

Self-reported Reasons for Changes in Performance of Daily Activities During a 2-Year Multidisciplinary Multiple Sclerosis Rehabilitation

Maarit E. Karhula, PhD; Katja Kanelisto, MSc; Päivi Hämäläinen, PhD; Juhani Ruutiainen, MD; Pertti Era, PhD; Arja Häkkinen, PhD; Anna-Liisa Salminen, PhD

ABSTRACT

BACKGROUND: Few multidisciplinary rehabilitation studies with a heterogeneous design have focused on individuals with multiple sclerosis (MS). This study compared subjective-reported changes in performance and satisfaction with daily activities among moderately and severely disabled individuals with MS during a 2-year, multidisciplinary, group-based, outpatient rehabilitation program comprising education in self-management and compensatory techniques, exercise, and guided peer support.

METHODS: Thirty-eight adults with moderate disability (Expanded Disability Status Scale [EDSS] score of 4.0-5.5, 74% women, mean age of 48) and 41 individuals with severe disability (EDSS 6.0-8.5, 63% women, mean age of 48) were assessed at baseline and after 12 and 21 months of outpatient rehabilitation using the Canadian Occupational Performance Measure (COPM). Group × time interactions were analyzed using mixed analysis of variance. Participants' explanations of reasons for changes in activity performance were collected via semistructured interviews and analyzed content.

RESULTS: Statistically significant improvements in COPM performance and satisfaction scores were reported in both groups from baseline to 21 months of rehabilitation. No significant between-group differences in improvement were observed. The self-reported reasons for improvement were mainly linked to environmental factors.

CONCLUSIONS: The outpatient rehabilitation program, including 4 themes—cognition, mood, energy conservation, and body control—improved the self-reported performance of patients with MS with moderate and severe disabilities. Environmental factors warrant consideration during rehabilitation.

Int J MS Care. 2022;24(3):110-116. doi:10.7224/1537-2073.2020-061

Multiple sclerosis (MS) is a chronic, progressive, and an unpredictable inflammatory autoimmune disease of the central nervous system.¹ Various combinations of problems at the body-function level, such as fatigue, bladder dysfunction, impaired tactile perception, pain, muscle weakness, spasticity, and poor walking balance,² hinder functioning in everyday life. The International Classification of Functioning, Disability, and Health (ICF) strongly recommends that various environmental and personal factors³ be considered when focusing, planning, and conducting holistic, multidisciplinary MS rehabilitation.⁴

A recent review of systematic reviews⁵ found moderate evidence supporting multidisciplinary rehabilitation for longer-term gains at the ICF levels of activity and participation. However, the review called for multidisciplinary rehabilitation programs that target long-term functional outcomes, thereby engaging, educating, and empowering patients and their caregivers.

A multiprofessional, 2-year, group-based, outpatient rehabilitation program was developed and implemented to answer the call for holistic, multifaceted, personalized, and goal-oriented rehabilitation for individuals with MS.⁶ Our interest in this study was to investigate whether individuals with severe and moderate disability would attain the primary goal of the rehabilitation, which is improvement in performance and satisfaction with daily activities, as measured using the Canadian Occupational Performance Measure (COPM). Disease severity was measured using the Expanded Disability Status Scale (EDSS).⁷ We hypothesized that on the participation level, those with severe disability would improve as much as those with lesser disability. We were also

From the GeroCenter Foundation for Aging Research and Development (MEK, KK, PE) and Faculty of Sport and Health Sciences (AH), University of Jyväskylä, Jyväskylä, Finland; South-Eastern Finland University of Applied Sciences, Mikkeli, Finland (MEK); Masku Neurological Rehabilitation Centre, Masku, Finland (PH); Finnish Neuro Society, Masku, Finland (PH, JR); University of Turku, Turku, Finland (PH, JR); Department of Physical Medicine and Rehabilitation, Central Finland Health Care District, Jyväskylä, Finland (AH); and Research Department, Social Insurance Institution of Finland, Helsinki, Finland (A-LS). Correspondence: Maarit E. Karhula, PhD, South-Eastern Finland University of Applied Sciences, Patteristonkatu 3D, 50101 Mikkeli, Finland; email: maarit.karhula@gmail.com.

Note: Supplementary material for this article is available at ijmsc.org.

© 2022 Consortium of Multiple Sclerosis Centers.

interested in whether the 2 groups would offer different reasons for changes.

METHODS

The study was approved by the research ethics committee of the Social Insurance Institution of Finland, and all the participants gave their written informed consent, according to the Declaration of Helsinki. The study was retrospectively registered with the International Standard Randomised Controlled Trials Number registry (identifier: 72556817).

The study sample comprised individuals with MS participating in a 2-year, multidisciplinary, group-based, outpatient rehabilitation project conducted by the Finnish Neuro Society, the Social Insurance Institution of Finland, and the GeroCenter Foundation for Aging Research and Development. Rehabilitation professionals from the Finnish Neuro Society, with local health care professionals, recruited participants from 3 areas of Finland: Helsinki, Kuopio, and Turku.

Recruitment was implemented from May 2010 to August 2010 using convenience sampling. Predefined inclusion criteria were ages 18 to 62, confirmed diagnosis of MS, and restrictions on functioning in at least 2 of the following 4 focal domains: cognition, mood, fatigue, and body control. Restricted functioning in these domains was assessed subjectively and by a rehabilitation physician and coded as restrictions vs no restrictions. Exclusion criteria were a Mini-Mental State Examination score less than 20 of 30 (ie, severe cognitive decline), a Beck Depression Inventory II score greater than 40 of 63 (ie, severe depression), an EDSS score less than 4.0 or greater than 8.5, or any other medical or mental condition precluding participation.

Sociodemographic data, including sex, age, housing status, receiving a disability pension, and disease characteristics (including disease duration and subtype), were collected before rehabilitation. Severity of MS was evaluated by a neurologist using the EDSS. The EDSS score ranges in increments of 0.5 from 0 (no impairment) to 10 (death).⁷

The primary outcome measure was the client-centered COPM, which is designed to identify clients' occupational performance problems.⁸ The COPM is a semistructured interview addressing the activities the client wants, needs, or is expected to perform. First, the client and the therapist explore the different areas of daily life, including self-care, productivity, and leisure, and lists the activities subjectively experienced as difficult to perform. The client rates the importance of each of these activities on a 10-point scale. Next, the client chooses up to 5 of the most important activities and rates them for performance and satisfaction on a 10-point scale (1 = unable to do it at all/not satisfied at all; 10 = able to do it extremely well/extremely satisfied). Finally, for each rated activity, mean scores for performance and satisfaction are calculated. Individuals were assessed at baseline (T₀) and after

12 months (T₁) and 21 months (T₂) of rehabilitation. At T₁, they were asked to rate their performance and satisfaction with the problems prioritized during the baseline COPM interview, blinded to their T₀ assessment scores (blind scores). In addition, at T₂, clients were asked to give their reasons for change with the open question: How would you explain your improving, unchanged, or deteriorated performance in the activities of everyday living identified by the COPM? The interviews were tape recorded. The main reasons given for changes in performance in each activity were summarized from the recorded data and transcribed. All the interviews were implemented using a literal protocol for assessment by 4 occupational therapists who had no involvement in the rehabilitation program.

Intervention

The goal of the 2-year, multidisciplinary, group-based rehabilitation program was to provide participants with a means to manage the effects of MS that would support their active participation in everyday life. The intervention was designed based on the current literature on MS, MS rehabilitation, and professional experience.⁶ The themes of the rehabilitation program addressed the most common participation limitations experienced by patients with MS: cognition,⁹ mood,¹⁰ energy conservation,¹¹ and body control.^{12,13} Group sessions included not only the dissemination of information on the themes and on compensation strategies in everyday life but also opportunities for peer support and the sharing of experiences of coping strategies that are helpful in everyday life. Participants were also instructed in-home exercises that were related to the themes.

Each theme was implemented in 2 versions: a short version comprising five, 3-hour sessions and 1 whole-day session (1 semester), as well as a long version consisting of ten, 3-hour sessions and 2 whole-day sessions (2 semesters). Participants attended sessions on 2 to 4 themes in groups of 4 to 6 individuals. Participants chose themes based on their needs and personal goals in relation to the ICF activity and participation levels. Each participant attended 20 half-day sessions and 4 whole-day sessions in total during the 2-year rehabilitation program.

Caregivers could participate in 1 half-day and 1 whole-day session each semester. Each participant had a personal supervisor who was responsible for coordinating the participant's program and cooperating with other institutions and communities when necessary. Two rehabilitation professionals from different disciplines (ie, physiotherapist, psychologist, neuropsychologist, occupational therapist, nurse, social worker) guided the theme groups according to a detailed handbook, which is available in Finnish on request from the authors. In addition to group meetings, the rehabilitation program included 3 to 5 individual home visits for individual-based assessment of functioning, goal setting, and guidance.

TABLE 1. Characteristics of the 79 Study Participants

Characteristic	Moderate disability (EDSS score 4.0-5.5) (n = 38)	Severe disability (EDSS score 6.0-8.5) (n = 41)	P value (between-group differences)
Age, y	48 ± 9 (28-61)	48 ± 9 (29-61)	.919 ^a
Duration of disease, y	10 ± 7 (0-25)	13 ± 7 (1-28)	.095 ^a
Sex			.327 ^b
Male	10 (26)	15 (37)	
Female	28 (74)	26 (63)	
Living alone	8 (21)	14 (34)	.427 ^b
Disability pension	28 (74)	29 (71)	.770 ^b
Disease subtype			.050 ^b
Relapsing-remitting	21 (55)	13 (32)	
Primary progressive	10 (26)	11 (27)	
Secondary progressive	7 (19)	17 (41)	
Disease severity (EDSS score)			
At baseline	4.5 ± 0.6	6.6 ± 0.7	< .000 ^a
At 21 months	4.6 ± 0.9	6.7 ± 0.9	< .000 ^a

EDSS, Expanded Disability Status Scale.

^at test.

^bχ² test.

Note: Data are given as mean ± SD (range), number (percentage), or mean ± SD.

Data Analysis

Quantitative data were analyzed using SPSS Statistics for Windows, version 21.0 (IBM). To compare changes between the moderately and severely disabled MS groups in their performance of and satisfaction with everyday living across T0, T1, and T2, scores were analyzed by mixed analysis of variance with a between-subject factor. First, mixed analysis of variance was conducted to ascertain possible interaction between the moderately or severely disabled MS groups (between-subjects factor) and time (within-subjects factor) on their performance of and satisfaction with everyday activities. If no interaction was observed, follow-up tests were performed to determine possible main effects for either factor (ie, group or time). Post hoc pairwise comparison tests were performed with Bonferroni correction.¹⁴

Before the analysis, the main assumptions of the data were assessed. Normal distribution of the data was confirmed by a box plot and the Shapiro-Wilk test (*P* > .05). No outliers were observed in either scatterplots or box plots. Moreover, the assumption of sphericity was tested using the Mauchly Test of Sphericity. The proportions of participants who reached a clinically relevant change were analyzed using the thresholds proposed by Eyssen et al¹⁵ (> 1.4 points for COPM performance and > 1.9 points for COPM satisfaction).

Qualitative data were analyzed by theory-driven content analysis.¹⁶ Before starting the analysis process, the investigators (M.E.K, K.K.) agreed on the steps to be followed in the content analysis. First, 1 investigator (K.K.) condensed the reasons for change into plain expressions, created a table, and imported it into an Excel spreadsheet (Microsoft Corp). The other investigator (M.E.K.) agreed or disagreed with the expressions used.

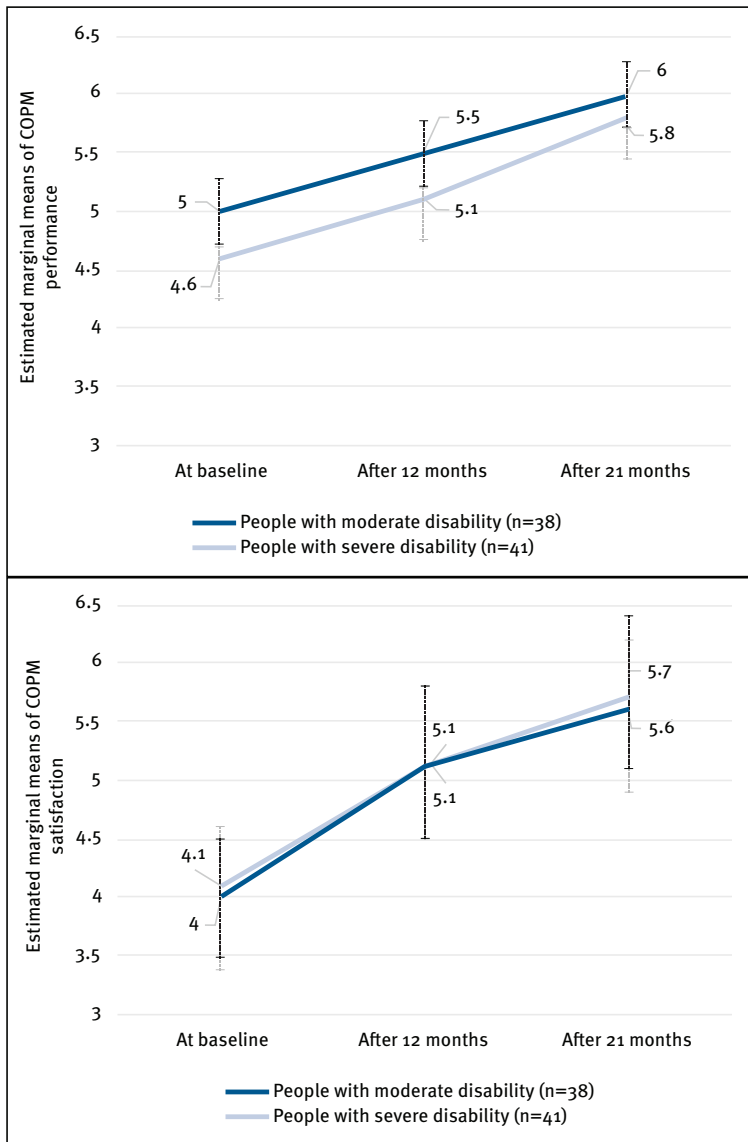
The first investigator (K.K.) then continued the analysis by coding the plain expressions that were mutually agreed on into the ICF components and submitting the results to the other investigator (M.E.K.) for confirmation. For example, a client who had selected “carrying objects” as a problem in everyday life gave as a reason for postintervention change that “although my condition is now worse than before and I can’t use a walker, I can carry objects better because I now use a wheelchair. I am also satisfied that I can carry objects on my own.” This meaning unit was condensed to the plain expression “doing daily tasks in a new way.” The condensed meaning unit was then coded into the personal factors component of the ICF. Finally, the investigators discussed points of disagreement and reached a consensus. A third investigator (A.-L.S.) was available for consultation when a consensus could not be reached.

RESULTS

Ninety individuals with MS started the rehabilitation program and 79 were included in the analysis. Eleven withdrew from the study, owing to lack of motivation (*n* = 4), changed health condition (*n* = 2), unsuitability for a group-based intervention (*n* = 1), refusal to take part in assessments (*n* = 2), assessments only partially conducted (*n* = 1), and in-patient care (*n* = 1). The study flowchart is presented in **FIGURE S1** (published in the online version of this article at ijmsc.org).

The characteristics of the participants with moderate (*n* = 38) and severe (*n* = 41) disability are presented in **TABLE 1**. No statistically significant between-group differences were observed in age, disease duration, sex, or proportion of those living alone or receiving a disability pension. However, there were more cases of

FIGURE 1. Comparisons of Canadian Occupational Performance Measure (COPM) Performance (A) and Satisfaction (B) in Moderately (n = 38) and Severely (n = 41) Disabled Multiple Sclerosis Groups During 21-Month Rehabilitation Program



relapsing-remitting MS in the moderately disabled group and more cases of secondary progressive MS in the severely disabled group. No within-group or between-group differences, which were measured using the *t* test, were found in EDSS scores during the intervention.

No between-group differences were found in COPM performance ($P = .26$) or COPM satisfaction ($P = .80$) between the moderate and severe groups during the 21-month intervention. In both groups, COPM performance and satisfaction scores improved significantly (both $P < .001$). No significant group \times time interaction was found in assessments of COPM performance ($P = .91$) or COPM satisfaction ($P = .92$) (FIGURE 1).

Post hoc analysis with a Bonferroni adjustment revealed that COPM performance in the moderately disabled group improved significantly from T0 to T2 (1.0; 95% CI, 0.2-1.8; $P = .006$). The COPM performance improved significantly in the severely disabled group from T0 to T2 (1.2; 95% CI, 0.4-1.9; $P = .001$) and from T1 to T2 (0.7; 95% CI, 0.1-1.3; $P = .016$). The COPM satisfaction in the moderately disabled group also improved significantly from T0 to T2 (1.5; 95% CI, 0.6-2.5; $P < .001$) and from T0 to T1 (1.1; 95% CI, 0.3-2.0; $P = .004$), as well as in the severely disabled group from T0 to T2 (1.6; 95% CI, 0.7-2.6; $P < .001$) and from T0 to T1 (1.0; 95% CI, 0.2-1.8; $P = .007$).

No significant differences were found between the moderately and severely disabled groups in the proportion of clinically relevant changes in COPM performance or satisfaction scores. A clinically relevant change (> 1.4 points) in COPM performance was reached by 35 participants (44%). The threshold value for clinically relevant change in COPM satisfaction (1.9 points) was reached by 31 participants (39%).

Participants presented 171 reasons for improved, 103 reasons for stable, and 77 reasons for deteriorated performance in activities of daily life. Over 80% of the reasons for improvement were linked to the ICF environmental and personal factors components. Reasons for stable or declining performance were most commonly linked to the ICF personal factors component (Table S1). The most prevalent reasons linked to the personal factors component were general state of health, a new

way of doing daily tasks, and a new way of dealing with situations and activities. Both improvement and decline in everyday activities were also attributed to general health condition. Reasons linked to the environmental factors component included the physical environment, such as devices and environmental modifications, the social environment; and assistance. Furthermore, using different kinds of formal and informal services was cited as improving everyday activities. The reasons linked to the body functions component were related to mental functions such as energy, drive, and pain. Only 5% of reasons were linked to the activity and participation component, and the most common reasons were

caring for oneself by maintaining physical fitness and getting or not getting a job.

DISCUSSION

The results of this study indicate that performance of and satisfaction with everyday activities did not differ between moderately and severely disabled individuals with MS during a 21-month rehabilitation program. The most important finding was that both groups improved in COPM performance and COPM satisfaction during the intervention. Two years is a fairly short time in the context of MS progression. The changes in disease severity (EDSS score)⁷ between the baseline and postintervention measurements suggest that participants' clinical status remained stable during the intervention. Thus, the results seem to be reliable and confirm earlier research findings that the performance of everyday activities can improve, even in individuals with progressive disease.¹⁷ However, note that the EDSS is not a very sensitive scale when used with participants, such as ours, whose scores are in the higher range.

The 4-theme (body control, mood, energy conservation, and cognition) multidisciplinary rehabilitation program, comprising components, such as theme-based sessions with peer support, home visits, and sessions for loved ones, succeeded in meeting the functional needs of individuals with moderate and severe MS, which vary from individual to individual and change as the disease progresses and symptoms change.^{18,19} This study supports a previous finding that disease severity does not explain the importance of specific activities.²⁰ In addition, the intervention underlined the importance of addressing the primary goal of rehabilitation,⁴ which was improving participation in everyday activities in the later and advanced stages of MS.

Another interesting finding was that satisfaction with important everyday activities improved before the perceived improvement in performance. Satisfaction improved in both groups from the beginning to the middle of the rehabilitation program. This improvement seemed to continue, if not statistically significantly, to the end of the program. One explanation for this apparent trend is that the first step toward change is to identify a challenging activity. This could motivate working on the challenging activity and increase the feeling of mastery and satisfaction that comes with it. This is in line with the theory that as a person identifies goals that are relevant to them in everyday life, motivation also improves and behavioral changes become possible.²¹ However, 44% of the participants in this study clinically improved their COPM performance scores (threshold > 1.4 points²⁰) and 39% clinically improved their COPM satisfaction scores (threshold > 1.9 points¹⁵). A previous study on the self-management of fatigue in individuals with MS similarly showed that clinically relevant changes were achieved more frequently in performance than in satisfaction.¹⁷

PRACTICE POINTS

- » The 2-year, multidisciplinary, group-based, outpatient rehabilitation program similarly improved the performance of everyday activities in individuals with moderate and severe disability.
- » Long-lasting, multidisciplinary rehabilitation is needed when the rehabilitation goal is to improve participation.
- » Individualized analysis of the factors affecting participation is needed.

A previous review showed that multidisciplinary rehabilitation improves participation outcomes up to 12 months after rehabilitation start.²² However, the present results indicate that improvement also occurred after the first year. Performance of everyday activities in the moderate disability group improved continuously during both rehabilitation years, whereas in the severe disability group, performance improved more during the second year. Hence, it is important to continue rehabilitation for a sufficiently long period. Moreover, consistent with a previous report,⁶ and with previous studies showing that challenges in everyday life are multiple,^{18,23} the self-reported reasons for changes in everyday activities were diverse. These results suggest that clinicians and individuals with MS should consider which factors influence specific everyday activities. In doing so, the ICF classification could be used as a frame of reference, assisting clinicians to select an appropriate intervention (eg, training, learning compensation strategies, or modifying the patient's environment). Rehabilitation should concentrate on environmental factors and alternative ways of coping, especially in the advanced stages of MS.⁴

Environmental and personal factors seemed to play an important role in the performance of and satisfaction with everyday activities of individuals with MS. In each rehabilitation phase—assessment, goal setting, and selecting the intervention—it is essential to eliminate hindering factors and promote facilitating factors.^{24,25} In clinical practice, it is important to recognize that even a small action can induce notable changes in everyday life if conducted in the right place and at the right time. For example, as in previous studies,^{26,27} identification of the need for assistive devices or environmental modifications resulted in major changes in everyday life.

The fact that personal factors are not defined in the ICF classification can lead to their being overlooked when planning interventions. The present findings encourage a stronger focus on personal factors. Participants accented a few personal factors that enable them to perform daily activities, such as learning new ways of doing activities or of awaiting challenging situations. Although these factors are closely connected to the ICF activity

and participation component, they were also classified under personal factors because they represent changes in behavior patterns and styles.²⁸ This study corroborates an earlier finding²⁹ on the centrality of motivation, coping, and action planning in a health promotion intervention. Moreover, self-awareness of functional status has been observed to influence daily activities and participation.³⁰

The diversity of reasons for change in the performance of everyday activities found in this study highlights the value of other theories in addition to treatment theories. The enablement theory might give an insight into, and help model, complex functions that are multiply determined.³¹ Furthermore, different behavior change theories, such as the theory of intentional action control,³² can help us understand how individuals translate their goals into actions and how their actions can be supported to reach goals in complex situations that are affected by multiple factors. Moreover, integrating the 3 core elements of a client-centered approach—effective communication, partnership, and health promotion³³—into the intervention process would ensure a person's unique life situation and needs are its starting point.

The present study has several strengths. First, the design, which incorporated quantitative and qualitative data to ascertain the reasons for improvement, enables a multifaceted view of the outcomes of MS rehabilitation. Second, the study adopted a client-centered approach, prioritizing individuals' subjective experience of changes in their performance of and satisfaction with self-selected everyday activities and their own views of the reasons for improvement. Third, compared with most of the interventions studied earlier, the current intervention was significantly longer in duration. Fourth, the COPM proved to be valid, reliable, clinically useful,³⁴ and sensitive enough to measure changes in everyday activities from the perspectives of performance and satisfaction.³⁵

Despite the strengths of the study, its generalizability is influenced by the study population and study design. The sample was limited to individuals with moderate to severe disability. Therefore, the results cannot be generalized to individuals with mild disabilities. In addition, there was no actual observation of activity performance. The pre-post design without controls enabled comparison of improvement between moderately and severely disabled groups during the 2-year rehabilitation. However, to fully evaluate the effectiveness of multidisciplinary long-term MS rehabilitation programs, more studies with randomized controlled trial designs are needed.

The COPM as a self-evaluation method also has its limitations. Results could have been influenced by the phenomenon known as response shift. It is described as a cognitive appraisal process in which individuals' self-assessment is influenced by different internal standards or values, or how individuals understand the concept being assessed.³⁶ Over time or as the disease changes, the

response shift can occur in 3 different ways: (1) internal standards of participation may change (recalibration); (2) values may change (reprioritization); and (3) the individual may define the concept differently than before (reconceptualization).³⁷ The life situations of the participants changed during the 2-year rehabilitation program. In addition, the activities that some participants considered important at the beginning of the rehabilitation program no longer seemed important at the end of the rehabilitation program (reprioritization). Therefore, it is worth noting that in the 12-month or 21-month assessments, approximately 10% of the activities were such that participants did not assess improvement in them. For example, walking the dog was no longer relevant after its death, or, owing to worsening of the disease, a previously important activity, such as sauna, no longer offered a pleasurable experience (recalibration).

In conclusion, the 2-year, multidisciplinary, group-based, outpatient rehabilitation program improved performance of and satisfaction with everyday activities among individuals with moderate and severe MS. However, the use of a pre-post study design without controls limits the generalizability of the results. Although self-reported reasons for change during the rehabilitation were diverse, personal and environmental factors seemed to have an important role. Therefore, it is recommended that participants' personal experiences of the factors affecting their everyday activities are regularly captured during the rehabilitation process. □

ACKNOWLEDGMENTS: We thank all the people with MS who participated in this study; the interviewers, Tuija Heiskanen and Maikku Tammisto; and the district coordinators of the Finnish MS Society, Annika Ingves, Anne Huuskonen, and Hannu Kapanen, for their participation in data collection. The study was a part of the first author's dissertation "Participation of People with Multiple Sclerosis in Everyday Life" published by University of Jyväskylä, Finland.

FINANCIAL DISCLOSURES: The authors declare no conflicts of interest.

FUNDING/SUPPORT: The study was performed as a part of a larger project funded by the Social Insurance Institution of Finland, and this work was supported by the Finnish Cultural Foundation's South Savo Regional Fund.

REFERENCES

- Compston A, Coles A. Multiple sclerosis. *Lancet*. 2008;372(9648):1502-1517. doi:10.1016/S0140-6736(08)61620-7
- Holper L, Coenen M, Weise A, Stucki G, Cieza A, Kesselring J. Characterization of functioning in multiple sclerosis using the ICF. *J Neurol*. 2010;257(1):103-113. doi:10.1007/s00415-009-5282-4
- Coenen M, Cieza A, Freeman J, et al. The development of ICF Core Sets for multiple sclerosis: results of the International Consensus Conference. *J Neurol*. 2011;258(8):1477-1488. doi:10.1007/s00415-011-5963-7
- European Multiple Sclerosis Platform. Recommendations on rehabilitation services for persons with MS in Europe. *Rehabilitation in Multiple Sclerosis*.

- April 2012. Accessed March 1, 2020. <https://www.eurims.org/News/recommendations-on-rehabilitation-services-for-persons-with-multiple-sclerosis-in-europe.html>
5. Khan F, Amaty B. Rehabilitation in multiple sclerosis: a systematic review of systematic reviews. *Arch Phys Med Rehabil.* 2017;98(2):353-367. doi:10.1016/j.apmr.2016.04.016
 6. Salminen AL, Hämäläinen P, Karhula ME, et al. Group-based multidisciplinary rehabilitation for outpatient clients with MS: development and evaluation of the rehabilitation model. Social Insurance Institution of Finland; 2014.
 7. Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an Expanded Disability Status Scale (EDSS). *Neurology.* 1983;33(11):1444-1452. doi:10.1212/wnl.33.11.1444
 8. Law M, Baptiste S, Carswell A, eds. *Canadian Occupational Performance Measure.* 4th ed. CAOT Publications ACE; 2005.
 9. Chiaravalloti ND, DeLuca J. Cognitive impairment in multiple sclerosis. *Lancet Neurol.* 2008;7(12):1139-1151. doi:10.1016/S1474-4422(08)70259-X
 10. Marrie RA, Horwitz R, Cutter G, Tyry T, Campagnolo D, Vollmer T. The burden of mental comorbidity in multiple sclerosis: frequent, underdiagnosed, and undertreated. *Mult Scler.* 2009;15(3):385-392. doi:10.1177/1352458508099477
 11. Finlayson M, Johansson S, Kos D. Fatigue. Multiple Sclerosis Rehabilitation for Impairments in Body Structure and Function Fatigue. In: Finlayson M. *Multiple Sclerosis Rehabilitation: From Impairment to Participation.* CRC Press; 2013:69-99.
 12. Cattaneo D, Jonsdottir J. Balance Disorders. In: Finlayson M. *Multiple Sclerosis Rehabilitation: From Impairment to Participation.* CRC Press; 2013:101-133.
 13. Bethoux F, Sutliff MH. Muscle Strength, Tone, and Coordination. In: Finlayson M. *Multiple Sclerosis Rehabilitation: From Impairment to Participation.* CRC Press; 2013:135-159.
 14. Two-way repeated measures ANOVA using SPSS statistics. Laerd Statistics Accessed June 10, 2019. <https://statistics.laerd.com/spss-tutorials/two-way-repeated-measures-anova-using-spss-statistics.php>
 15. Eysen IC, Steultjens MP, Oud TA, Bolt EM, Maasdam A, Dekker J. Responsiveness of the Canadian Occupational Performance Measure. *J Rehabil Res Dev.* 2011;48(5):517-528. doi:10.1682/jrrd.2010.06.0110
 16. Krippendorff K. *Content Analysis: An Introduction to Its Methodology.* 4th ed. Sage Publications Inc; 2018.
 17. Kos D, Dupontail M, Meirte J, et al. The effectiveness of a self-management occupational therapy intervention on activity performance in individuals with multiple sclerosis-related fatigue: a randomized-controlled trial. *Int J Rehabil Res.* 2016;39(3):255-262. doi:10.1097/MRR.0000000000000178
 18. Lexell EM, Flansbjerg UB, Lexell J. Self-perceived performance and satisfaction with performance of daily activities in persons with multiple sclerosis following interdisciplinary rehabilitation. *Disabil Rehabil.* 2014;36(5):373-378. doi:10.3109/09638288.2013.797506
 19. Lexell EM, Lund ML, Iwarsson S. Constantly changing lives: experiences of people with multiple sclerosis. *Am J Occup Ther.* 2009;63(6):772-781. doi:10.5014/ajot.63.6.772
 20. Yorkston KM, Kuehn CM, Johnson KL, Ehde DM, Jensen MP, Amtmann D. Measuring participation in people living with multiple sclerosis: a comparison of self-reported frequency, importance and self-efficacy. *Disabil Rehabil.* 2008;30(2):88-97. doi:10.1080/09638280701191891
 21. McPherson KM, Kayes NM, Kersten P. Meaning as a Smarter Approach to Goals in Rehabilitation. In: Siegert RJ, Levack WMM. *Rehabilitation Goal Setting Theory, Practice and Evidence.* CRC Press, Taylor & Francis Group; 2015:105-122.
 22. Amaty B, Khan F, Galea M. Rehabilitation for people with multiple sclerosis: an overview of Cochrane Reviews. *Cochrane Database Syst Rev.* 2019;1(1):CD012732. doi:10.1002/14651858.CD012732.pub2
 23. Dehghan L, Faraji F, Dalvand H, Shamsoddini A, Hadian-Rasanani MR. Occupational performance of individuals with multiple sclerosis based on disability level in Iran. *Iran J Neurol.* 2019;18(1):1-6.
 24. Geyh S, Peter C, Müller R, et al. The personal factors of the International Classification of Functioning, Disability and Health in the literature - a systematic review and content analysis. *Disabil Rehabil.* 2011;33(13-14):1089-1102. doi:10.3109/09638288.2010.523104
 25. Hamed R, Tariah HA, Hawamdeh ZM. Personal factors affecting the daily functioning and well-being of patients with multiple sclerosis using the International Classification of Functioning model. *Int J Ment Health.* 2012;41(4):47-61. doi:10.2753/IMH0020-741140404
 26. Carver J, Ganus A, Ivey JM, Plummer T, Eubank A. The impact of mobility assistive technology devices on participation for individuals with disabilities. *Disabil Rehabil Assist Technol.* 2016;11(6):468-477. doi:10.3109/17483107.2015.1027295
 27. Eisenberg Y, Vanderbom KA, Vasudevan V. Does the built environment moderate the relationship between having a disability and lower levels of physical activity? A systematic review. *Prev Med.* 2017;95S:S75-S84. doi:10.1016/j.ypmed.2016.07.019
 28. Geyh S, Schwegler U, Peter C, Müller R. Representing and organizing information to describe the lived experience of health from a personal factors perspective in the light of the International Classification of Functioning, Disability and Health (ICF): a discussion paper. *Disabil Rehabil.* 2019;41(14):1727-1738. doi:10.1080/09638288.2018.1445302
 29. Chiu CY, Lynch RT, Chan F, Berven NL. The Health Action Process Approach as a motivational model for physical activity self-management for people with multiple sclerosis: a path analysis. *Rehabil Psychol.* 2011;56(3):171-181. doi:10.1037/a0024583
 30. Goverover Y, Chiaravalloti N, Gaudino-Goering E, Moore N, DeLuca J. The relationship among performance of instrumental activities of daily living, self-report of quality of life, and self-awareness of functional status in individuals with multiple sclerosis. *Rehabil Psychol.* 2009;54(1):60-68. doi:10.1037/a0014556
 31. Whyte J. Contributions of treatment theory and enablement theory to rehabilitation research and practice. *Arch Phys Med Rehabil.* 2014;95(suppl 1):S17-23.e2. doi:10.1016/j.apmr.2013.02.029
 32. Gollwitzer PM, Sheeran P. Implementation intentions and goal achievement: a meta-analysis of effects and processes. *Adv Exp Soc Psychol.* 2006;38:69-119. doi:10.1016/S0065-2601(06)38002-1
 33. Constand MK, MacDermid JC, Dal Bello-Haas V, Law M. Scoping review of patient-centered care approaches in healthcare. *BMC Health Serv Res.* 2014;14:271. doi:10.1186/1472-6963-14-271
 34. Carswell A, McColl MA, Baptiste S, Law M, Polatajko H, Pollock N. The Canadian Occupational Performance Measure: a research and clinical literature review. *Can J Occup Ther.* 2004;71(4):210-222. doi:10.1177/000841740407100406
 35. Eysen IC, Steultjens MP, Dekker J, Terwee CB. A systematic review of instruments assessing participation: challenges in defining participation. *Arch Phys Med Rehabil.* 2011;92(6):983-997. doi:10.1016/j.apmr.2011.01.006
 36. Schwartz CE. Applications of response shift theory and methods to participation measurement: a brief history of a young field. *Arch Phys Med Rehabil.* 2010;91(suppl 9):S38-S43. doi:10.1016/j.apmr.2009.11.029
 37. Schwartz CE, Stucky B, Rivers CS, Noonan VK, Finkelstein JA; RHSCIR Network. Quality of life and adaptation in people with spinal cord injury: response shift effects from 1 to 5 years postinjury. *Arch Phys Med Rehabil.* 2018;99(8):1599-1608.e1. doi:10.1016/j.apmr.2018.01.028