People with MS face a myriad of barriers to PA due to a plethora of aspects such as disease progression and symptoms (e.g., fatigue, physical disability), lack of social support, safety concerns, and accessibility.

The social ecological model describes behaviour as influenced at the levels of

* individual (e.g. socio-demographic characteristics, social cognitions, attitudes, and skills)
* social environment (e.g. interactions in social networks, social supports, and work environments)
* physical environment (e.g. natural and built environments)
* policy (e.g. laws and regulations at the local, provincial, and national levels)

The social ecological model includes barriers and facilitators, by considering how environmental factors impact on accessibility and interact with personal factors to alter opportunities.

The interaction between barriers at the various levels of the social ecological model leads to low levels of PA among PwMS as well as other physical disabilities.

Here, we considered the social ecological model to categorize answers to the survey question 69, in which we asked participants to tick all of the answers that apply to them related to have stopped or done less some activities. In particular:

Individual

* *I am afraid of contracting COVID*
* *I am unwell with COVID*
* *My mental health (anxiety/depression) is poor*
* *My MS symptoms got worse*
* *I had an MS relapse*
* *I had a non-MS related injury*

Social Environment

* *Restrictions prevented me from exercising in groups*
* *I don’t have the support I need to do my chosen activity*
* *I have less motivation to exercise*
* *I stopped enjoying exercising*
* *I have reduced time for exercise (caring responsibilities, home schooling, etc.)*

Physical Environment

* *Classes were cancelled by the organiser*
* *I found it too hard*
* *I’m afraid of falling*
* *I had a fall*

Policy

* *Restrictions prevented me from going to the venue*
* *Venues closed (e.g. gym or pool closed)*
* *Access to my healthcare provider was reduced/stopped*

N/A

* *Not applicable, I have not started a new activity or increased my activity levels*

Answers to *Other (please describe)* were included in one of the categories depending on the description.

For each responder we counted the number of barriers in each category and we calculated the percentage of those reporting 0, 1 or >1 barriers to practice PA.

As results, we found that most respondents (57.90%) reported at least one barrier that could cause them to stop or do less PA. Significant differences were found by considering the disability groups with a higher percentage of respondents with moderate and severe disability reporting at least a barrier to practice PA (mild: 53.91%; moderate: 65.15%; severe: 60.69%; X2(2)=39.13, p<0.01).

The analysis using the social-ecological model showed that individual and physical environment barriers were significantly more often negatively impacting on performing PA in PwMS with moderate and severe disability levels (individual: X2(2)=70.48, p<0.01; social environment: X2(2)=6.21, p=0.18; physical environment: X2(2)=83.60, p<0.01; policy: X2(2)=7.43, p=0.11) (Table S2).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mild | Moderate | Severe |
|  | PRE | PRE | PRE |
| ALL CATEGORIES |  |  |  |
|  0 | 46.09 | 34.85 | 39.31 |
|  1 | 25.55 | 26.30 | 24.32 |
| >1 | 28.36 | 38.85 | 36.36 |
| INDIVIDUAL |  |  |  |
|  0 | 76.33 | 63.85 | 65.11 |
|  1 | 17.64 | 24.63 | 23.59 |
| >1 | 6.03 | 11.52 | 11.30 |
| SOCIAL ENVIRONMENT |  |  |  |
|  0 | 74.18 | 73.14 | 78.13 |
|  1 | 18.31 | 20.17 | 16.71 |
| >1 | 7.50 | 6.69 | 5.16 |
| PHYSICAL ENVIRONMENT |  |  |  |
|  0 | 87.18 | 75.65 | 78.13 |
|  1 | 11.30 | 16.45 | 15.48 |
| >1 | 1.52 | 7.90 | 6.39 |
| POLICY |  |  |  |
|  0 | 68.56 | 64.31 | 68.30 |
|  1 | 21.66 | 23.42 | 21.38 |
| >1 | 978 | 12.27 | 10.32 |

**Table S2. Barriers to physical activity following the socio ecological model.**