INTRODUCTION

- Research among individuals with multiple sclerosis (MS) and studies of experimental autoimmune encephalomyelitis, an animal model of MS, suggest exercise might modify disease progression.
- Few prior studies have focused on whether physical activity is associated with incident MS.
- In this study, we examined whether physical activity levels during adulthood and early in life are associated with risk of MS.

METHODS

- **Design:** Prospective cohort study

  - **Population:** Nurses’ Health Study—cohort of 121,701 women started in 1976, women aged 30 to 55 in 1976. Follow-up for these analyses between 1986 (first year activity reported) and 2004.
  - Nurses’ Health Study II—cohort of 116,430 women followed between 1989 and 2009, who were 25 to 42 years old at baseline.

- **Case ascertainment:** Every 2 years, women reporting a diagnosis of MS are asked for permission to contact their neurologists and obtain pertinent information regarding their diagnosis including clinical history, MRI, and CSF test results. During follow-up, 564 women were confirmed as having definite or probable MS.

- **Exposure assessment:** At baseline, women reported average hours per week spent doing recreational activities. Each activity was assigned a metabolic equivalent score (MET), a measure of energy expenditure. For example, jogging was assigned a score of 7; running, 12. MET-hours per week for individual activities were summed to calculate a total MET-hours per week score.

  - In NHSII in 1997, women reported hours per week of walking, moderate and strenuous activity from ages 12 to 34, from which total MET-hours per week was derived.

- **Statistical analysis:** Cox proportional hazards models, adjusted for age, ethnicity, latitude of residence at age 15, pack-years of smoking, body mass index at age 18 and supplemental vitamin D intake, were used to estimate rate ratios. Cohort-specific relative rates were pooled using the inverse of the variances as weight. We assessed how physical activity of women with MS (relative to non-cases) changed before and after first MS symptoms and diagnosis.

RESULTS

<table>
<thead>
<tr>
<th>Categories of Total Activity (MET-h/week)</th>
<th>No. of women</th>
<th>Relative Rate</th>
<th>P trend, &lt;0.001</th>
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</thead>
<tbody>
<tr>
<td>&lt;21</td>
<td>21-36</td>
<td>36-48</td>
<td>48-72</td>
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<tr>
<td>&lt;21</td>
<td>16,487</td>
<td>16,646</td>
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<td>48-72</td>
<td>16,487</td>
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<td>72+</td>
<td>16,487</td>
<td>16,646</td>
<td>16,587</td>
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</tbody>
</table>

- **Table.** Selected characteristics of women in NHS and NHSII by total physical activity at baseline.

- **Figure 1.** Baseline Physical Activity and Rate of MS (NHS and NHSII pooled)

- **Figure 2.** NHSII Early-Life Activity and Rate of MS

CONCLUSIONS

- Baseline activity was associated with a reduced risk of incident MS, but there was no association between early-life activity and MS.
- We cannot rule out the possibility that women change their activity in response to pre-clinical MS.

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