# Impact of Multiple Sclerosis Disease Type on Productivity in a Propensity-Matched Cohort of NARCOMS Participants


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## BACKGROUND

- Multiple sclerosis (MS) is typically diagnosed in people aged between 20 and 40 years, while they are of working age
- The chronic nature of the disease has adverse effects on employment, with rates of those not working ranging between 40 and 80%
- As patients with primary progressive MS (PPMS) represent a small proportion of all MS patients, less is known about employment and productivity loss specifically in PPMS

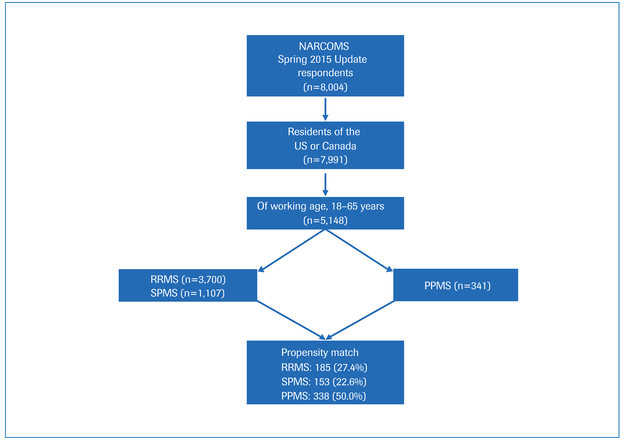
## OBJECTIVE

- To compare employment status of persons with PPMS vs those with relapsing-remitting MS (RRMS) or secondary progressive MS (SPMS)

## METHODS

- NARCOMS Spring 2015 Update survey respondents who met the following criteria were included in this analysis:
  - Residents of USA or Canada
  - Age 18 to 65 years
  - Reported an MS type of RRMS, SPMS or PPMS
- The study cohort was divided into 2 groups: RRMS/SPMS and PPMS
- Propensity-matching method was nearest neighbor caliper width=0.2*logit (SD) (**Figure 1**)
- Matching variables were age, sex and disability as measured by the Patient Determined Disease Steps (PDDS)
- The demographic and clinical characteristics of the unmatched and matched cohorts are summarized in **Table 1**
- Marital status, type of residence and annual household income were similar between the matched groups
- Tests that account for the matched nature of the sample were used to examine differences in employment (yes/no), absenteeism and quality of life
- Physical and mental quality of life were measured using the RAND-12

### Figure 1. Disposition of the study cohort




NARCOMS, North American Research Committee on Multiple Sclerosis; PPMS, primary progressive multiple sclerosis; RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis.

### Table 1. Demographics and clinical characteristics of the unmatched and matched cohorts

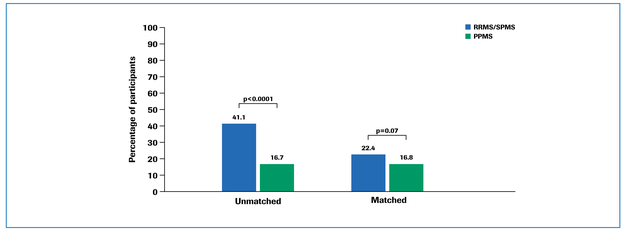
| Characteristics | Unmatched | | Propensity-matched | |
|---|---|---|---|---|
| | RRMS/SPMS (n=4,807) | PPMS (n=341) | RRMS/SPMS (n=338) | PPMS (n=338) |
| **Age in 2015, mean (SD), years** | 54.3 (8.1) | 58.1 (5.9) | 58.1 (5.7) | 58.1 (5.9) |
| **Female, n (%)** | 3793 (78.9) | 197 (57.8) | 194 (57.4) | 195 (57.7) |
| **White, n (%)** | 4346 (92.6) | 293 (90.2) | 305 (93.6) | 290 (90.1) |
| **Annual household income, n (%)** | | | | |
| <$15,000 | 339 (7.1) | 33 (9.8) | 37 (11.1) | 32 (9.6) |
| $15,001–$30,000 | 587 (12.3) | 52 (15.4) | 59 (17.7) | 50 (14.9) |
| $30,001–$50,000 | 667 (14.0) | 62 (18.3) | 42 (12.6) | 62 (18.5) |
| $50,001–$100,000 | 1,171 (24.5) | 86 (25.4) | 74 (22.2) | 86 (25.7) |
| >$100,000 | 985 (20.6) | 31 (9.2) | 44 (13.2) | 31 (9.3) |
| I do not wish to answer | 1,026 (21.5) | 74 (21.9) | 78 (23.4) | 74 (22.1) |
| **Health insurance type, n (%)** | | | | |
| Private | 2,441 (52.8) | 91 (27.8) | 105 (31.4) | 90 (27.8) |
| Public | 1,312 (28.4) | 148 (45.3) | 145 (43.4) | 146 (45.1) |
| Private + public or other | 792 (17.1) | 84 (25.7) | 79 (23.7) | 84 (25.8) |
| Other | 76 (1.6) | 4 (1.2) | 5 (1.5) | 4 (1.2) |
| **Disease duration, mean (SD), years** | 17.8 (8.1) | 16.9 (7.9) | 19.5 (8.7) | 16.8 (7.9) |
| **PDDS, median (25%, 75%)** | 2 (0,4) Mild Disability (Normal, Early Cane) | 4 (3,6) Moderate Disability (Early Cane, Bilateral Support) | 4 (3,6) Moderate Disability (Early Cane, Bilateral Support) | 4 (3,6) Moderate Disability (Early Cane, Bilateral Support) |

PDDS, Patient Determined Disease Steps; PPMS, primary progressive multiple sclerosis; RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis.

## RESULTS

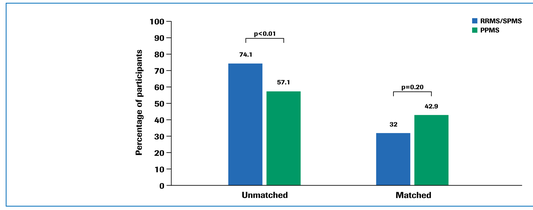
- After matching, the percentages of participants who were employed vs unemployed (**Figure 2**), employed full-time vs part-time (**Figure 3**), and on disability insurance (**Figure 4**) no longer significantly differed between groups

### Figure 2. Percentage of participants who were employed



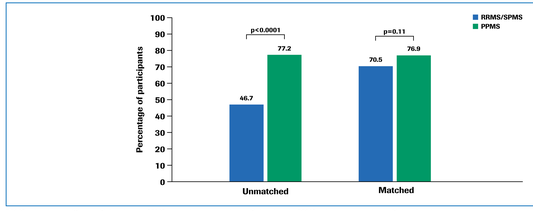

RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis.

### Figure 3. Percentage of employed participants who were working full-time




RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis.

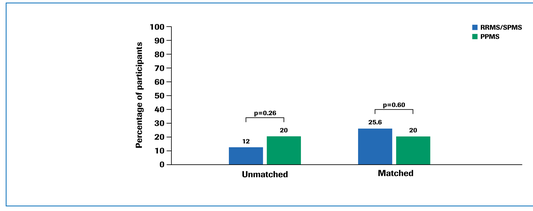
### Figure 4. Percentage of participants on disability insurance




RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis.

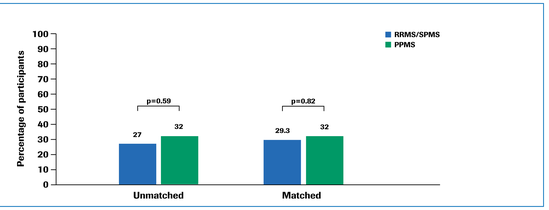
- After matching, participants who were employed full-time were found to have no statistically significant differences on measures of absenteeism (reduced hours, missed workdays and median number of missed workdays; **Figures 5 and 6**)

### Figure 5. Percentage of participants employed full-time who reduced hours




RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis.

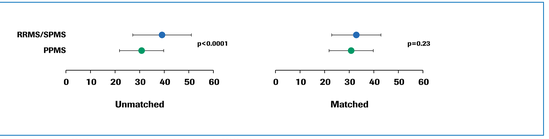
### Figure 6. Percentage of participants employed full-time who missed workdays




RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis.

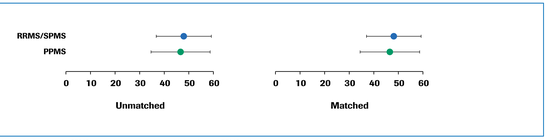
- Although the composite physical quality of life was lower (worse) for PPMS in the unmatched comparison (RRMS/SPMS, mean [SD], 46.9 [10.2] vs PPMS, mean [SD], 37.5 [10.0]; p<0.0001), after matching, quality of life did not differ between groups (p=0.23; **Figure 7**)
- The mental quality of life was similar between the groups in both the unmatched and matched comparisons (**Figure 8**)
- The physical functioning (p<0.0001), role functioning physical (p<0.0001), vitality (p=0.04) and social functioning (p<0.01) subscale scores were lower for PPMS than for RRMS/SPMS in the unmatched and matched cohorts

### Figure 7. Physical component summary–12 of the RRMS/SPMS and PPMS study cohorts




RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis.

### Figure 8. Mental component summary–12 of the RRMS/SPMS and PPMS study cohorts




RRMS, relapsing-remitting multiple sclerosis; SPMS, secondary progressive multiple sclerosis; PPMS, primary progressive multiple sclerosis

## CONCLUSIONS

- **After matching for age, disability and sex, compared with RRMS or SPMS, working-age registry participants with PPMS demonstrated similar levels of employment-related issues but lower quality-of-life scores**
- **These findings underscore the unmet need for effective treatments for the PPMS population**

## DISCLOSURES

AS has nothing to disclose; NT is an employee of Genentech, Inc.; GRC data and safety monitoring boards: Apotex, Biogen-Idec, Cleveland Clinic (Vivus), GlaxoSmithKline Pharmaceuticals, Gilead Sciences, Horizon Pharmaceuticals, Modigenetech/Prolor, Merck/Ono Pharmaceuticals, Merck, Merck/Pfizer, Neuren, Sanofi, Teva Pharmaceuticals, Washington University in St. Louis, NHLBI (protocol review committee), NINDS, NICHD (OPRU oversight committee); consulting or advisory boards: Consortium of MS Centers (grant), D3 (Drug Discovery and Development), Genentech, Inc., Genzyme, Janssen Pharmaceuticals, Klein Buendel Incorporated, MedImmune, Novartis, Opexa Therapeutics, Receptos, Roche, EMD Serono, Teva Pharmaceuticals, TG Therapeutics, Inc., Transparency Life Sciences; TT has nothing to disclose; RAM has conducted clinical trials for Sanofi and receives research funding from CIHR, MS Society of Canada, National MS Society, CMSC, MS Scientific Research Foundation, Research Manitoba, Rx & D Health Research Foundation.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