



Fatigue measured using the Neurological Fatigue Index is associated with poor sleep quality and inattentiveness in people with Multiple Sclerosis

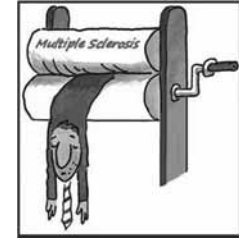
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Introduction

- Variety of signs and symptoms
 - Numbness and tingling
 - Dizziness and vertigo
 - Fatigue
 - Cognitive impairments
 - Depression and Anxiety
 - Sleep disturbances
 - Visual deficits
 - Balance and Walking difficulties



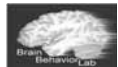
(Wingerchuk et al. 2014, Motl et al. 2009)



Introduction

- Fatigue in MS
 - Affects up to 90% of individuals
 - Described as the worst symptom by 40%
 - Negatively affects performance of daily physical and mental tasks
 - Major cause of unemployment
 - Measured using self-reported scales
 - Multidimensional (associated with other common symptoms)

(Berger et al. 2013, Braley et al. 2010)



Introduction

- Cognitive impairments in MS
 - Affects up to 70% of individuals
 - Most common domains affected are speed of information processing and attention
 - Negatively affects individual quality of life
- Sleep Disturbances in MS
 - 50% have a diagnosable sleep disorder
 - Affects daily function and work load
 - Associated with reduced employment rate

(Ruet et al. 2015, Braley et al. 2015)

Introduction



- Recent evidence shows psychometric issues in commonly used fatigue scales in the MS population

Problem: Interpretation of previous studies might be difficult! And using the same common scales without proper evaluation affects study results!

Need a more accurate fatigue scale...??!!

(Mills et al. 2014, Larson et al. 2013)

Introduction



- The Neurological Fatigue Index (NFI-MS)
 - Validated in people with MS
 - Follows guidelines from the FDA for developing outcome measures
 - Follows the standards of the psychometric model analysis for developing patient reported outcomes
 - ONLY known fatigue scale to have sleep components!

Unknown if the NFI-MS is associated with poor sleep quality and cognitive function in people with MS.....

(Mills et al. 2010)

Purpose of study



- To examine the relationship between fatigue (NFI-MS) and sleep quality
- To examine the relationship between fatigue (NFI-MS) and cognitive function (attention)

..... In people with MS

Materials and methods



- Participants recruited from MS clinic located at the Landon center on Aging and personal referral from consented subjects
- Cross sectional design
- Data collection took place in Brain Behavior Lab (BBL) at KUMC
- Written informed consent obtained from all study participants

Materials and methods



- **Inclusion criteria**
 - 18-60 years of age
 - Relapsing remitting or secondary progressive MS
 - Able to ambulate with or without an assistive device
 - Score > 24 on the Mini Mental Status Exam (MMSE)
- **Exclusion criteria**
 - History of alcohol/drug abuse or nervous system disorder other than MS
 - Severe physical, neurological, or sensory impairments that would interfere significantly with testing
 - Developmental history of learning disability or attention-deficit/hyperactivity disorder
 - Relapse and/or corticosteroid use within four weeks of assessment
 - Untreated sleep disorder (such as sleep apnea)
 - Uncorrected vision loss that would interfere significantly with testing.

Materials and methods



- **The NFI-MS**
 - Four sub-scales (physical, cognitive, relief by diurnal sleep or rest, and abnormal nocturnal sleep and sleepiness)
 - 23 questions (Likert scale from 0-3) with higher score indicating more fatigue
 - Measures fatigue in the past two weeks

(Mills et al. 2010)

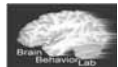
Materials and methods



- **The Pittsburgh Sleep Quality Index (PSQI)**
 - Gold standard self-reported sleep quality measure
 - 19 self-rated questions
 - Each question is rated on a scale of 0-3 with 0 indicating no sleep difficulty and 3 indicating severe sleep difficulties
 - A single global score ranging from 0–21
 - A cutoff value of > 5 reflects poor sleep quality

(Buysse et al. 1989)

Materials and methods



- **The Continuous Performance Test (CPT)**
 - A well-known computerized measure of sustained attention
 - Participant seated in front of a computer screen and instructed to press the space bar when any letter of the alphabet except the letter X appeared on the monitor
 - Takes 14 minutes to complete
 - Outcome measure is Hit Reaction Time (HRT)
 - Higher HRT score indicates decreased attention/inattentiveness

(Connors et al. 2014)



Results

- Total 52 participants enrolled
 - 44 females
 - 47 relapsing remitting and five with secondary progressive

Variable	Mean	Std. Deviation
Age	46.8	10.1
Disease Duration	12.4	7.5
PDDS (Disease severity)	1.8	1.6
MMSE (Global cognitive function)	28.7	1.5
BDI (Depression)	3.6	3.1

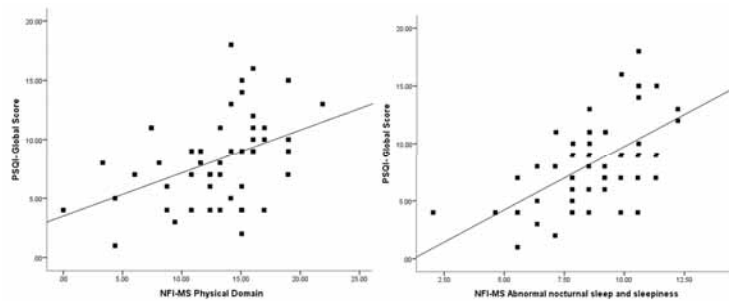


Results

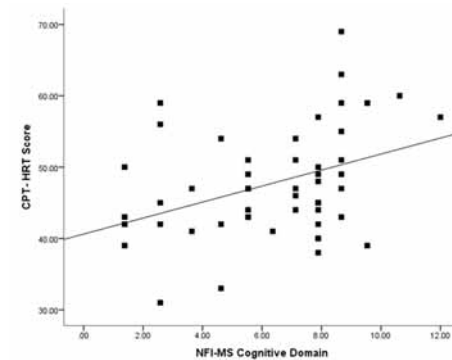
NFI-MS		PSQI - Global score	CPT- HRT score
Physical Domain	r	.431	.242
	p	.001*	.087
Cognitive Domain	r	.240	.383*
	p	.087	.006
Relief by diurnal sleep	r	.118	.145
	p	.403	.311
Abnormal nocturnal sleep	r	.579*	-.019
	p	≤ .001	.895



Results



Results



Discussion



- Findings emphasize the need for health care providers to consider the assessment of sleep quality and possibly address sleep disturbances as part of the treatment plan
- Cognitive fatigue affects sustained attention which is necessary for individuals to effectively perform continuous and repetitive activities
- The NFI-MS can be easily administered and used in research and clinical settings

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Thank you!



**ANY
QUESTIONS?**