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# Cognitive Impairment in Multiple Sclerosis: A Look at Phenotypes

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## BACKGROUND

Although up to 70% of MS patients experience cognitive impairment at some point during their disease course, cognitive impairment often receives little attention, is under-recognized and is poorly evaluated in routine practice due in part to lack of suitable tools.[1] Although cognitive impairment is present in all MS phenotypes, there is an increased frequency in progressive forms most likely due to patient age rather than disease phenotype.[2–4]

The Multiple Sclerosis Association of America (MSAA) and @Point of Care have collaborated and developed complementary apps for use by patients and their clinicians which facilitate sharing of data: *My MS Manager*™, a patient app, and Multiple Sclerosis @Point of Care, a clinician app, respectively. In a recent collaboration, MSAA and @Point of Care added a patient self-administered cognitive function assessment tool, PROMIS® v2.0 Cognitive Function-Short Form 8a, to the *My MS Manager*™ patient app. These data were aggregated by MS phenotype to determine differences in cognitive function scores across phenotypes.[5]

## OBJECTIVE

This analysis evaluates cognitive impairment by MS phenotype as self-reported by MS patients utilizing the PROMIS v2.0 Cognitive Function-Short Form 8a tool in the *My MS Manager*™ app, and the utility of incorporating these apps/tool into the practice setting to inform patients and clinicians.

## METHODS

The PROMIS v2.0 Cognitive Function-Short Form 8a tool was launched on the *My MS Manager*™ app 3/6/19 and within 8 weeks, more than **538 patients (RRMS: 462; SPMS: 40; PPMS: 36)** had accessed this tool. To assess cognitive impairment in MS patients by phenotype, @Point of Care analyzed data from patients who had both 1) self-reported their phenotype in their *My MS Manager*™ app, and 2) self-reported their cognitive function in the PROMIS v2.0 Cognitive Function-Short Form 8a tool in this app (8 questions), utilizing a Likert scale (never, rarely, sometimes, often, very often). Comparisons were made to look at phenotypic differences.

### PROMIS® v2.0 Cognitive Function-Short Form 8a tool* includes the following questions[5]

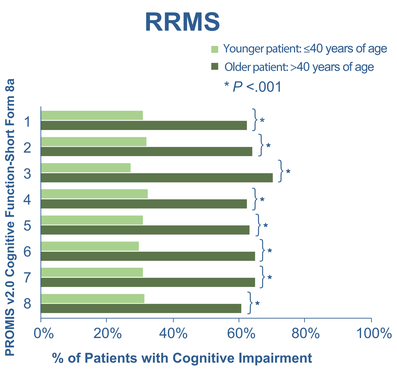
[Likert scale: never, rarely, sometimes, often, very often]

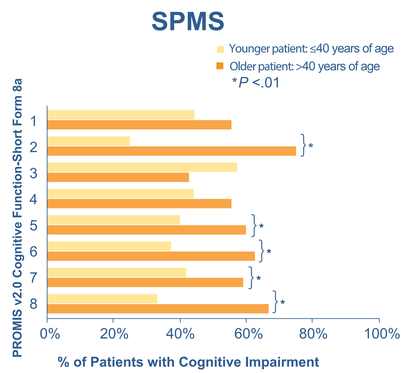
1. My thinking has been slow.
2. It has seemed like my brain was not working as well as usual.
3. I have had to work harder than usual to keep track of what I was doing.
4. I have had trouble shifting back and forth between different activities that require thinking.
5. I have had trouble concentrating.
6. I have had to work really hard to pay attention or I would make a mistake.
7. I have had trouble forming thoughts.
8. I have had trouble adding or subtracting numbers in my head.

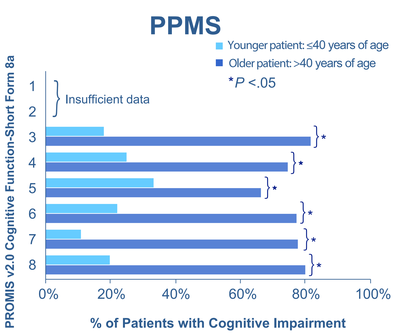
*Northwestern University is the official distributer of PROMIS®. Funding for PROMIS was provided by the National Institutes of Health.

## RESULTS

### Cognitive Impairment Worsens With Age

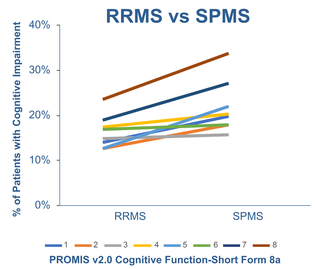


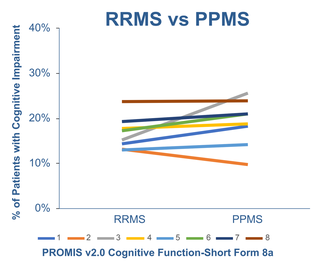




- RRMS: all questions analyzed; all 8 reflect **statistically significant cognitive worsening with age** (*P* <.001)
- SPMS: all questions analyzed; 5/8 reflect **statistically significant cognitive worsening with age** (*P* <.01) (Questions 2, 5, 6, 7, 8)
- PPMS: 6 of 8 questions analyzed; 6/8 reflect **statistically significant cognitive worsening with age** (*P* <.05) (Questions 3, 4, 5, 6, 7, 8)

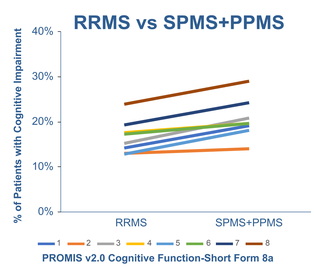
### Trends: Worsening Cognitive Function




- **RRMS vs SPMS**
  - In looking at trends for worsening cognitive function (very often/often) when comparing RRMS patients with SPMS patients, SPMS patients were trending worse for all 8 questions

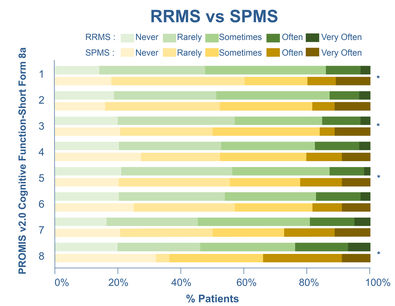



- **RRMS vs PPMS**
  - In assessing trends for worsening cognitive function (very often/often) when comparing RRMS patients with PPMS patients, PPMS patients were trending worse for 7 of 8 questions (questions 1, 3, 4, 5, 6, 7, 8). These questions addressed slow thinking, trouble shifting back and forth between different activities, trouble concentrating, working harder than usual to keep track of what they were doing, working really hard to pay attention or would make a mistake, trouble forming thoughts, and trouble adding and subtracting numbers in their head

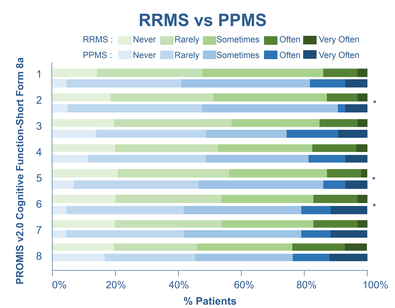



- **RRMS vs Progressive Forms of MS (SPMS + PPMS)**
  - In looking at trends for worsening cognitive function (very often/often) when comparing RRMS patients with both SPMS + PPMS patients (progressive forms of MS), SPMS + PPMS patients were trending worse for all 8 questions

### Cognitive Function Profile Comparisons




- In comparing RRMS with SPMS patients, SPMS patients had statistically different cognitive function score distributions for 4 of 8 questions (*P <.05). The focus of the 4 questions (questions 1, 3, 5, 8) included: slow thinking, trouble concentrating, work harder than usual to keep track of what I was doing, and have trouble adding and subtracting numbers in my head




- The findings also showed PPMS patients compared with RRMS patients had statistically different cognitive function score distributions for 3 of 8 questions (*P <.05). The focus of the 3 questions (questions 2, 5, and 6) included: trouble concentrating, having to work really hard to pay attention or would make a mistake, and "brain not working as well as usual"

## CONCLUSIONS

Cognitive impairment affects a high percentage of MS patients during the course of their disease. The severity of cognitive impairment associated with MS can vary by phenotype and, overall, worsens with age. Patients with RRMS phenotype and cognitive deficits fare better than those with the progressive forms of MS.

- In looking at trends for worsening cognitive function by phenotype (Likert scale: very often/often)
  - SPMS compared with RRMS patients were trending worse for all 8 questions
  - PPMS compared with RRMS patients were trending worse for 7 of 8 questions
  - Both SPMS + PPMS compared with RRMS patients were trending worse for all 8 questions
- SPMS patients compared with RRMS patients had statistically different cognitive function on 4 of 8 questions (P <.05)
- PPMS patients compared with RRMS patients had statistically different cognitive function in 3 of 8 questions (P <.05)
- The *My MS Manager*™ patient app provides an easy way for patients, especially those with cognitive impairment, to enter and track their MS disease and share this share this information with their clinicians
- The new addition of the PROMIS v2.0 Cognitive Function-Short Form 8a Tool has been well received by patients as reflected in rapid uptake and use. Utilizing a simple app tool to capture cognitive deficits allows patients to easily share their cognitive data with their clinicians

**References**

1. Cotter J, Vithanage N, Colville S, et al. Investigating domain-specific cognitive impairment among patients with multiple sclerosis usingtouchscreen cognitive testing in routine clinical care. *Front Neurol*. 2018;9:331.
2. Ruet A, Deloire M, Charré-Morin J, Hamel D, Brochet B. Cognitive impairment differs between primary progressive and relapsing-remitting MS. *Neurology*. 2013;80:1501-1508.
3. Brochet B, Ruet A. Cognitive impairment in multiple sclerosis with regards to disease duration and clinical phenotypes. *Front Neurol*. 2019;10:261.
4. Ruano L, Portaccio E, Goretti B, et al. Age and disability drive cognitive impairment in multiple sclerosis across disease subtypes. *Mult Scler J*. 2017;23:1258-1267.
5. Patient-Reported Outcomes Measurement Information System (PROMIS®). Cognitive function. Accessed 5/16/19 at: http://www.healthmeasures.net/images/PROMIS/manuals/PROMIS_Cognitive_Function_Scoring_Manual.pdf

**Author Disclosures:**

1 @Point of Care—Elaine Rudell, CHCP, Patty Peterson, CHCP, Tarjani Agrawal, PhD, and Michele Ingram, BS, have no relevant relationships to disclose.

2 Multiple Sclerosis Association of America—Andrea Griffin, BS, has no relevant relationships to disclose.

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