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A mixed-methods feasibility case series of a job retention vocational rehabilitation intervention for people with multiple sclerosis

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ABSTRACT

Purpose: To ascertain the feasibility and acceptability of delivering a job retention vocational rehabilitation intervention [MSVR] for people with multiple sclerosis (pwMS) in a community setting. Secondary objectives included determining whether MSVR was associated with changes in quality of life, fatigue, mood, cognition, workplace accommodations, work instability, work self-efficacy, and goal attainment.

Methods: Single-centre mixed-methods feasibility case series.

Results: 15 pwMS and three employers received 8.36 (SD = 4.48) and 1.94 (SD = 0.38) hours of MSVR respectively over three months. The intervention predominantly addressed managing cognition, fatigue, and negotiating reasonable accommodations. Four healthcare professionals were recruited to clarify clinical information.

Results: The intervention was feasible to deliver, and there was a significant positive impact on goal attainment immediately following MSVR ($t(14) = 7.44, p = .0001, d = 1.9$), and at months 3 ($t(13) = 4.81, p = .0001, d = 1.28$), 6 ($t(11) = 4.45, p = .001, d = 1.28$), and 12 ($t(9) = 5.15, p = .001, d = -2.56$). There was no impact on quality of life, fatigue, mood, cognition, workplace accommodations, work instability, and work self-efficacy. In post-intervention interviews, participants reported that MSVR was acceptable. Four themes were derived regarding the context, employer engagement, empowerment through knowledge, and intervention components and attributes.

Conclusion: It was feasible and acceptable to deliver MSVR. Participants better understood their MS, became more confident managing problems at work and attained their work-related goals.

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KEYWORDS

Vocational rehabilitation; multiple sclerosis; job retention; employment

► IMPLICATIONS FOR REHABILITATION

- People with multiple sclerosis (MS) experience problems at work because of the interaction between symptoms and environmental factors (e.g., co-workers' attitudes).
- Vocational rehabilitation for people with MS and their employers should be tailored in terms of content and intensity.
- People with MS can be empowered at work by learning about MS and how their symptoms fluctuate over time.
- Understanding legal responsibilities and examples of accommodations at work can be beneficial for employers.



Introduction


Multiple sclerosis (MS) affects approximately 700,000 people in Europe and 130,000 people in the United Kingdom (UK) [1,2]. People are usually still employed when they are diagnosed with MS; however, they leave the workforce prematurely [3]. There is extensive evidence that employment is good for physical and mental health, economic reasons, and social status [4].

Current healthcare services for people with MS recommend the need to support the person with MS with employment from the point of diagnosis. However, there is little to no information about the support needed and the attributes for this support.

Vocational rehabilitation (VR) aims to support those with illness or disability at work [5]. VR is considered a quality requirement of the National Service Framework (NSF) for people with long-term health conditions such as MS [6], and an outcome of UK National Health Service interventions (NHS) [7].

To date, there is inconclusive information about the effectiveness of these interventions for people with MS [8]. Few VR interventions for people with MS have been developed, implemented, and evaluated. The most recent interventions have focused on developing job-seeking skills [9] or addressing the impact of cognition at work [10]. Unfortunately, these interventions do not address all factors that affect job retention (e.g., fatigue levels, accessibility issues, etc.).

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Previous research exploring the VR needs of people with MS at work suggests that people with MS need holistic support in understanding and managing their condition, support in identifying workplace accommodations and managing employers' expectations through education [11,12].

Because of the limitations of the previously identified interventions, we developed a job retention VR intervention to support employed people with MS at work based on extensive literature and stakeholder engagement [11,13]. The intervention is called MSVR and is designed to be delivered to both the person with MS and their employer (including line managers, human resources, or occupational health).

This study presents the experiences of delivering MSVR and further insight into what VR for people with MS looks like. This study aimed to understand the feasibility of delivering MSVR and its acceptability for people with MS, employers and healthcare professionals. Secondary objectives explored whether MSVR was associated with changes in outcomes such as fatigue, cognition, work self-efficacy, work instability, and goal attainment for people with MS at four different time points.

Methods

Design and setting

This is a feasibility mixed-methods single-case series study design with an embedded qualitative study. Participants with MS and employers were involved in a three-month intervention and an interview three months post-intervention. The participants with MS were also asked to complete a questionnaire at the end of the intervention, and at 3-, 6-, and 12 months post-intervention.

Healthcare professionals were recruited to understand the clinical characteristics of the participants with MS and to request

additional support for people with MS if needed. They completed the initial interview and an interview at 3-months post-intervention to explore the acceptability of the intervention and barriers to participating in the support. Figure 1 presents the study participants' pathway.

Eligibility and recruitment

Participants were recruited over five months and received the intervention remotely. The inclusion criteria for participants with MS were: diagnosis of MS, aged between 18–65 years, currently employed, can give informed consent, and can communicate in English. The only exclusion criterion was: planning to retire due to age or take early retirement within the next six months. Employers and healthcare professionals were recruited if they: consented to participate in the study, and were over the age of 18 years. There were no exclusion criteria for employers and healthcare professionals.

We recruited participants with MS from three sources: The MS Clinic at Nottingham University Hospitals (NUH) NHS Trust, local charities working with people with MS (e.g., UK MS Society), and publicly available information on social media (e.g., Twitter). Once a participant with MS was recruited, the assistant psychologist (BDP) informed the participant of the possibility of including their employer/line manager in the intervention. Those participants with MS interested in involving their employer were provided with a Participant Information Sheet (PIS) to share with their employer. Employers were only contacted by their employees or assistant psychologist if the employee agreed to employer involvement in the intervention. Participants were also asked if they wanted to designate a healthcare professional involved in their usual MS care to gather further information about the

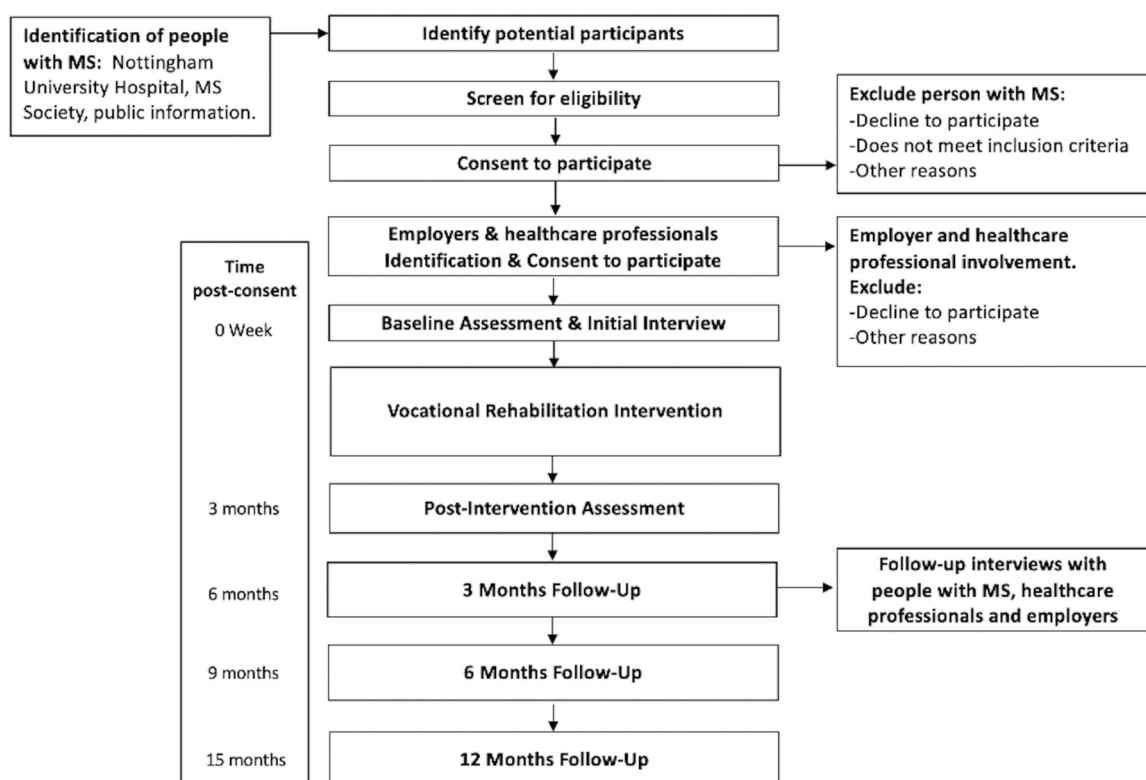


Figure 1. Participant's recruitment pathway.

characteristics of their MS and further support if needed. Agreeing to include an employer or healthcare professional in the intervention was not an inclusion criterion for the participant with MS.

This study was granted ethical approval by the Division of Psychiatry and Applied Psychology at the University of Nottingham, reference number 1582 (April 2019). Ethical approval was also granted by the NRES Committee East Midlands Nottingham 2, reference number 20/EM/0113, and the Research and Development (R&D) department of NUH NHS Trust. All participants completed a consent form before data collection.

Intervention description

MSVR aims to support people with MS to remain at work by providing support both in managing MS symptoms and reducing environmental barriers [13]. MSVR was underpinned by a biopsychosocial approach that takes into account the chronic and progressive character of MS and environmental factors [14], paradigms of work disability prevention [15], and anti-discrimination legislation (e.g., UK Equality Act 2010) [16] to ensure the person with MS is adequately supported in the workplace. The full description of the intervention following the template for intervention description and replication (TiDiEr) [17] is presented in [Supplementary Material A](#).

The first step of the intervention consisted of an initial interview (i.e., a workability assessment). The aim was to understand the demographic, clinical and professional characteristics of the person with MS, barriers to job retention, and set intervention work-related goals.

Participants then received up to 10 h of individually tailored VR in 1:1 meetings over three months with the assistant psychologist. The intervention was tailored for each participant from a menu of components presented in [Table 1](#).

Participants with MS had the opportunity to include their employer in the intervention. The employers' intervention involved an initial interview to understand their role and experience in supporting the person with MS at work and up to 4 h of support addressing topics such as understanding MS, legal responsibilities, and identifying reasonable accommodations.

The intervention was delivered by an assistant psychologist (BDP) with experience working with people with MS, who was involved in the intervention development. The assistant psychologist received mentoring from an Occupational Therapist with extensive experience in delivering VR to people with long-term neurological conditions.

The intervention was designed to be delivered in person or remotely according to the preference and availability of the participant.

To record the support provided to each participant, we adapted a proforma previously used to measure the delivery of VR interventions for people with stroke and traumatic brain injury [18,19]. The proforma allowed recording of intervention intensity and components delivered. The proforma was used to record both face-to-face contact (direct contact) which refers to the

topics discussed during each session with the person with MS (or employer); and indirect contact, which includes all the activities conducted outside of the session such as liaison with other professionals and communications. [Supplementary material A](#) presents the methods used to measure intervention content.

Feasibility measures

To ascertain the feasibility of delivering MSVR the assistant psychologist recorded on a proforma data regarding:

- Feasibility of recruiting participants using the recruitment strategy for the study.
- Time to recruit the target sample (15 people with MS, 10 employers, 10 healthcare professionals).
- Feasibility of delivering up to 10 hours of MSVR to people with MS and 4 hours for employers.
- Practical attrition and dropout reasons (if provided).
- Appropriateness of study methods and procedures.

Quantitative measures

The assistant psychologist collected demographic information from the participants during the initial interview. Participants with MS were asked to complete a booklet of questionnaires at baseline, at the end of the intervention, and at 3-, 6-, and 12 months post-intervention. The measures collected were ([Table 2](#)): Perceived difficulties questionnaire (PDQ) [20] to measure the presence of cognitive difficulties; Work Productivity and Activity Impairment Questionnaire [21] to assess the impact of MS at work; MS Work Instability Scale (MS-WIS) [22] to assess levels of work instability; Hospital Anxiety and Depression Scale (HADS) [23] to assess levels of anxiety and depression; Modified Fatigue Impact Scale –5 Items version [24] to assess fatigue levels; EQ-5D (Euro-QOL) [25] to assess health-related quality of life; Work Self-efficacy Scale (WSES) [26] to assess work self-efficacy; Workplace Adjustments questions [27] to measure the work adjustments received; Goal Attainment Scaling [28] to ascertain the level of goal attainment.

Qualitative measures

At three months post-intervention, all the participants included in the study (persons with MS, employers, and healthcare professionals) were invited via email to complete an online semi-structured interview with the assistant psychologist who delivered the intervention. The characteristics of the assistant psychologist are presented in [Table 3](#). The assistant psychologist did not know the participants prior to the intervention delivery. The interviews, conducted using a topic guide, focussed on understanding the intervention's acceptability and potential barriers to future implementation.

Table 1. Menu of intervention components.

Intervention components		
Understanding MS	Signposting to local and national resources	Cognition in MS
Education about legal rights	Signposting to organisations	MS and emotions (anxiety, stress)
Support with disclosure	Advice about reasonable accommodations	Long-term career planning
Fatigue management	Employer engagement	Referrals

Table 2. Summary of assessments and time-points.

Measures	Assessments and time-points					
	Baseline	MSVR intervention	Post-intervention	3 Months follow-up	6 Months follow-up	12 Months follow-up
Participant with Multiple Sclerosis (MS)						
Initial Interview (includes demographic information)	x					
Goal Attainment Scaling	x		x	x	x	x
Perceived Difficulties Questionnaire (PDQ)	x		x	x	x	x
Work Productivity and Activity Impairment Questionnaire (MS)	x		x	x	x	x
MS Work Instability Scale (MS-WIS)	x		x	x	x	x
Hospital Anxiety and Depression Scale (HADS)	x		x	x	x	x
Modified Fatigue Impact Scale –5 Items version	x		x	x	x	x
European Quality of Life-5D (Euro-QOL)	x		x	x	x	x
Work Self-efficacy Scale (WSES)	x		x	x	x	x
Workplace accommodations	x		x	x	x	x
Qualitative data						
Post-intervention interview				x		
Intervention compliance	x		x			
Observations	x		x			
Employer						
Initial Interview (includes demographic information)	x					
Post-intervention interview				x		
Healthcare professional						
Initial interview (includes demographic information)	x					
Post-intervention interview				x		

Table 3. Interviewer characteristics.

Characteristics	Interviewer (BDP)
Gender	Female
Education	BSc Psychology (Neuropsychology) MPhil (Psychology)
Ethnicity	White, not British
Research role	PhD Researcher/ Research Assistant
Experience	Multiple sclerosis research, rehabilitation research.

Data analysis

We present descriptive statistics mean and standard deviation (SD) to present the demographic, clinical and employment characteristics of the participants. Quantitative data were analysed using Statistical Package for Social Sciences (SPSS) version 24.0. To compare the performance of the participants as a group at different time points, we conducted paired *T*-tests and Wilcoxon signed-rank test (for parametric and non-parametric data, respectively).

Interviews were audio-recorded, transcribed verbatim and handled using NVivo v.12. The analysis was informed by the framework method [29]. The framework method involves five steps, which have been summarised in Table 4. Topic guides were informed by the Behaviour Change Wheel (BCW) [30], the International Classification of Functioning Disability and Health (ICF) [14], and the Consolidated Framework for Implementation Research (CFIR) [31]. A Patient and Public Involvement (PPI) representative reviewed the topic guides to ensure the questions could capture the experiences of receiving the intervention and were easy to understand. We present the topic guides used and how they map to the theoretical frameworks in [Supplementary Material B](#).

The main domains of the theoretical frameworks were used to inform the coding of the interviews, and the main themes were agreed upon between the study authors through discussion. We used Yardley's framework about quality of the data collection and analysis [32] to improve the quality of our study. The Consolidated Criteria for Reporting Qualitative Research checklist was used to ensure comprehensive reporting of the interviews study ([Supplementary Material C](#)).

Data synthesis

The data from the qualitative and quantitative findings were synthesised following the convergence coding matrix strategy [33]. This method allows for identifying areas of agreement and disagreement between the two types of data.

Results

Figure 2 represents the pathway the participants followed through the study. In total, 26 people were screened and 22 consented to participate. The participants with MS were recruited from NHS ($n = 3$), and self-referral from publicly available information (e.g., social media advertisement) ($n = 12$).

Participant characteristics

Fifteen participants with MS were included in the study. At the time of recruitment three participants were furloughed as a result of the Covid-19 pandemic. The combined employment and demographic characteristics of the participants with MS are presented in Table 5.

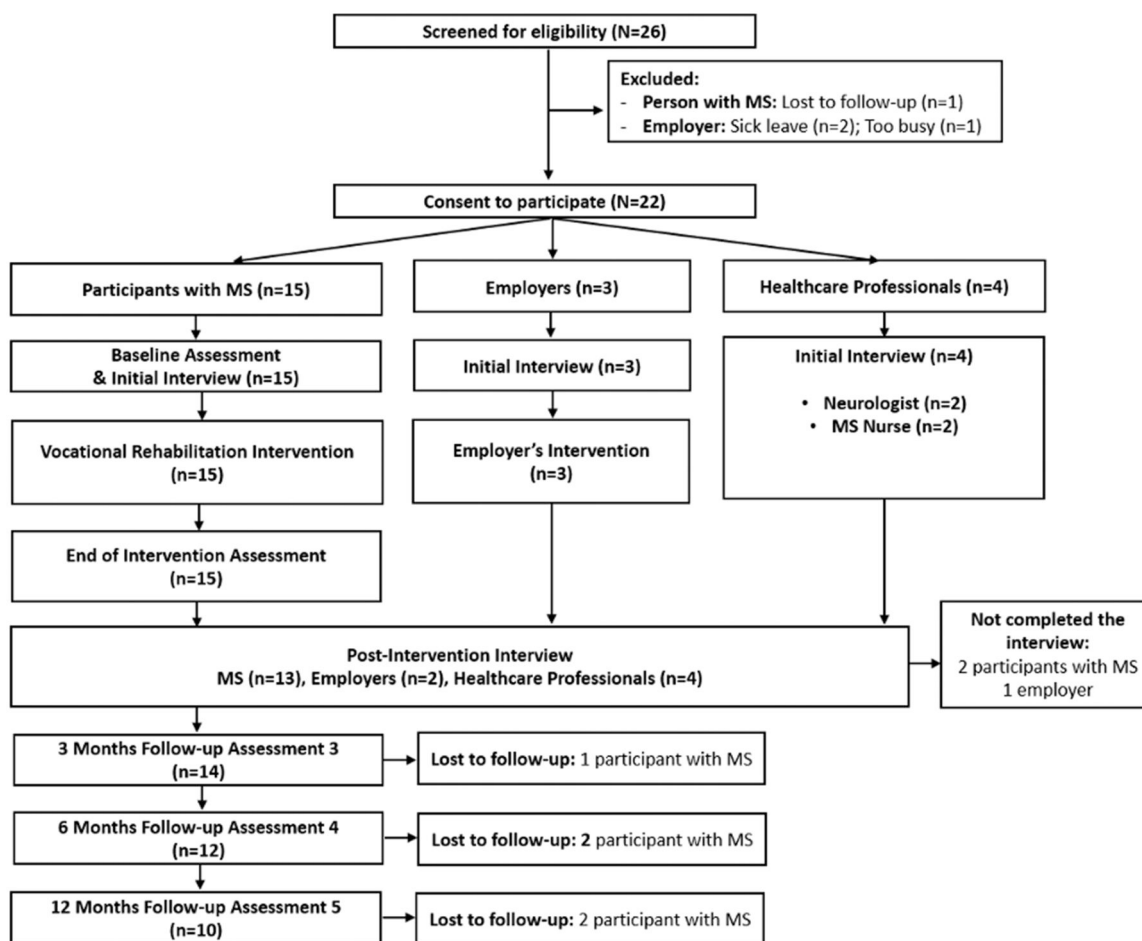
The participants with MS were on average aged 46.13 (SD: 9.58) years and were relatively well educated (Table 5). They had MS for a mean of 5.87 (4.83) years. Regarding the level of physical disability, their Expanded Disability Severity Score (EDSS) ranged from 0 (no disability) to 7.5 (severe disability), with an average score of 4.57 (2.10).

Three employers (line managers) were included in the study (1 woman, and 2 men). All self-identified as White British and had high educational levels, including degrees ($n = 2$) and postgraduate qualifications ($n = 1$). The employers had been supervising the person with MS for a relatively short time, ranging between two months to three years.

Four healthcare professionals (2 women, and 2 men) were included. The healthcare professionals included three neurologists and one MS nurse with an average of 14.25 (6.65) years of experience working with people with MS. The demographic characteristics of the employers and healthcare professionals are presented in Table 6.

Table 4. Description of framework analysis.

Phase	Description
Familiarisation	The transcripts from the interviews were read through twice, and notes were taken to identify key messages.
Identifying a thematic framework	We developed a thematic framework to organise the data iteratively following the headings of the ICF, BCW, and CFIR.
Indexing	The interview transcripts were uploaded to NVivo 12 software and the thematic framework was included in Nvivo as nodes to index the data of the interviews to the framework. Additional themes not covered by the framework were initially coded as "other" and revised iteratively throughout the data analysis process.
Charting data	Using Nvivo 12, we created matrices of each theme addressed in the interview, explored the relationship between the themes identified, and created a summary of the information included, as well as identifying key quotes from each theme.
Mapping and interpretation	The charting of the data allow us to gain an understanding of the data as a whole, and establish a relationship between the findings to answer the research question.


Figure 2. Screening and recruitment flow.

Feasibility results

The recruitment methods selected were suitable for the study. However, only 20% ($n=3$) and 26% ($n=4$) of participants with MS agreed to include their employers and designated healthcare professional in the intervention. The recruitment time had to be extended by two months to reach the recruitment target of participants with MS.

It was feasible to deliver up to 10 h of support for people with MS and 4 for their employers. However, as reported below (MSVR Delivery), not all participants needed all the support. All participants who started the intervention completed it, and there were no dropouts.

The questionnaire return rates for the participants with MS were 100% ($n=15$) at post-intervention, 93.33% ($n=14$) at three-

months, 80% ($n=12$) six, and 66.67% ($n=10$) at 12 months. Data completeness was excellent (100%); all questionnaires returned were fully completed.

MSVR delivery

The intervention was delivered between June 2020 and January 2021. On average, the participants with MS received 8.36 (4.48) hours of MSVR. The initial interview lasted on average 60 (16.9) minutes, and participants received on average 4.74 h (SD = 2.33) of direct support and 2.61 (2.2) hours of indirect support. Because the intervention was delivered only remotely, no time was spent travelling.

Five participants with MS (33.3%) received more support than that initially proposed (10h). These participants required lengthier discussions addressing a wider range of topics. The main interven-

Table 5. Demographic and employment characteristics of participants with multiple sclerosis.

Demographic information (n = 15)	
Women	12 (80%)
Men	3 (20%)
Ethnicity	
White British	14 (93.33%)
Black British Caribbean	1 (6.67%)
Relationship Status	
Single	1 (6.67%)
In a relationship	12 (80%)
Divorced/separated	2 (13.33%)
Education	
A-Levels	4 (26.67%)
Higher National Diploma	4 (26.67%)
College	3 (20%)
Degree	3 (20%)
Postgraduate	1 (6.67%)
MS Characteristics	
RRMS	9 (60%)
SPMS	6 (40%)
Employment characteristics	
Working full-time	6 (40%)
Working part-time	9 (60%)
Organisation size ^a	
Large (>250 employees)	12 (80%)
Medium (50–249)	1 (6.67%)
Small (10–49)	2 (13.33%)
Job Category ^b	
Unskilled	2 (13.3%)
Semi-skilled	4 (26.7%)
Semi-professional	5 (33.3%)
Professional	4 (26.7%)

RRMS: Relapsing-remitting MS; SPMS: Secondary progressive MS.

^aOrganisation size obtained from UK Government guidelines.

^bJob category obtained from UK Standard Occupational Classification [41].

tion components addressed and the percentage of the direct time spent addressing these topics are presented in Figure 3.

The most common topics addressed for participants with MS were managing cognitive problems, fatigue management, and identifying and requesting reasonable accommodations. To address the needs of the participants recruited, three new intervention components were incorporated into the intervention. These were supported by providing support identifying and requesting benefits (i.e., economic support), information about working during Covid-19, and mobility in MS.

The employers received on average 1.94 (0.38) hours of support. All completed the initial interview plus one intervention session. The employer's intervention addressed two main concerns: (1) the impact of MS symptoms at work, and (2) how to deal with the impact at the group level of the reduced productivity of an employee with MS.

Quantitative Results

All measures, except for the HADS depression subscale, met the criteria for analysis using a paired t-test. The HADS depression subscale was analysed using the Wilcoxon signed-rank test because the distribution of the difference between the baseline and the following time points was not normally distributed.

There was a significant positive impact on goal attainment immediately following MSVR at 3, 6, and 12 months (Table 7). However, there was not a statistically significant difference in the PDQ, MS-WIS, HADS anxiety, EQ-5D-5L, WSES, and MFIS-5 at any time point (Table 7). The Wilcoxon signed-rank test showed no significant difference in the HADS depression scores at post-intervention ($Z = -158$, $p < 0.874$, $r = 0.04$), three ($Z = -224$, $p < 0.823$, $r = 0.06$), six ($Z = -1.65$, $p < 0.098$, $r = .47$), and 12 ($Z = 1.42$, $p < 0.153$, $r = 0.44$) months.

Table 6. Demographic and employment characteristics employers and healthcare professionals.

Study ID	Gender	Ethnicity	Education	Role	Years of experience working with MS
EMP_01	Woman	White British	Degree	Line manager	3
EMP_02 ^a	Man	White British	Degree	Line manager	3
EMP_03	Man	White British	Post-graduate	Line manager	2 Months
HCP_01	Man	White other	PhD	Neurologist	20
HCP_02	Woman	White British	Post-graduate	MS Nurse	18
HCP_03	Man	White British	PhD	Neurologist	5
HCP_04	Woman	Asian British	Degree	Neurologist	14

^aParticipant who did not complete the post-intervention interview.

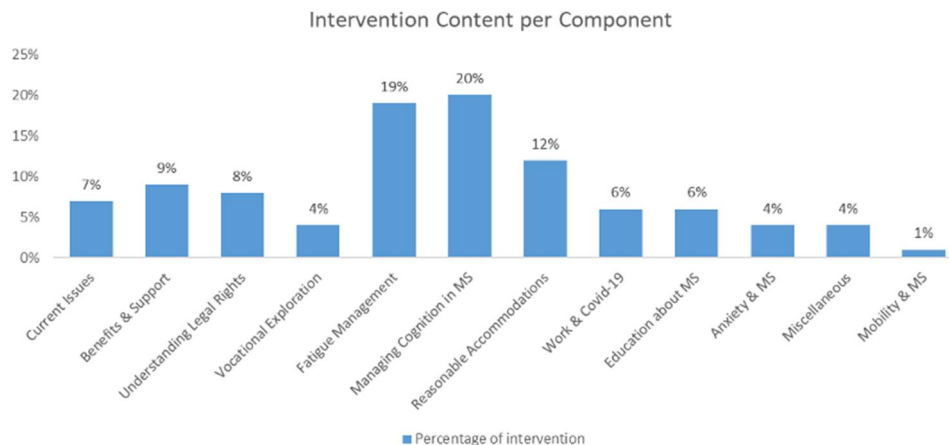


Figure 3. MSVR content per component for participants with MS.

Table 7. Paired T-Test quantitative measures.

	Descriptive Statistics					Paired t-test			
	Baseline (n = 15)	Post-intervention (n = 15)	3 Months FU (n = 14)	6 Months FU (n = 12)	12 Months FU (n = 10)	Baseline vs. post-Intervention	Baseline vs. 3 months FU	Baseline vs. 6 months FU	Baseline vs. 12 months FU
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean change (SD, 95% CI), p			
PDQ	40.73 (13.67)	38.12 (11.96)	37.57 (10.99)	37.42 (12.09)	40.3 (9.38)	-2.6 (8.74, -7.44 to 2.24), p = .269	-2.07 (8.53, -6.99 to 2.85), p = .380	-83 (9.08, -6.6 to 4.93), p = .757	-2.2 (7.1 (-7.3 to 2.9), p = .356
HADS anxiety	9.6 (5.19)	9.8 (4.32)	8.21 (4.11)	8.58 (3.37)	8.6 (3.74)	-20 (3.66, -1.83 to 2.23), p = .836	-57 (3.47, -2.58 to 1.43), p = .550	.58 (2.52, -1.02 to 2.19), p = .443	-1 (2.3, -2.6 to .68), p = .213
MS-WIS	14.8 (3.32)	14.46 (3.74)	14.29 (3.12)	15.17 (2.95)	15.2 (2.89)	-33 (2.49, -1.71 to 1.04), p = .613	-21 (3.35, -2.15 to 1.72), p = .815	.91 (2.99, -.98 to 2.82), p = .312	.90 (2.8, 2.9 to -1.1), p = .337
MIFS-5	12 (3.76)	11.6 (3.45)	12.07 (3.02)	10.54 (4.63)	12.5 (2.46)	-40 (3.18, -2.16 to 1.36), p = .634	.64 (2.76, -.95 to 2.23), p = .400	.16 (3.92, -2.32 to 2.66), p = .886	.6 (2.8, -2.62 to 1.42), p = .520
EQ-5D-5L+	.64 (1.19)	.62 (1.17)	.66 (1.19)	.63 (1.18)	.56 (1.17)	-01 (1.1, -.08 to .04), p = .600	-01 (0.9, -.07 to .03), p = .550	-03 (1.2, -.11 to .44), p = .354	.08 (1.8, -.04 to .21), p = .192
GAS ⁺⁺	42.57 (2.33)	60.5 (8.85)	56.55 (9.79)	57.51 (10.66)	58.54 (9.18)	17.94 (9.33, 12.77 to 23.10), p = .0001*	13.93 (10.82, 7.68 to 20.18), p = .0001*	14.6 (11.35, 7.39 to 21.82), p = .001*	15.7 (9.6, 22.58 to 8.8), p = .001*
WSES+	38.6 (4.86)	38.86 (4.77)	40.5 (3.95)	38.75 (5.53)	40.1 (4.9)	.26 (3.01, -1.4 to 1.93), p = .737	1.71 (4.35, -.80 to 4.23), p = .165	-91 (2.93, -2.78 to .95), p = .303	-1.4 (4.03(-4.28 to 1.48), p = .301

PDQ: Perceived deficit questionnaire; HADS: Hospital Anxiety and Depression Scale; MS-WIS: Multiple Sclerosis Work Instability Scale; MIFS-5: Modified Fatigue Impact Scale-5 items; EQ-5D-5L: EuroQoL 5-dimensions, 5 levels; WSES: Work Self-efficacy Scale; GAS: Goal Attainment Scale; SD: standard deviation; FU: follow-up. +: measures where a higher score represents a positive outcome. **Bold** *: Statistically significant change.

Qualitative results

The interviews lasted for 37 min on average (SD = 16.26). Two participants with MS and one employer were lost to follow-up and therefore, did not participate in the interview. The demographic characteristics of the participants who completed the interviews are presented in Table 5 (employers and healthcare professionals) and Table 8 (participants with MS).

The themes identified in the post-intervention interviews were categorised as barriers and facilitators to the acceptability of the intervention (see coding Tree in Table 9). Four main themes were drawn: (1) context, (2) employer engagement, (3) empowerment through knowledge, and (4) intervention components and attributes.

Context

Most participants with MS did not understand what impact MS can have in the workplace or how to manage the impact of their MS symptoms. The content and structure of MSVR were seen as acceptable by the participants. One participant felt the need to have meetings in person:

If you are struggling emotionally, it would be good to have that human contact. (MS_09)

Participants also reflected on how the Covid-19 pandemic limited some aspects of the intervention:

Interviewer: Was there anything that did not work well with you?

Participant: Covid-19... haha that is all I can say, Covid-19 got in the way. I mean because it stopped the participation of the intervention with the school; the only thing I can say that got in the way, nothing else did. Environmental surroundings did. (MS_04)

However, participants were still able to implement some of the knowledge gained in the intervention at work:

Before [the intervention] I used to sit for hours and just be there. Now I pace myself, you taught me that and I do feel better. (MS_12)

The healthcare professionals believed that there is a need to provide VR for people with MS; however, they lacked the knowledge and confidence to advise about work:

As doctors, I think it would be very tricky for us to also have that expertise, and be confident enough to deliver those interventions, when it is outside our area of expertise. (HCP_03)

The main barrier identified to receiving VR support from the perspective of people with MS was working full time (i.e., not having enough time):

I mean I don't work full-time so that made it [participate in the intervention] easier. It might be a little bit more difficult for somebody who works 5-9 Monday to Friday. (MS_08)

Another barrier referred to not "experiencing problems at work." The participants (MS, employer, and healthcare professionals) reflected that if a person was managing well at work, they might not see the need to understand their employment rights, because thinking about potential problems at work might add further stress to their lives; and therefore, they may reject VR support.

Employer engagement

The most common issues at work usually arose from difficulties managing relationships with the employer. Thus, there were mixed views about whether to include the employer in the intervention:

Table 8. Summary of demographic characteristics of interview participants.

Study ID	Age (years)	Gender	Ethnicity	Education	Type of MS	Years with MS	EDSS	Employment	SOC classification	Type of employer	Size of employer
MS_01	51	Man	White British	A-Levels	SPMS	2	4	Full-time	Professional	Public	Large
MS_02	36	Woman	White British	Degree	RRMS	11	2	Part-time	Semi-professional	Private	Large
MS_03	55	Woman	White British	College	RRMS	3	6.5	Part-time	Semi-skilled	Private	Small
MS_04	50	Woman	White British	HND	SPMS	3	5	Part-time	Unskilled	Public	Medium
MS_05	44	Woman	White British	HND	RRMS	4	4	Part-time	Semi-professional	Public	Large
MS_07	33	Woman	White British	HND	RRMS	0.5	4	Part-time	Unskilled	Private	Small
MS_08	52	Woman	White British	A-Levels	SPMS	16	6.5	Part-time	Semi-skilled	Public	Large
MS_09	57	Woman	White British	Post-graduate	SPMS	10	7.5	Part-time	Professional	Public	Large
MS_10	55	Woman	White British	A-Levels	RRMS	4	4.5	Part-time	Semi-professional	Private	Large
MS_11	45	Man	White British	A-Levels	SPMS	14	6	Full-time	Semi-professional	Public	Large
MS_12	47	Woman	White British	Degree	RRMS	7	4.5	Full-time	Professional	Public	Large
MS_14	35	Woman	Black British	Degree	RRMS	2	0	Full-time	Semi-skilled	Public	Large
MS_15	62	Woman	White British	College	SPMS	7	6.5	Full-time	Semi-skilled	Private	Large

MS: multiple sclerosis; HND: Higher National Diploma; SP: secondary-progressive; PP: primary progressive; EDSS: Expanded Disability Status Scale; SOC: Standard Occupational Classification. Size of employer: Large (>250 employees), medium (50–249 employees), small (10–49 employees).

Table 9. Interviews coding tree.

Theme	Subtheme
Context	–
Employer engagement	–
Empowerment through knowledge	–
Intervention component and attributes	Support received Intervention tailoring Therapist's attributes

I was a bit concerned in the early stages about including my employer. Because I feel like I have a supportive employer anyway, I kind of felt that it might be a little bit of a slur on them, that I wanted them included on it. (MS_10)

The main idea shared was that the employer should not be aware of all the aspects of MS affecting the person with MS at work, because that can lead to further discrimination at work:

At the start [of the intervention] it needs to be only the person [with MS] and the person [therapist] doing the intervention so that you get to know the person and issues before the employer pops in. (MS_08)

In general, the employers reported not knowing much about MS and having only heard about it through their employees. Therefore, the employers reported that the intervention helped them understand the needs of their employees with MS better:

I think it's been very insightful. I think that the explanation that you [assistant psychologist] gave me about the condition and background of what is involved in the condition and by extension things to be aware of, as an employer was very useful. (EMP_03)

Some participants with MS who did not involve their manager in MSVR reported that their managers recognised an improvement in the way they were working following MSVR:

I had my yearly review from my manager, and he said since November or December last year he has seen that my output has improved, and I am doing more, I have more energy to give or put into my work, so yes, it is all flying colours from every direction. (MS_11)

Empowerment through knowledge

Empowerment was a recurring topic throughout the interviews. Understanding their legal rights and learning what made their symptoms worse or fluctuate over the day was seen as crucial to requesting support. The knowledge acquired helped the participants with MS structure their requests and address the employer's questions:

I feel empowered and capable. I have had some conversations with my new line manager, and she is very supportive. Whenever I need it, I would be able to speak up for myself. Because I think a lot of the

things with the understanding the MS, now I feel in a better position because I understand how it affects me in work, I can ask for relevant things. (MS_05)

Even those who were not experiencing problems at work reported that the knowledge gained made them feel more positive about their future at work:

Before we started talking, the cognitive side worried me, it scared me, because that is the side of me that I use all the time at work, that's the side that pays my wages, keeps food on the table. (MS_01)

Two employers included in the intervention recognised that MSVR had empowered their employees with MS to start addressing the problems they were experiencing at work:

I think it has been useful because as you know, [name] has issues of coming to terms with her condition, and I think this has helped her face up to it and therefore has been more open to all of us at work. (EMP_01)

Intervention components and attributes

Three main sub-themes were drawn from this theme referring to the support received, tailoring of the intervention, and the therapist's attributes.

Support received

The participants with MS highlighted the importance of conducting a detailed assessment of needs at work to think about barriers at work. In particular, participants found it beneficial to discuss ideas to manage the challenges at work:

I think it was the practical tips really, and talking through them with somebody, it is nice when somebody understands what is going on or says that these things happen, and they are real. It is Ok to feel like that. (MS_12)

The intervention was seen as comprehensive and receiving resources (e.g., booklets) to complement the discussions from the sessions and an email summarising content covered in the sessions helped the participants with MS solidify their knowledge:

You [assistant psychologist] used to send us an email summarizing what we covered [in the session] and any information with it. You would always then re-cover what we did in the previous session, so it jogged my memory of what we were going to cover today. (MS_04)

Intervention tailoring

Receiving an individually-tailored intervention in terms of hours of support, content, and goals was seen as a valued feature of MSVR by employers and people with MS:

I think because it [the intervention] was based around me and my outcomes, I felt it was all valuable because it was all specific to what I was saying. (MS_05)

Participants suggested the need for a longer intervention to allow for lengthier intervention procedures such as applying for Access to Work [34], a UK Government funding to pay for reasonable adjustments that enable people with disabilities to access or remain in work:

With some things like "Access to Work," the sort of length of time for the study might need to be more flexible so that you start and if things like that have to go back to Government or HR, you can have a sort of a number of hours in one month, and then come back to it. (MS_08)

MSVR provided information about Access to Work, and help with the application process; however, because of the intervention length (as part of the study), participants had not received funding from Access to Work during the timeframe of the intervention.

Therapist's attributes

The participants with MS believed that it was essential for the success of the intervention to have a therapist (i.e., the person delivering the intervention) who has extensive knowledge about MS and employment law. They also commented on the need for the therapist to collaborate with other professionals (e.g., human resources, legal representatives) to complement the support:

The person that is leading it [the intervention], is quite important as well. Because you [assistant psychologist] have done a lot of research, you have really good natural knowledge on the topics that I wanted advice about, but then also, you supplemented your natural knowledge with seeking advice from other professionals that would be more knowledgeable in a particular knowledge as well. (MS_14)

The participants with MS felt that the therapist was open-minded and easy to talk to, which in turn gave them the confidence to bring up their concerns in the sessions.

I think it was you [assistant psychologist]...you made me feel more confident. It is all of that, I think the whole thing has been very beneficial. (MS_12)

Convergence matrix

The combined findings from both methodologies and levels of agreement are presented in Table 10. There was convergence on only one measure (fatigue). We found complementary data from the anxiety, depression, and goal attainment measures. For most measures, there was a disagreement between the quantitative and qualitative data about cognition, work self-efficacy, and work instability. Two measures (relationship with line manager and empowerment) were not covered by the quantitative findings and were only identified in the qualitative data.

Discussion

It was feasible and acceptable to deliver MSVR for employed people with MS and their employers in a community setting. MSVR was associated with improved goal attainment, but the intervention had no impact on measures of quality of life, fatigue, mood, cognition, workplace accommodations, work instability, and work self-efficacy. All participants recruited completed the intervention.

On average, participants with MS needed fewer than the originally planned 10 h of support. A third of participants with MS did, however, need additional hours, but these were still provided within the intervention timeline (3 months). Because the

intervention was highly individualised, those participants who were experiencing issues with their employers or had greater difficulty managing their symptoms at work and required further support to address their needs. This heterogeneity in the intensity of support needed has been discussed in the literature that suggests that all people with MS should be informed about where to look for support with employment; those who are concerned about work should be supported to self-manage their condition, and a smaller group of people with MS who are in a work crisis (e.g., attending an employment tribunal) require specialist VR support [35]. However, it is not yet clear what factors (employment, clinical, personal) led to people needing these different levels of support or indeed the content of the specialist support.

The most commonly requested support was related to managing cognitive problems and fatigue at work. These findings are in line with other studies that suggest fatigue is a commonly reported factor for leaving the workforce [36] and cognitive problems negatively affect work performance [37].

Additionally, most participants requested support in identifying reasonable accommodations and understanding legal rights. Unfortunately, the experiences of delivering the intervention and interviews highlighted that not all employers provided the accommodations requested. This was also found in research about disability equality in the workplace, suggesting that up to 67% of workers with disabilities in the UK have had all or some of their accommodations requests refused [38].

For this reason, participants with MS requested information about their legal rights. Under the UK Equality Act (2010) employers have a legal responsibility to implement reasonable accommodations for employees with MS [16]. However, some employers still fail to provide these accommodations [11]. Therefore, professionals involved in the delivery of VR for people with MS should know disability legislation and discrimination, as well as the ability to negotiate support with employers.

Delivering the intervention during the pandemic helped us identify areas of support that were not originally intended to be addressed by the intervention, such as support with benefits and support understanding Covid-19 regulations and what they meant for the working arrangements of the participants with MS. The intervention was developed pre-Covid-19; thus, we could not have foreseen the need for this support during the development stages. However, because the intervention was still in the modelling phase of its development, we had room to incorporate additional support as needed.

Participants recognised that receiving individually-tailored support was the most important attribute of the intervention. The intervention was designed to adopt a flexible approach to provide tailored support in terms of content, goals, hours of support, modality of delivery, and frequency of sessions. The benefits of individually-tailored support have been widely acknowledged in the literature [6,8].

One of the main limitations of the study is that we only recruited three employers for the intervention. Thus, we were unable to provide detailed information about their needs. This finding is interesting in itself and aligns with previous research in VR for people with long-term neurological conditions reporting challenges with employer recruitment [39]. Employers are a key factor in work stability [35]. Unfortunately, many participants with MS were uncomfortable with involving their employers because they had poor relationships with their line managers. To compensate for the lack of employer engagement, the intervention empowered the participants with MS to request additional support from their line managers and advised them on how to talk

Table 10. Convergence matrix case series.

Variable	Quantitative finding	Qualitative finding	Convergence matrix coding
Cognition	No change in perceived cognitive deficits for participants with MS	The participants with MS reported an improved ability to manage their cognition at work.	Disagreement: The reported improvement was not captured in the quantitative data.
Anxiety	At an individual level, three participants experienced a reduction in anxiety scores at 3-months follow-up. Overall, there was no change over time.	Participants reported a fluctuation in anxiety levels as a result of the Covid-19 pandemic and family issues.	Complementary: The uncertainty of the Covid-19 pandemic worsens anxiety levels for the participants. Thus, the intervention had a limited impact on the participants' anxiety levels.
Depression	At three months follow-up one participant experienced a reduction in depression scores. There were no significant changes over time across participants.	Participants reported increased feelings of isolation and depression as a result of the pandemic, working from home, and living arrangements	Complementary: The environmental circumstances (covid-19 pandemic) limited the impact of the intervention on depression levels.
Work self-efficacy	Participants remained relatively stable on this measure over time.	Participants with MS reported improved self-efficacy in managing work demands.	Disagreement: Improvements in work self-efficacy were not observed in the quantitative data.
Fatigue	The fatigue levels of the participants with MS did not improve over time.	Participants with MS reported that they were still learning to manage their fatigue.	Convergence: The intervention did not help the participants to manage their fatigue at work.
Work Instability (WI)	The intervention did not help the participants with MS to reduce WI levels.	The participants with MS overall reported feeling more confident about their ability to remain at work.	Disagreement: The quantitative data did not capture the self-reported reduction of work instability.
Goal attainment	Most participants met their intervention goals. Three participants did not meet their goals at three months follow-up and one at six months follow-up.	Participants reported that environmental factors such as Covid-19 regulations limited their ability to meet some goals.	Complementary: Both datasets agree that the intervention helped the participants with MS to achieve their intervention goals, although this was not without difficulty.
Relationship with employer	No measure recorded this.	Participants reported the need for employer engagement to provide them with education and improve workplace relationships.	Silence: Only the qualitative data reported on the relevance of the relationship with the employer.
Empowerment	No questionnaire measured this.	Participants with MS reported feeling empowered as a result of the intervention. The employers reported that their employees had become more proactive in managing their MS at work and that had a positive impact at work.	Silence: Only the qualitative data reported on empowerment.

about the impact of their MS at work. Future research should aim to explore the benefits for employers of supporting employees with disabilities at work, to enhance their engagement in VR interventions. Examples of strategies could be disability confident schemes, developing accredited training opportunities for employers or implementing policies that require organisations to demonstrate that they can support employees with disabilities at work.

One of the main strengths of this study was the diversity of methods used to collect data about the intervention delivered. We collected both quantitative and qualitative data to address the study's aims. Data from a proforma and notes were taken by the assistant psychologist during intervention delivery and were combined to measure the intervention content and timing. This provided rich data to describe what VR interventions for people with MS could include, and to illustrate the nature of individual tailoring in terms of content, dose, and measure the intensity of hours of support needed according to the person with MS and their employment circumstances.

We also used multiple quantitative measures to obtain rich data about the impact of the VR intervention on aspects that were addressed with the intervention, such as fatigue and cognition. We selected questionnaires that had been validated with people with MS (where possible) and were simple and quick to complete, to reduce participant burden. We felt that including a lengthy assessment might lead to participants getting tired or not completing all the questions. Unfortunately, we did not find any effect of the MSVR on the measures of quality of life, fatigue, mood, cognition, work instability, and work self-efficacy. This could be because they were insufficiently sensitive to changes resulting from the intervention, which were mostly identified by the qualitative findings. This discrepancy may be explained by heterogeneity in the sample in terms of disability levels, support

received at work and the impact of MS at work. Additionally, not all the benefits of the intervention could be captured using the quantitative measures selected. There are no measures specific enough to capture gradual changes in relationships with their line managers or gain a better understanding of the support that may be beneficial for the person with MS in the future. For this reason, it is important to include vocational goal setting as a key outcome of VR interventions. Finally, the impact of the Covid-19 pandemic led to people with disabilities experiencing high levels of isolation, poor access to other healthcare services, and uncertainty at work [40]. These issues were recorded in the interviews and participants attributed increased fatigue and lower mood to the Covid-19 restrictions.

Future studies should explore other tools that may be more suitable to measure the impact of VR interventions. For example, it may be beneficial to include tools to measure empowerment and understand relationships with line managers. In this study, participants suggested having become more empowered at work, however, this was only captured in the post-intervention interviews. There is also a need to include outcome measures for the employers to capture changes in their knowledge about MS, confidence in managing the person with a health condition at work, and attitudes towards disabilities.

Because of the diversity in employment, clinical, and personal characteristics, there is a need to further understand the support (in terms of content and intensity) that people with MS need according to their circumstances; as well as the mechanisms underlying of VR for people with MS, so that there is a clear understanding of what aspects of the support provided led to successful goal achievement for most participants, and why others did not benefit from the support.

In conclusion, VR interventions have the potential to help people with MS achieve their employment goals. There is a need to support healthcare professionals involved in the care of people with MS to identify those experiencing employment concerns and develop services that integrate employment and healthcare services to provide comprehensive care to people with MS.

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