FEATURE ARTICLE

Australian Occupational Therapy Journal

WILEY

Occupational balance, quality of life, occupational performance, and disease-related factors in people with multiple sclerosis: A case–control study

Araceli Ortiz-Rubio[1] | Eva Månsson Lexell[2,3] | Carita Håkansson[4] | Alba Navas-Otero[1]

[1]Occupational Therapy Division, Department of Physical Therapy, Faculty of Health Sciences, University of Granada, Granada, Spain

[2]Department of Neurology, Rehabilitation Medicine, Memory Disorders and Geriatrics, Skåne University Hospital, Lund, Sweden

[3]Department of Health Sciences, Lund University, Lund, Sweden

[4]Division of Occupational and Environmental Medicine, Lund University, Lund, Sweden

Correspondence
Araceli Ortiz Rubio, Occupational Therapy Division, Department of Physical Therapy, Faculty of Health Sciences, University of Granada, Av de la Ilustración 60, Granada 18016, Spain.
Email: aortiz@ugr.es

Funding information
Formación Profesorado Universitario, Grant/Award Number: FPU 22/01543; University of Granada, Spain; unding for open access charge: Universidad de Granada / CBUA

Abstract

Importance: Multiple sclerosis is a chronic neurological progressive disease that can lead to different impairments. It may also impact individuals' quality of life and daily living, including occupational performance and occupational balance. However, occupational balance has not been thoroughly described in this population.

Objective: This study aimed to assess occupational balance in a sample of adults with multiple sclerosis, in comparison with a healthy control group.

Design: A descriptive case–control study was carried out. Adults with multiple sclerosis were matched by sex and age with a healthy control group.

Setting: The study was conducted in a community setting.

Participants: A total of 122 participants (61 adults with mulitple sclerosis and 61 healthy controls) were included in this study.

Outcomes and Measures: The following aspects were assessed: occupational balance, disease-related factors including disability and symptom severity, occupational performance, and quality of life total score and visual analogue scale.

Consumer and Community Involvement: Consumer and community members were not involved in the development or implementation of research or writing of this manuscript.

Results: Both groups had similar occupational balance total scores ($p = 0.05$), except for two items where the multiple sclerosis group rated lower on

'balance between obligatory/voluntary occupations' ($p = 0.002$) and 'balance between energy-giving/energy-taking occupations' ($p = 0.01$). A negative relationship was found between low disease severity and high occupational balance and between high health-related quality of life, high occupational performance, and high occupational balance.

Conclusions and Relevance: No differences between groups were found in OB, but the MS group experienced more problems with some items. Adults living with multiple sclerosis for many years may adapt by altering their roles, routines, and daily priorities, which may explain why occupational balance was similar between the groups. Occupational balance is a core concept related to all the measures in this study and is thus important to address.

PLAIN LANGUAGE SUMMARY

Multiple sclerosis is a disease that can lead to cognitive, emotional, and physical impairments. As a result, individuals with MS may experience difficulties performing single daily occupations and engaging in different occupations during a day, week, or period of their life; in other words, reaching occupational balance may be difficult. The aim of this study was to assess occupational balance in a sample of adults with multiple sclerosis compared to a control group. We included 61 adults with multiple sclerosis and compared them to 61 healthy adults of the same age and sex who did not have multiple sclerosis. Data were collected through self-reported questionnaires focusing on disease-related factors, occupational performance, quality of life, and occupational balance. Results showed that both groups had similar occupational balance, except for two aspects where the multiple sclerosis group rated lower on 'balance between obligatory/voluntary occupations' and 'balance between energy-giving/energy-taking occupations'. A negative relationship was found between low disease severity and high occupational balance and between high health-related quality of life, high occupational performance, and high occupational balance. In conclusion, although the multiple sclerosis group experienced more problems with a few aspects of occupational balance, there were no differences in overall occupational balance between both groups. Further, the results indicate that the higher disease severity and lower occupational performance, the lower occupational balance, whereas the higher occupational balance, the higher quality of life. This study shows the importance of not only focusing on disease severity and occupational performance but also considering measures of occupational balance with people with multiple sclerosis.

1 | INTRODUCTION

Multiple sclerosis (MS) is a chronic and progressive neurological disease that causes demyelination and neurodegeneration in the central nervous system (Trapp & Nave, 2008). MS may cause multiple impairments of a cognitive, emotional, or physical nature (Amatya et al., 2019; Browne et al., 2014). Impairments that are non-apparent for others are especially known to impact health (Parker et al., 2021) and quality of life (Hosseini et al., 2022). It is also well known that individuals with MS experience problems in their ability to successfully and satisfactorily perform the meaningful everyday tasks and roles essential for their life (i.e., self-care), work, and leisure, within their specific environment (Jansa et al., 2022; Pérez De Heredia-Torres et al., 2020), in all areas of daily occupations (Månsson Lexell et al., 2006). This ability of individuals to engage in the occupations they need and want to do in everyday life denominates occupational balance (OB). In turn, this can lead to profound changes in how the individuals perceive their sense of self (Graziano et al., 2025).

In the last 10–15 years, medical advancements have decreased disease development and impairments in several disorders, including MS (Selmaj et al., 2024). Fewer impairments imply that more people are able to and expected to engage in occupational areas such as social participation, work, and leisure. At the same time, many individuals with MS report problems with fatigue (Oliva Ramirez et al., 2021a) and cognitive impairments (Benedict et al., 2020). Such impairments may not be susceptible to medical treatments to the same extent as physical impairments. Moreover, despite being able to perform a single occupation, individuals' ability to perform and engage in the right amount and range of occupations in everyday life may still be difficult. That is, their possibility to find a balance between different types of daily occupations may be more difficult (Lindberg et al., 2021). This is particularly significant given the challenges faced by individuals with MS who experience fluctuating symptoms during the day (Powell et al., 2017). However, the gap in the current literature is not only the absence of studies focusing on exploring OB in individuals with MS. There is also a lack of understanding of how disease-related factors, occupational performance (OP), and quality of life are related to OB in individuals with MS.

There are different concepts in the literature that describe balance in everyday occupations. Two of them—life balance and OB—have gained attention within the field of occupational therapy. Life balance is defined as 'a satisfying pattern of daily occupations that is healthful, meaningful, and sustainable to an individual within the

---

Key Points for Occupational Therapy

- Adults with multiple sclerosis may obtain the same total occupational balance score as the control group.
- Adults with multiple sclerosis reported statistically significant lower levels of occupational balance for two items: 'balance between obligatory/voluntary occupations' and 'balance between energy-giving/energy-taking occupations'.
- Occupational balance is influenced by disease-related factors, occupational performance, and quality of life.
- Occupational therapy practitioners should address energy management strategies and occupational balance when working with adults with multiple sclerosis.

---

context of his or her current life circumstances' (Matuska & Christiansen, 2008, p. 11). OB is defined as 'a subjective perception of having the right amount and variation of occupations in the occupational pattern' (Wagman et al., 2012 p. 324). Both concepts refer to a state where the individual feels satisfied with the distribution of his/her time, energy, and attention among different occupations. Such concepts also emphasise the dynamic nature of balance, which can vary based on the individual's changing life circumstances. OB has been studied in several chronic diseases, for example, in individuals with arthritis (To-Miles et al., 2022; Wagman et al., 2020), fibromyalgia (Ortiz-Rubio et al., 2022), and acquired brain injury (Kassberg et al., 2021; Nyman et al., 2021; Ortiz-Rubio et al., 2024). Life balance has been studied in individuals with MS, focusing on psychometric properties (Özden et al., 2022) of the Life Balance Inventory (Kos et al., 2020) or used as a theoretical framework in a phenomenological study (Matuska & Erickson, 2008). The psychometric properties of the life balance questionnaire show limited test–retest reliability, cross-cultural validity, and construct validity in the MS population. The study conducted by Matuska and Erickson (2008) explored life balance among women with MS. A total of 13 interviews were completed and concluded that their daily occupations are determined by stress, personal identity, and management of their energy. In the current study, we have used the concepts synonymously and used the term 'occupational balance' (OB). The aim of this study was to assess OB in a sample of individuals with MS in comparison with a control

group. The aim was also to investigate whether there were any relationships among disease-related factors, OP, quality of life, and OB.

2 | METHODS

2.1 | Design

The present study was a descriptive case–control study that followed the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement guidelines for reporting observational studies (Ghaferi et al., 2021).

2.2 | Ethics statement

The study complied with the standards of the 1964 Declaration of Helsinki updated in 2013 (General Assembly of the World Medical Association, 2013). The protocol for this research was reviewed and approved by the Biomedical Research Ethics Committee (NUMBER 1475-N-22). Informed consent was acquired from all participants, and the study adhered strictly to the International Code of Medical Ethics set by the World Medical Association and the Declaration of Helsinki. Participants' information was password protected and stored.

2.3 | Participants

This study is part of a larger project in which OB was studied in adults with different neurodegenerative diseases. In the current study, individuals with MS were invited to participate by a local patient association, a community-based organisation supporting people with MS. Those who accepted to participate were included in the study. The inclusion criteria for participation in the MS group were (a) diagnosis of MS (Polman et al., 2011) confirmed in writing by the participant's neurologist; (b) being relapse-free in the last 30 days; (c) the capacity to answer the questionnaires; and (d) the ability to engage in this study without exacerbating any existing conditions. Those who agreed to participate were matched in a 1:1 ratio by age and sex with control volunteers. Participants in the control group were friends, relatives, or family members of participants with MS. Inclusion criteria for the control group were (a) no chronic condition limiting participation in the study and (b) having the ability to answer the questionnaires. The exclusion criteria for both groups were (a) having any rheumatic or orthopaedic diseases, which could affect OB, hearing, and vision acuity, and (b) having heart, kidney, or liver failure and other neurological disorders, cancer, or a history of drug use.

2.4 | Measures

The evaluation was conducted in a one-to-one face-to-face session by an occupational therapist between February and May 2023.

Sociodemographic factors comprised information about the participants' ages (years), sex (male or female), living arrangements (living alone or with others), and employment status (employed, unemployed, or retired).

Disease-related factors included information about participants' MS subtype (relapsing–remitting, primary progressive, or secondary progressive), years with MS diagnosis, use of assistive devices and equipment (yes or no), and participants' regular contact or not with a MS rehabilitation unit (yes or no). The Expanded Disability Status Scale (EDSS) (Kurtzke, 1983) was used to measure disability, mainly in walking, and symptom severity was measured with SymptoMScreen (Green et al., 2017).

The EDSS (Kurtzke, 1983) is a common measure for disability in MS, with a total score that ranges from 0 to 10. Scores between 1.0 and 4.5 denote individuals with a high degree of ambulatory ability, whereas the subsequent levels 5.0–9.5 refer to the loss of ambulatory ability. The EDSS has shown good validity (Amato & Ponziani, 1999; Ebers et al., 2008) but limited reliability and especially a low inter-rater reliability (Cohen et al., 1993; Noseworthy et al., 1990).

The symptoMScreen (Green et al., 2017) is a scale that comprises 12 domains: walking/mobility, hand function/dexterity, spasticity and stiffness, bodily pain, sensory symptoms, bladder control, fatigue, vision, dizziness, cognitive function, depression, and anxiety. It uses 7-point Likert scales to assess each functional domain ranging from 0 (*not affected at all*) to 6 (*total limitation/I'm unable to do most daily occupations*). The total score ranges from 0 to 72, with higher scores indicating more severe symptoms. SymptoMScreen showed good psychometric properties and was unidimensional with high reliability (Cronbach's alpha 0.94) and different item difficulties (Meca-Lallana et al., 2020). Test–retest reliability of SymptoMScreen and its subscales was excellent ($r = 0.71$–0.94, $p < 0.001$) (Green et al., 2017).

OB was measured using the Spanish version of the Occupational Balance Questionnaire (OBQ-E) (Peral-Gómez et al., 2021, 2022). The 13 OBQ-E items employ a 6-point scale with ordered response categories, accompanied by a verbal description. Participants express their agreement levels regarding several aspects of the quantity

and diversity of occupations in the occupational pattern (0 = *completely disagree*, 1 = *disagree a lot*, 2 = *tend to disagree*, 3 = *tend to agree*, 4 = *agree a lot*, and 5 = *completely agree*) (Peral-Gómez et al., 2021, 2022). The OBQ-E is designed for both item-level analysis and a cumulative total score (ranging from 0 to 65). A higher score shows greater OB, that is, increased satisfaction with the amount and diversity of occupations (Peral-Gómez et al., 2021, 2022). The OBQ-E has shown good content validity, internal consistency (Cronbach's alpha = 0.87), and concurrent validity (regarding life satisfaction, rho 0.54; $p < 0.001$) as well as strong test–retest reliability (rho = 0.73; $p < 0.001$) (Peral-Gómez et al., 2021).

OP was evaluated with the functional independence measure (FIM) (Haddad et al., 2022) and physical performance tests (PPT) (King et al., 2000).

The FIM measures functional independence when a person is eating, dressing, walking, problem solving, and so on. The scale comprises 18 items that cover two domains: motor (13 items) and cognitive (5 items) (Haddad et al., 2022). Each item is assessed on a 7-point ordinal scale from 1 to 7. The total score ranges from 18 to 126, with higher scores representing greater functional independence. The FIM has shown excellent internal consistency for people with MS (Chronbach's alpha = 0.98) (Sharrack et al., 1999).

The PPT requires the individual to write a sentence, simulate eating, lift a book onto a shelf, put on and remove a jacket, pick up a penny from the floor, walk 50 ft, and turn 360°. We used the 7-item version of the PPT (Reuben & Siu, 1990) where all items are scored ranging from 0 to 4. Scores for the first six tasks are based on time completion, whereas the score for the seventh task is based on steadiness and continuity. The total score ranges from 0 to 28, with higher scores demonstrating better functioning (Reuben & Siu, 1990).

Quality of life was measured with the EuroQol five-dimensions three-level questionnaire (EQ-5D-3L) (Rabin & De Charro, 2001), which comprises two parts: the EQ-5D descriptive system and the EQ visual analogue scale (EQ VAS).

The EQ-5D-3L descriptive system consists of five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each domain is split into three levels of perceived problems indicated in the answers: Participants are asked if they have no problems (1), some problems (2), or extreme problems (3). By ticking the box next to the most appropriate statement in each dimension, the participant indicates his/her health status. The responses given for each dimension are subsequently transformed into a summary score that shows the overall utility. For both the individual dimension levels and the overall summary score, a lower number indicates better health (e.g., Level 1, *no problems*, is better than Level 3, *extreme problems*). The instrument has shown good internal consistency (Rabin & de Charro, 2001).

The EQ VAS consists of a vertical visual analogue scale scored from 0 (*worst imaginable health state*) to 100 (*best imaginable health state*). The EQ VAS records the patient's self-rated health. The VAS can be used as a quantitative measure of quality of life that shows the patient's own judgement. In contrast to the descriptive system, a higher score on the EQ VAS indicates a better self-rated health state.

2.5 | Sample size calculation

The sample size was calculated using G*Power 3.1.9.4 software (Universitat Kiel, Germany) (Kang, 2021). There were two groups (case and control), ratio 1:1, alpha 0.05, power = 0.8, and effect size = 0.5, following a published previous study (To-Miles et al., 2022).

The minimum sample size was computed as 102. Yet, considering a hypothetical dropout rate, 122 participants were required.

2.6 | Statistical analysis

We used IBM Statistical Package for Social Sciences software (IBM corp. Released 2012. IBM SPSS statistics for Windows, Version 23.0. Armonk, NY) to perform the statistical analysis.

A descriptive analysis of the sociodemographic characteristics and disease-related factors of participants included in this study was performed. Absolute frequency (n) and percentage (%) were used to describe the categorical variables. Continuous variables (age, disability severity, and symptom severity) were described as the mean $\pm$ standard deviation (SD). The Shapiro–Wilks test was used to explore normal data distribution. The Mann–Whitney U test was used to compare differences between both groups in continuous variables with a non-normal distribution. The chi-square test was performed for categorical variables. For each group, median values and quartiles (Q1–Q3) were calculated in the OBQ-E, and the mean (SD) was calculated for occupational performance and quality of life. Relationships between disease-related factors, OP, quality of life, and OB were determined with Spearman's rank correlation coefficients (r_s). We interpreted $r_s \leq 0.30$ as weak, $r_s = 0.31–0.69$ as moderate, and $r_s \geq 0.70$ as strong relationships (Prion & Haerling, 2014). A p value less than 0.05 was considered statistically significant.

2.7 | Positionality statement

This study's research team comprises individuals that are full-time academics with a range of professional experience in MS. The team has a commitment to improve OB in adults with MS and is composed of clinicians and researchers with diverse expertise in their respective fields.

3 | RESULTS

A total of 122 participants agreed to participate in the study, 61 adults with MS, and 61 controls matched by age and sex according to the criteria. Table 1 shows the socio-demographic and disease-related factors of participants and comparisons between groups. There were no statistically significant differences between the MS group and the control group regarding age, sex, or living arrangements. However, statistically significant differences were found regarding employment status, use of aids, and equipment.

Participants' perceptions of OB are presented in Table 2. Overall, the OB scores for the MS group and the control group were not significantly different ($p = 0.05$). However, the MS group scored significantly lower on two items: 'balance between obligatory/voluntary occupations' ($p = 0.002$) and 'balance between energy-giving/energy-taking occupations' ($p = 0.01$).

Participants' OP and quality of life are shown on Table 3. Compared to the control group, the MS group had a statistically significant lower FIM motor score, FIM cognitive score, and FIM total score ($p < 0.001$).

The MS group had statistically significant lower PPT scores ($p < 0.001$). Adults with MS showed statistically significant more challenges (lower scores) in all EQ-5D-3L dimensions. In the EQ VAS, the MS group had a statistically significant lower quality of life compared to the control group ($p < 0.001$).

TABLE 1 Characteristics of the MS group and control group.

Variables	MS group ($n = 61$)	Control group ($n = 61$)	p value
Sex			
Male (n [%])	32 (53)	32 (53)	1.00
Age (mean ± SD)	49 ± 9.97	49 ± 10.11	0.95
Living arrangement (n [%])			
Living alone	12 (20)	6 (10)	0.12
Living with someone	49 (80)	55 (90)	
Employment status (n [%])			
Employed	11 (18)	47 (77)	<0.001
Unemployed	3 (5)	7 (12)	
Retired	-	7 (12)	
Disability benefit	47 (77)	-	
MS subtype (n [%])			
Relapsing/remitting	29 (48)		
Primary progressive	7 (12)		
Secondary progressive	25 (40)		
Years of disease duration (mean ± SD)	15.6 ± 9.80		
Use of aids and equipment			
Yes (n [%])	45 (74)		
Weekly rehabilitation			
Yes (n [%])	50 (82)		
Severity of disability, EDSS (mean ± SD)	5.7 ± 2.01		
Symptom severity (mean + SD)	34.5 ± 13.07		

Note: The Chi-square test was used for categorical variables; the Mann–Whitney U test was used for continuous variables except for age (Student's test).
Continuous variables are expressed as the mean ± SD; categorical variables are expressed as a percentage.
Abbreviations: EDSS, Kurtzke Expanded Disability Status Scale; MS, multiple sclerosis; n, population size.

TABLE 2 Occupational balance of participants.

Item	MS group (*n* = 61)		Control group (*n* = 61)		*p* value
	Min–max	Median (Q1–Q3)	Min–max	Median (Q1–Q3)	
1. Balance between doing things for others/for oneself	0–5	4 (3–5)	1–5	4 (3–5)	0.53
2. Perceiving one's occupations as meaningful	0–5	4 (4–5)	2–5	4 (4–5)	0.62
3. Time for doing things wanted	0–5	4 (3–5)	1–5	4 (3–5)	0.10
4. Balance between work, home, family, leisure, rest, and sleep	0–5	3 (2–4.5)	1–5	4 (2.5–5)	0.88
5. Balance between doing things alone/with others	0–5	3 (2–5)	1–5	4 (3–5)	0.57
6. Having sufficient to do during a regular week	0–5	4 (3–5)	2–5	4 (3.5–5)	0.65
7. Have sufficient time for doing obligatory occupations	1–4	4 (3–5)	1–5	4 (3–5)	0.95
8. Balance between physical, social, mental, and restful occupations	0–5	3 (2–4)	1–5	3 (2–4)	0.38
9. Satisfaction with how time is spent in everyday life	0–5	3 (2–4)	1–5	4 (3–4)	0.20
10. Satisfaction with the number of occupations during a regular week	0–5	3 (2–4.5)	2–5	4 (3–5)	0.70
11. Balance between obligatory/voluntary occupations	0–5	3 (2–4)	2–5	4 (3–5)	0.002
12. Balance between energy-giving/energy-taking occupations	0–5	3 (2–4)	1–5	4 (3–5)	0.01
13. Satisfaction with time spent in rest, recovery, and sleep	0–5	4 (2–5)	1–5	4 (3–5)	0.38
OBQ-E total score	10–65	44 (33.5–53.50)	28–65	48 (42–56.50)	0.05

Abbreviations: MS, multiple Sclerosis; n, population size; OBQ-E, Spanish version of the Occupational Balance Questionnaire.

TABLE 3 Occupational performance and quality of life of participants.

Variable	MS group (*n* = 61) mean (SD)	Control group (*n* = 61) mean (SD)	*p* value
Occupational performance			
FIM motor	72.77 ± 15.27	90.95 ± 0.28	<0.001
FIM cognitive	32.44 ± 2.99	34.98 ± 0.13	<0.001
FIM total score	105.21 ± 15.99	125.93 ± 0.31	<0.001
PTT total score	11.98 ± 6.27	26.55 ± 1.73	<0.001
Quality of life			<0.001
EQ-5D-3L mobility	2.15 ± 0.54	1.07 ± 0.25	<0.001
EQ-5D-3L self-care	1.85 ± 0.78	1.04 ± 0.18	<0.001
EQ-5D-3L usual activities	2.00 ± 0.58	1.07 ± 0.25	<0.001
EQ-5D-3L pain/discomfort	1.86 ± 0.78	1.39 ± 0.55	<0.001
EQ-5D-3L anxiety/depression	1.95 ± 0.74	1.31 ± 0.56	<0.001
EQ-5D-3L summary score	1.89 ± 0.41	1.19 ± 0.26	<0.001
EQ-5D-3L VAS	59.26 ± 20.51	82.15 ± 13.08	<0.001

Abbreviations: EQ-5D-3L, EuroQol five-dimension three-level questionnaire; FIM, functional independence measure; MS, multiple sclerosis; *n*, population size; PTT, physical performance test; VAS, visual analogue scale.

This study revealed several statistically significant correlations that illustrate the relationships between disease severity, OP, quality of life, and OB. A clear negative relationship was observed between disease severity and OB. Specifically, higher levels of disease severity (EDSS) were weakly correlated with lower levels of OB ($r_s = 0.21$), and higher overall symptom burden (symptonMSscreen) was correlated with lower levels of

occupational balance ($r_s = 0.32$). Conversely, higher OB demonstrated consistent positive associations with higher quality of life and higher OP. Specifically, higher OB was weakly correlated with higher functional independence across all domains of the FIM motor ($r_s = 0.28$), FIM cognitive ($r_s = 0.27$), and FIM total score ($r_s = 0.27$), as well as with higher objective physical performance on the PPT ($r_s = 0.31$).

4 | DISCUSSION

This study assessed OB in a sample of adults with MS in comparison with a control group. Results showed similar OB in both groups, and overall OB scores for the MS group were also aligned with normative data for the general Spanish population (Peral-Gómez et al., 2022). However, our findings revealed significant differences between groups for two of the items in the OBQ-E. In addition, relationships were found between low OB scores and severe disease-related factors and between high OB scores and high quality of life and high OP.

Overall, individuals with MS reported high OB (mean 44), low OP (mean FIM 105.21 and mean PTT 11.98), and low quality of life (mean 1.89). Participants with MS had low OP and low quality of life compared to the control group. This is not surprising because the different assessment tools measure similar aspects (e.g., walking, personal care, work, and household tasks). The high OB score is surprising because individuals with other neurological disorders generally report low OB (Kassberg et al., 2021; Nyman et al., 2021). Hence, it is reasonable to expect individuals with low OP and low quality of life to also report low OB. However, having had MS for a long time (mean duration 15.6 years) and having regular contact with a rehabilitation centre (82%) may have influenced their perception of their occupations and OB. They may have adjusted to a different life by changing their roles, routines, and habits as well as the number and type of daily occupations they engage in. Furthermore, 77% of participants received a disability benefit and were no longer working. From our previous research (Ortiz-Rubio et al., 2024), we know that individuals with stroke who are no longer working also report higher OB compared to those who are still working (Kassberg et al., 2021; Nyman et al., 2021). Thus, this may also be relevant for participants in the present study.

Interestingly, our findings revealed significant differences between groups for two of the items in the OBQ-E, 'balance between obligatory/voluntary occupations' and 'balance between energy-giving/energy-taking occupations'. This is in line with previous studies (Emery et al., 2022; Lexell et al., 2009) that have shown that, as

the disease progresses, individuals with MS describe a decline in their engagement in occupations. Specifically, the number of voluntary or self-rewarding occupations often decreases at the expense of mandatory occupations (Lexell et al., 2009). Moreover, because fatigue is a common symptom in MS (Oliva Ramirez et al., 2021b), many individuals also have difficulties engaging in energy-consuming occupations. This may explain why the MS participants' scores on the item 'balance between energy-giving/energy-taking occupations' were lower than those of the control group. Helping clients find solutions for engaging in meaningful occupations despite fatigue is therefore an important area to focus on during occupational therapy interventions (Cunningham et al., 2022). For example, it would have value for these individuals to learn how to prioritise between occupations they need and want to engage in, pace occupations, plan rest and taking breaks, make environmental modifications, and learn alternate ways to perform meaningful occupations.

4.1 | Limitations

The present study has both strengths and limitations that should be considered when interpreting the results. One of its strengths is the inclusion of a diverse sample of adults with different subtypes of MS. However, there was a selection bias towards participants with a greater disability severity; few participants were newly diagnosed and most participants used walking devices. Thus, this sample reflects the reality of the MS population involved in a local patient association in Spain. Therefore, our findings may not be generalizable to all individuals with MS. Additionally, although the sample may not represent individuals without access to rehabilitation services, it provides valuable data on a key segment of the population that directly benefits from these services, offering insights into potential outcomes when such support is available. Notably, 74% of participants used assistive devices, and 82% used rehabilitation services. These percentages reflect the situation of many people living with chronic conditions who rely on these interventions to maintain their quality of life. Furthermore, the potential influence of education level as a confounding variable should be considered, as it was not accounted for in the analysis and could be related to both health literacy, adherence to rehabilitation, and reported outcomes.

Despite these limitations, this is the first study to highlight OB using the Spanish translation of the OBQ in a sample of adults with MS. This OBQ offers a new and complementary perspective to other assessment tools that focus on the time spent in desired occupations, the

perception of meaningful activities, and the need for more fulfilling occupations. Additionally, these results are key to understanding how MS affects the daily occupations of these individuals and may also provide important insight for developing new and more targeted interventions.

4.2 | Implications for occupational therapy practice

OT practitioners should add an OB assessment as part of the other measures they use with individuals with MS, leading to a more comprehensive assessment. Identifying problems in OB may also be important for identifying and being able to plan and implement interventions that target problems in occupations due to fatigue or cognitive impairments.

5 | CONCLUSION

Our findings show that, although adults with MS may exhibit a similar overall OB to others without MS, it is essential to consider results in specific items in the OBQ. Lower scores were found in adults with MS in the items 'obligatory/voluntary occupations' and 'energy management', reflecting common problem areas for individuals with MS. Addressing OB in adults with MS may therefore provide valuable insight on how they manage their occupational roles, responsibilities, and goals, which is important when planning and implementing interventions.

AUTHOR CONTRIBUTIONS
Alba Navas-Otero: Conceptualization; methods; data curation; writing original draft and editing. **Carita Håkansson**: Conceptualization; methodology; writing original draft; formal analysis; review and editing. **Eva Månsson Lexell**: Conceptualization; methodology; writing original draft; formal analysis; review and editing. **Araceli Ortiz-Rubio**: Formal analysis; data curation; writing original draft; review and editing; visualisation.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT
The protocol for this research was reviewed and approved by the Biomedical Research Ethics Committee (NUMBER 1475-N-22).

ORCID
Araceli Ortiz-Rubio https://orcid.org/0000-0002-7353-835X
Eva Månsson Lexell https://orcid.org/0000-0002-7243-4348
Carita Håkansson https://orcid.org/0000-0002-3660-3079
Alba Navas-Otero https://orcid.org/0000-0003-2514-3190

REFERENCES
Amato, M. P., & Ponziani, G. (1999). Quantification of impairment in MS: Discussion of the scales in use. *Multiple Sclerosis (Houndmills, Basingstoke, England)*, *5*(4), 216–219. https://doi.org/10.1177/135245859900500404

Amatya, B., Khan, F., & Galea, M. (2019). Rehabilitation for people with multiple sclerosis: An overview of Cochrane reviews. *The Cochrane Database of Systematic Reviews*, *1*(1), CD012732. https://doi.org/10.1002/14651858.CD012732.PUB2

Benedict, R. H. B., Amato, M. P., DeLuca, J., & Geurts, J. J. G. (2020). Cognitive impairment in multiple sclerosis: Clinical management, MRI, and therapeutic avenues. *Lancet Neurology*, *19*(10), 860–871. https://doi.org/10.1016/S1474-4422(20)30277-5

Browne, P., Chandraratna, D., Angood, C., Tremlett, H., Baker, C., Taylor, B. V., & Thompson, A. J. (2014). Atlas of Multiple Sclerosis 2013: A growing global problem with widespread inequity. *Neurology*, *83*(11), 1022–1024. https://doi.org/10.1212/WNL.0000000000000768

Cohen, R. A., Kessler, H. R., & Fischer, M. (1993). The extended disability status scale (EDSS) as a predictor of impairments of functional activities of daily living in multiple sclerosis. *Journal of the Neurological Sciences*, *115*(2), 132–135. https://doi.org/10.1016/0022-510X(93)90215-K

Cunningham, R., Simon, A. U., & Preissner, K. (2022). Occupational therapy practice guidelines for adults with multiple sclerosis. *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, *76*(5), 7605397010. https://doi.org/10.5014/AJOT.2022.050088

Ebers, G. C., Heigenhauser, L., Daumer, M., Lederer, C., & Noseworthy, J. H. (2008). Disability as an outcome in MS clinical trials. *Neurology*, *71*(9), 624–631. https://doi.org/10.1212/01.WNL.0000313034.46883.16

Emery, H., Padgett, C., Ownsworth, T., & Honan, C. A. (2022). A systematic review of self-concept change in multiple sclerosis. *Neuropsychological Rehabilitation*, *32*(8), 1774–1813. https://doi.org/10.1080/09602011.2022.2030367

Ghaferi, A. A., Schwartz, T. A., & Pawlik, T. M. (2021). Strobe reporting guidelines for observational studies. *JAMA Surgery*, *156*(6), 577–578. https://doi.org/10.1001/JAMASURG.2021.0528

Graziano, F., Calandri, E., Borghi, M., Giacoppo, I., Verdiglione, J., & Bonino, S. (2025). Multiple sclerosis and identity: A mixed-methods systematic review. *Disability and Rehabilitation*, *47*(9), 2199–2216. https://doi.org/10.1080/09638288.2024.2392039

Green, R., Kalina, J., Ford, R., Pandey, K., & Kister, I. (2017). SymptoMScreen: A tool for rapid assessment of symptom severity in MS across multiple domains. *Applied Neuropsychology. Adult*, *24*(2), 183–189. https://doi.org/10.1080/23279095.2015.1125905

Haddad, R., Turmel, N., Lagnau, P., Chesnel, C., le Breton, F., Amarenco, G., & Hentzen, C. (2022). Functional independence measure predicts the outcome of clean intermittent catheterization training in patients with multiple sclerosis. *Annals of Physical and Rehabilitation Medicine*, *65*(2), 101539. https://doi.org/10.1016/j.rehab.2021.101539

Hosseini, Z., Homayuni, A., & Etemadifar, M. (2022). Barriers to quality of life in patients with multiple sclerosis: A qualitative study. *BMC Neurology*, *22*(1), 174. https://doi.org/10.1186/S12883-022-02700-7

Jansa, J., Ferdinand, S., Milo, M., Løyning, I. G., Huilla, T., Kallmayer, L., Ilsbroukx, S., Filló, N., Raats, J., Jakobson, J., & Kos, D. (2022). Performance of activities of daily living in people with multiple sclerosis. *Multiple Sclerosis and Related Disorders*, *57*, 103342. https://doi.org/10.1016/j.msard.2021.103342

Kang, H. (2021). Sample size determination and power analysis using the G*Power software. *Journal of Educational Evaluation for Health Professions*, *18*, 17. https://doi.org/10.3352/JEEHP.2021.18.17

Kassberg, A. C., Nyman, A., & Larsson Lund, M. (2021). Perceived occupational balance in people with stroke. *Disability and Rehabilitation*, *43*(4), 553–558. https://doi.org/10.1080/09638288.2019.1632940

King, M. B., Judge, J. O., Whipple, R., & Wolfson, L. (2000). Reliability and responsiveness of two physical performance measures examined in the context of a functional training intervention. *Physical Therapy*, *80*(1), 8–16. https://doi.org/10.1093/PTJ/80.1.8

Kos, D., Ferdinand, S., Duportail, M., Eijssen, I., Schouteden, S., Kerkhofs, L., Jansa, J., Fillo, N., Matuska, K., & Beckerman, H. (2020). Assessing life balance of European people with multiple sclerosis: A multicenter clinimetric study within the RIMS network. *Multiple Sclerosis and Related Disorders*, *39*, 101879. https://doi.org/10.1016/J.MSARD.2019.101879

Kurtzke, J. F. (1983). Rating neurologic impairment in multiple sclerosis: An expanded disability status scale (EDSS). *Neurology*, *33*(11), 1444–1452. https://doi.org/10.1212/WNL.33.11.1444

Lexell, E. M., Lund, M. L., & Iwarsson, S. (2009). Constantly changing lives: Experiences of people with multiple sclerosis. *The American Journal of Occupational Therapy*, *63*(6), 772–781. https://doi.org/10.5014/AJOT.63.6.772

Lindberg, M., Ranner, M., Månsson-Lexell, E., Jacobsson, L., & Larsson-Lund, M. (2021). Work and everyday life in a

digitalized time: Experiences of people with subjective cognitive difficulties related to neurological disorders. *PLoS ONE*, *16*(11), e0260013. https://doi.org/10.1371/JOURNAL.PONE.0260013

Månsson Lexell, E., Iwarsson, S., & Lexell, J. (2006). The complexity of daily occupations in multiple sclerosis. *Scandinavian Journal of Occupational Therapy*, *13*(4), 241–248. https://doi.org/10.1080/11038120600840200

Matuska, K. M., & Christiansen, C. H. (2008). A proposed model of lifestyle balance. *Journal of Occupational Science*, *15*(1), 9–19. https://doi.org/10.1080/14427591.2008.9686602

Matuska, K. M., & Erickson, B. (2008). Lifestyle balance: How it is described and experienced by women with multiple sclerosis. *Journal of Occupational Science*, *15*(1), 20–26. https://doi.org/10.1080/14427591.2008.9686603

Meca-Lallana, J., Maurino, J., Hernández-Pérez, M. Á., Sempere, Á. P., Brieva, L., García-Arcelay, E., Terzaghi, M., Saposnik, G., & Ballesteros, J. (2020). Psychometric properties of the SymptoMScreen questionnaire in a mild disability population of patients with relapsing-remitting multiple sclerosis: Quantifying the patient's perspective. *Neurology and Therapy*, *9*(1), 173–179. https://doi.org/10.1007/s40120-020-00176-6

Noseworthy, J. H., Vandervoort, M. K., Wong, C. J., & Ebers, G. C. (1990). Interrater variability with the Expanded Disability Status Scale (EDSS) and functional systems (FS) in a multiple sclerosis clinical trial. The Canadian Cooperation MS Study Group. *Neurology*, *40*(6), 971–975. https://doi.org/10.1212/WNL.40.6.971

Nyman, A., Kassberg, A. C., & Lund, M. L. (2021). Perceived occupational value in people with acquired brain injury. *Scandinavian Journal of Occupational Therapy*, *28*(5), 1–8. https://doi.org/10.1080/11038128.2020.1791951

Oliva Ramirez, A., Keenan, A., Kalau, O., Worthington, E., Cohen, L., & Singh, S. (2021). Prevalence and burden of multiple sclerosis-related fatigue: A systematic literature review. *BMC Neurology*, *21*(1), 468. https://doi.org/10.1186/S12883-021-02396-1

Ortiz-Rubio, A., Cabrera-Martos, I., Haro-Piedra, E., López-López, L., Rodríguez-Torres, J., Granados-Santiago, M., & Valenza, M. C. (2022). Exploring perceived occupational balance in women with fibromyalgia. A descriptive study. *Scandinavian Journal of Occupational Therapy*, *29*(5), 395–402. https://doi.org/10.1080/11038128.2020.1865449

Ortiz-Rubio, A., Håkansson, C., Rasmussen, H. P., & Lexell, E. M. (2024). Occupational balance and stroke impact among community-dwelling stroke survivors 65 years or older: A cross-sectional study. *Australian Occupational Therapy Journal*, *71*(5), 746–755. https://doi.org/10.1111/1440-1630.12962

Özden, F., Özkeskin, M., & Yüceyar, N. (2022). The life balance inventory in patients with multiple sclerosis: Cross-cultural adaptation, reliability and validity of the Turkish version. *The British Journal of Occupational Therapy*, *86*(4), 312–319. https://doi.org/10.1177/03080226221136816

Parker, L. S., Topcu, G., De Boos, D., & das Nair, R. (2021). The notion of "invisibility" in people's experiences of the symptoms of multiple sclerosis: a systematic meta-synthesis. *Disability and Rehabilitation*, *43*(23), 3276–3290. https://doi.org/10.1080/09638288.2020.1741698

Peral-Gómez, P., Espinosa-Sempere, C., Navarrete-Muñoz, E. M., Hurtado-Pomares, M., Juárez-Leal, I., Valera-Gran, D., & Sánchez-Pérez, A. (2022). The Spanish version of occupational balance questionnaire: Psychometric properties and normative data in a representative sample of adults. *Annals of Medicine*, *54*(1), 3211–3218. https://doi.org/10.1080/07853890.2022.2145016

Peral-Gómez, P., López-Roig, S., Pastor-Mira, M. A., Abad-Navarro, E., Valera-Gran, D., Håkansson, C., & Wagman, P. (2021). Cultural adaptation and psychometric properties of the Spanish version of the occupational balance questionnaire: An instrument for occupation-based research. *International Journal of Environmental Research and Public Health*, *18*(14), 7506. https://doi.org/10.3390/IJERPH18147506

Pérez De Heredia-Torres, M., Huertas-Hoyas, E., Sánchez-Camarero, C., Máximo-Bocanegra, N., Alegre-Ayala, J., Sánchez-Herrera-Baeza, P., Martínez-Piédrola, R. M., García-Bravo, C., Mayoral-Martín, A., & Serrada-Tejeda, S. (2020). Occupational performance in multiple sclerosis and its relationship with quality of life and fatigue. *European Journal of Physical and Rehabilitation Medicine*, *56*(2), 148–154. https://doi.org/10.23736/S1973-9087.20.05914-6

Polman, C. H., Reingold, S. C., Banwell, B., Clanet, M., Cohen, J. A., Filippi, M., Fujihara, K., Havrdova, E., Hutchinson, M., Kappos, L., Lublin, F. D., Montalban, X., O'Connor, P., Sandberg-Wollheim, M., Thompson, A. J., Waubant, E., Weinshenker, B., & Wolinsky, J. S. (2011). Diagnostic criteria for multiple sclerosis: 2010 revisions to the McDonald criteria. *Annals of Neurology*, *69*(2), 292–302. https://doi.org/10.1002/ana.22366

Powell, D. J. H., Liossi, C., Schlotz, W., & Moss-Morris, R. (2017). Tracking daily fatigue fluctuations in multiple sclerosis: Ecological momentary assessment provides unique insights. *Journal of Behavioral Medicine*, *40*(5), 772–783. https://doi.org/10.1007/S10865-017-9840-4

Prion, S., & Haerling, K. A. (2014). Making sense of methods and measurement: Spearman-rho ranked-order correlation coefficient. *Clinical Simulation in Nursing*, *10*(10), 535–536. https://doi.org/10.1016/j.ecns.2014.07.005

Rabin, R., & de Charro, F. (2001). EQ-5D: A measure of health status from the EuroQol Group. *Annals of Medicine*, *33*(5), 337–343. https://doi.org/10.3109/07853890109002087

Reuben, D. B., & Siu, A. L. (1990). An objective measure of physical function of elderly outpatients. The physical performance test. *Journal of the American Geriatrics Society*, *38*(10), 1105–1112. https://doi.org/10.1111/J.1532-5415.1990.TB01373.X

Selmaj, K., Cree, B. A. C., Barnett, M., Thompson, A., & Hartung, H. P. (2024). Multiple sclerosis: Time for early treatment with high-efficacy drugs. *Journal of Neurology*, *271*(1), 105–115. https://doi.org/10.1007/S00415-023-11969-8

Sharrack, B., Hughes, R. A. C., Soudain, S., & Dunn, G. (1999). The psychometric properties of clinical rating scales used in multiple sclerosis. *Brain: A Journal of Neurology*, *122*(Pt 1), 141–159. https://doi.org/10.1093/BRAIN/122.1.141

To-Miles, F., Håkansson, C., Wagman, P., & Backman, C. L. (2022). Exploring the associations among occupational balance and health of adults with and without inflammatory arthritis. *Arthritis Care & Research*, *74*(1), 22–30. https://doi.org/10.1002/ACR.24732

Trapp, B. D., & Nave, K. A. (2008). Multiple sclerosis: An immune or neurodegenerative disorder? *Annual Review of Neuroscience*, *31*, 247–269. https://doi.org/10.1146/ANNUREV.NEURO.30.051606.094313

Wagman, P., Ahlstrand, I., Björk, M., & Håkansson, C. (2020). Occupational balance and its association with life satisfaction in men and women with rheumatoid arthritis. *Musculoskeletal Care*, *18*(2), 187–194. https://doi.org/10.1002/MSC.1454

Wagman, P., Håkansson, C., & Björklund, A. (2012). Occupational balance as used in occupational therapy: A concept analysis. *Scandinavian Journal of Occupational Therapy*, *19*(4), 322–327. https://doi.org/10.3109/11038128.2011.596219