to 57

Education
- 77% have 12+ years
- 41% have 16+ years

Employment
- 16% working FT or PT
- 25% unemployed due to disability
- 45% retired

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Results

Measure	Mean (SD)
PROMIS Cognitive Abilities	42.2* (4.5)
PROMIS Fatigue	52.5* (7.3)
PROMIS Pain Intensity	46.2* (10)
Perceived Stress Scale	14.9 (8.3)
CESD-10	12.0 (4.4)

* t-scores

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Correlations

	1	2	3	4	5	6	7	8
1. PROMIS Cognitive Abilities	-							
2. Age	.16**	-						
3. MS Duration	.05	.38**	-					
4. Years Education	.13*	.01	-.02	-				
5. PSS	-.58**	-.11*	-.05	-.14*	-			
6. CESD-10	-.58**	-.12*	-.07	-.13*	.65**	-		
7. PROMIS Fatigue	-.61**	-.05	-.02	-.15*	.56**	.62**	-	
8. PROMIS Pain Intensity	-.37**	-.02	-.01	-.11*	.38**	.41**	.50**	-

N = 295, *p<.05, **p<.01

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Cognitive Abilities

		B	SE B	β	t	*p*	R²*	Δ R²	*p*
Step 1	Age	.11	.04	.16	2.6	.01			
	Years Education	.33	.14	.13	2.32	.021			
	MS Duration	-.01	.06	-.01	-.14	.89	.03	.043	.005
Step 2	PROMIS Fatigue	-.32	.06	-.34	-5.67	.000			
	CESD-10	-.26	.09	-.18	-2.93	.004			
	PSS	-.19	.04	-.25	-4.22	.000			
	PROMIS Pain Intensity	-.06	.10	-.03	-.54	.59	.47	.436	.000

*Adjusted R^2

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Limitations

- Cross-sectional study

- Self-report data

- Convenience sample composed of persons with longstanding MS (18+ year duration)

- Community residing rather than clinic-based sample

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Conclusions

47% of the variance in *perceived cognitive abilities* is explained by *perceived stress, depressive symptoms, pain, and fatigue* in this sample of persons with longstanding MS

This finding supports the expected theoretical relationships between modifiable symptoms and perceived cognitive abilities and is consistent with research findings from other studies

Perceived stress, depressive symptoms, pain and fatigue *are largely modifiable with behavioral interventions* and hold potential as targets for future interventions to improve perceived cognitive abilities in persons with longstanding MS

Asano & Finlayson, 2014; McGuire et al., 2015; Simpson et al., 2015; Stuifbergen et al., 2003

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Questions?

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