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ORIGINAL ARTICLE

Lessons learned and paths forward: Navigating the social landscape of multiple sclerosis care in the second wave of COVID-19

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ABSTRACT

Objectives: This study aimed to explore the specific difficulties faced by multiple sclerosis (MS) patients during the longest wave of coronavirus disease 2019 (COVID-19), focusing on their physical and psychological health, healthcare access, and social dynamics.

Patients and methods: The observational cross-sectional study employed a mixed-methods approach, conducting telephone interviews with 114 patients (88 females, 26 males; mean age: 40.7±11.5 years; range, 19 to 66 years) with MS between October 2020 and March 2021 to gather comprehensive data on their experiences. Quantitative data was complemented with qualitative insights to provide a deeper understanding of the multifaceted impact of the pandemic on this population.

Results: The findings revealed that patients with MS experienced increased physical and cognitive fatigue, heightened anxiety, and exacerbation of disease symptoms during the pandemic. Disruption of social support networks and reduced access to healthcare services further compounded their challenges, significantly diminishing their quality of life.

Conclusion: The study underscores the critical need for integrating qualitative and quantitative data to fully understand the pandemic's impact on patients with MS. We recommend developing online social and psychological support mechanisms and enhancing telemedicine services to better address the needs of patients with MS in future health crises, thereby augmenting existing primary healthcare services.

Keywords: COVID-19, healthcare access, multiple sclerosis, psychological health.

The coronavirus disease 2019 (COVID-19) pandemic has imposed substantial challenges on global healthcare systems, disproportionately affecting vulnerable groups such as individuals with multiple sclerosis (MS).[1] The pandemic's disruptions to work, family, and social life have contributed to poorer mental health outcomes, with social isolation and personal health effects exacerbating these challenges.[2] The impact has been particularly severe on those facing financial uncertainty, women, and healthcare workers, whose connections to social support networks were severed.[3] The UK Household Longitudinal Study highlighted the heightened psychological strain among women, young people, and individuals with preschool-aged children.[4]

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Adults with intellectual and developmental disabilities have also faced severe impacts, with these conditions identified as a significant independent risk factor for COVID-19 diagnosis and mortality. The unique care requirements, including in-home healthcare and shared residential settings, have increased their vulnerability.[5] However, there has been less focus on the protective measures implemented and their effects on care and quality of life.

For individuals with chronic illnesses such as MS, the pandemic has led to increased anxiety, depression, and stress, further affecting healthcare-seeking behaviors and follow-up care.[6-8] Multiple sclerosis is an autoimmune, inflammatory, and neurodegenerative disease that impairs various neurological functions, leading to reduced quality of life and daily functioning.[9] While previous research on patients with MS (PwMS) during the pandemic has identified heightened stress and health deterioration, it has primarily focused on physical health and safety rather than the broader impact on their quality of life.[10,11]

This study aimed to explore the unique challenges faced by PwMS in Türkiye during the pandemic, using a mixed-methods approach that combined open-ended questions and focus group discussions. By examining the interplay of socioeconomic factors, family dynamics, and healthcare access, we seek to provide a nuanced understanding of how these elements collectively impact the health and well-being of PwMS amid the pandemic.

PATIENTS AND METHODS

This study was designed to assess the impact of the COVID-19 pandemic on PwMS using an observational and cross-sectional research design to gather data at a specific point in time. This approach provided insights into the pandemic's effects on PwMS without requiring a longitudinal study. Participants included were PwMS under regular follow-up at the Hacettepe University Faculty of Medicine, Department of the Neurology. Data was collected through an extensive questionnaire covering demographics, family background, access to MS-related information and healthcare, self-assessment of physical and psychological well-being, and changes in dietary habits, mobility, and MS-related symptoms during the pandemic. Income groups were based on the Turkish Ministry of Labor and Social Security's minimum wage of 2,324 TL. The survey, conducted via telephone interviews with 114 PwMS (88 females, 26 males; mean age: 40.7±11.5 years; range, 19 to 66 years) between October 2020 and March 2021, adhered to safety protocols and was administered by medical doctors among the authors.

The qualitative and quantitative datasets were integrated through a parallel mixed-methods design. Quantitative analyses identified significant patterns in self-reported outcomes, while qualitative data provided explanatory context and illustrative examples for these patterns. Themes emerging from open-ended responses were used to interpret, validate, and enrich statistical trends, particularly in relation to sex differences, healthcare access barriers, and psychological responses to the pandemic. Direct quotations were selected to reflect thematic prevalence and to humanize the data patterns observed in quantitative models. These insights aimed to inform better support strategies for individuals with MS in ongoing and future health crises.

Ethical considerations

Before data extraction and analysis commenced, ethical approval was obtained from the Hacettepe University Non-Interventional Clinical Research Ethics Committee (Date: 30.11.2020, No: GO 20/892-2020/18-38). Written informed consent was obtained from all respondents before the interviews, each lasting approximately 15 min. To ensure privacy and comply with data protection regulations, all patient data were anonymized and handled with strict confidentiality. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical analysis

A regression model using Stata version 15 software (StataCorp LLC, College Station, TX, USA) examined binary and continuous determinants, while thematic analysis in MAXQDA 2020 explored patterns and insights from open-ended responses. Descriptive analyses, including mean comparisons and chi-square tests, were conducted using IBM SPSS version 25.0 software (IBM Corp., Armonk, NY, USA).

We constructed five dimensions to assess the abilities, strategies, and perceptions of people with MS in responding to social challenges during the pandemic. These dimensions integrated clinical status (EDSS), self-reported physical and psychological health, MS-related symptoms, and

TABLE 1
Demographic characteristics of the participants

	Female (n=88)					Male (n=26)					Total (n=114)					
	n	%	Mean±SD	Median	Min-Max	n	%	Mean±SD	Median	Min-Max	n	%	Mean±SD	Median	Min-Max	*p*
Age (year)			40.8±11.1					40.4±12.7					40.7±11.5			0.634
Duration of disease (year)			8.43±6.16					7.31±4.76					8.17±5.95			0.577
EDSS				2.0	0.0-7.5				2.5	0.0-7.0				2.0	0.0-7.5	0.096
Education level (%)																0.008
Primary school	27	30.7				1_a	3.8				28	24.6				
Middle school	8	9.1				2	7.7				10	8.8				
High school	15	17.0				12_a	46.2				27	23.7				
Associate's degree	10	11.4				1	3.8				11	9.6				
University	22	25.0				10	38.5				32	28.1				
Master's degree	3	3.4				0	0				3	2.6				
Uneducated	3	3.4				0	0				3	2.6				
Employment status (%)																0.034
Unemployed	56	63.6				9_a	34.6				65	57.0				
Administrative leave	5	5.7				4	15.4				9	7.9				
Retired	5	25.0				3	11.5				8	7.0				
Employed	22	25.0				9	34.6				31	27.2				
Part-time	0	0				1	3.8				1	0.9				
Marital status (%)																0.329
Single	16	18.2				7	26.9				24	20.2				
Married	72	81.8				19	73.1				94	79.8				
Income																0.848
Low (below 2.500 TL)	10	11.9				3	11.5				14	11.8				
Middle (2.500- 11.000 TL)	70	83.3				21	80.8				94	82.7				
High (above 11.000 TL)	4	4.8				2	7.7				6	5.5				

SD: Standard deviation; EDSS: Expanded disease severity scale. Each subscript letter denotes a subset of Gender categories whose column proportions differ significantly from each other at the 0.05 level.

pandemic-specific factors such as healthcare access, lockdown adherence, mobility, digital resource use, family support, stress management, and economic burden. All variables were evaluated while controlling for demographic and socioeconomic factors. The demographic variables included income, age, and duration of MS.

Two separate logistic regression models were constructed to assess the determinants of psychological well-being. The first model included core explanatory variables such as sex, independence level, and access to healthcare. The second model extended this analysis by incorporating an additional control variable: technology access, which captures patients' reported usage of digital communication tools, internet-based health resources, and online MS information during the pandemic. This approach allowed us to evaluate the mediating role of digital tools in shaping psychological outcomes.

RESULTS

The mean disease duration was 8.17±5.95 years. The median (min-max) EDSS score was 2.0 (0.0-7.5). It was observed that the education level of the participants was generally low, with male participants being more educated than female participants. The low education level of the general sample was attributed to the lower education level of female participants and their representation of 77% of the sample. Approximately one-third (27.2%) of the patients were employed, while 7.9% were on administrative leave due to COVID-19 and their chronic disease. The rate of being unemployed was notably higher among female participants compared to male participants, with 63.6% of female patients being unemployed compared to 34.6% of male patients (Table 1).

The majority of patients (60.5%; 53 females, 16 males) reported no significant physical changes

TABLE 2
Self-reported changes in well-being and health access by sex during the COVID-19 pandemic

	Female		Male		
Variables	n	%	n	%	*p*
Physical changes (%)					0.034
Negative change	32	36.4	9	34.6	
No change	53	60.2	16	61.5	
Positive change	3	3.4	1	3.8	
Psychological changes (%)					0.014
Negative change	52	59.1	7	26.9	
No change	33	37.5	18	69.2	
Positive change	3	3.4	1	3.8	
Symptom severity changes (%)					0.784
Negative change	22	25.6	8	32.0	
No change	58	67.4	15	60.0	
Positive change	6	7.0	2	8.0	
Isolation level changes (%)					0.874
Negative change	2	2.3	1	4.2	
No change	3	3.5	1	4.2	
Positive change	81	94.2	22	91.7	
Independence level changes (%)					0.359
No change	43	49.4	9	37.5	
Change	44	50.6	15	62.5	
Health access and anxiety					0.368
No change	56	63.6	14	53.8	
Change	32	36.4	12	46.2	

COVID-19: Coronavirus disease 2019.

TABLE 3

Participant characteristics and COVID-19-related functional capacities among PwMS

EDSS (MS severity)	Coefficient	SE	z	p>|z|	95% CI	
Access to the health system	0.02	0.48	0.05	0.962	–0.93	0.97
Physical and mental health	–1.51	0.69	–2.18	**0.029**	–2.86	–0.15
Individual mobility	–0.64	0.64	–0.99	0.320	–1.90	0.62
Family resources and care	–0.87	0.72	–1.21	0.227	–2.28	0.54
Use and utilization of online media	0.30	0.52	0.57	0.567	–0.72	1.32
Ability to handle COVID-19 and economic stress	0.17	0.45	0.38	0.705	–0.71	1.05
MS duration	0.53	0.27	1.95	**0.051**	0.00	1.07
Income group	–0.82	0.86	–0.96	0.338	–2.51	0.86
Marital status	0.46	0.56	0.81	0.415	–0.64	1.56
Constant	0.02	1.11	0.02	0.983	–2.15	2.20

COVID-19: Coronavirus disease 2019; PwMS: Patients with multiple sclerosis; SE: Standard error; CI: Confidence interval; EDSS: Expanded Disability Status Scale; MS: Multiple sclerosis; Pseudo R^2=0.153.

TABLE 4

Determinants of psychological well-being among PwMS during the COVID-19 pandemic

Mental health	Coefficient	SE	z	p>|z|	95% CI	
Physical and mental health	0.07	0.10	0.69	0.492	–0.13	0.27
Family resources and care	**–1.36**	**0.69**	**–1.98**	**0.048**	**–2.71**	**–0.01**
Individual mobility/independence	1.08	0.96	1.13	0.257	–0.79	2.96
Access to the health system	**1.16**	**0.53**	**2.17**	**0.030**	**2.20**	**0.11**
Age group	0.08	0.30	0.28	0.781	–0.50	0.67
Income group	–0.33	0.59	–0.56	0.577	–1.49	0.83
Marital status	0.21	0.55	0.39	**0.697**	–0.86	1.29
Sex	**1.67**	**0.53**	**3.17**	**0.002**	**0.64**	**2.70**
Constant	–0.69	0.84	–0.82	0.411	–2.35	0.96

PwMS: Patients with multiple sclerosis; COVID-19: Coronavirus disease 2019; SE: Standard error; CI: Confidence interval; Pseudo R^2=0.129. This model includes core explanatory variables such as sex, independence level, and healthcare access, without digital access variables.

during the pandemic. In this respect, no significant differences were observed between females and males regarding physical changes (p=0.983). One-third of the patients (27%; n=30) reported an increase in their disease-related symptoms or felt a worsening during COVID-19, and 36% (n=41) reported experiencing adverse physical changes. These changes mainly included the worsening of disease symptoms (25.3%), such as gait difficulty, ataxia, and loss of upper extremity dexterity, as well as clinical attacks (7.7%). Other reported changes included fatigue (8.5%) and pain (7.7%). Unexpectedly, 3.5% (n=4) of the patients noted that staying at home decreased their symptoms, resulting in overall beneficial effects, while 7.2% (n=8) reported an improvement in terms of MS (Table 2).

We also assessed the isolation levels among PwMS during the first two waves of COVID-19, along with changes in their independence and mobility levels. Nearly all patients reported adherence to isolation rules or precautions (93.6%). The limitation of patients' physical mobility not only impacted their psychological well-being but also affected their self-reported physical health parameters (Table 2). A 30-year-old high school graduate stated, “My mobility has been restricted, and I feel heavier and weaker. Normally (before COVID-19), I was more active.”

Only a small percentage mentioned the inability to follow the rules due to their working conditions (n=3; 2.7%). All patients with progressive types of MS (n=19; 16.7%) consistently adhered to high levels of precautions.

Approximately half of the patients, regardless of sex (p=0.300), reported a decrease in their independence levels during COVID-19 (53.2%; n=59). Most patients continued seeking medical care (n=70; 61.4%), and this behavior did not differ significantly between sexes (p=0.368). However, 20% of patients (4 males, 10 females) reported feeling anxious during hospital visits, although this did not affect their behavior in seeking medical attention. When we examined the responses to open-ended questions, it was observed that patients did not attend hospital appointments due to their concerns about contracting COVID-19 during their hospital visit. As a result, they did not attend their regular check-ups as they did before.

A 51-year-old male patient stated he could not attend his appointments and get his prescription renewed. He also hesitated to travel to Ankara from Çorum (for a physician check-up) due to the

TABLE 5
Extended model of psychological well-being among PwMS during the COVID-19 pandemic

Mental health	Coefficient	SE	z	*p*	95% CI	
EDSS	–0.029	0.117	–0.250	0.802	–0.259	0.201
Technology access	0.871	0.571	1.530	0.127	–0.248	1.990
Family anxiety	–1.42	0.472	–3.020	**0.003**	–2.350	–0.500
Isolation level (self-reported)	0.198	0.721	0.270	0.783	–1.214	1.610
Personal mobility	1.492	0.536	2.780	**0.005**	0.441	2.542
Access to healthcare	0.824	0.496	1.660	0.097	1.796	–0.149
Age-group	0.236	0.340	0.690	0.488	–0.431	0.903
Income-group	–0.107	0.654	–0.160	0.870	–1.389	1.175
Marital status (married)	1.022	0.646	1.580	0.113	–0.243	2.288
Sex (female)	2.809	0.751	3.740	**0.000**	1.337	4.281
Constant	–4.168	1.633	–2.550	0.011	–7.369	–0.967

PwMS: Patients with multiple sclerosis; COVID-19: Coronavirus disease 2019; SE: Standard error; CI: Confidence interval; EDSS: Expanded Disability Status Scale; Pseudo R^2=0.249. This model includes all variables from Table 3 and additionally incorporates Technology Access to assess its mediating effect on psychological outcomes.

TABLE 6
Physical health determinants during the COVID-19 pandemic in PwMS

Physical health	Coefficient	SE	z	*p*	95% CI	
Family resources and care	–1.09	0.69	–1.58	0.115	–2.44	0.26
Individual mobility/independence	3.35	1.05	3.2	0.001	1.29	5.40
Health access problems						
0	0 (base)					
1	–2.21	0.79	–2.78	0.005	–3.76	–0.65
MS severity (EDSS)	–0.25	0.14	–1.73	0.083	–0.53	0.03
MS severity (EDSS)						
1	0.39	0.21	1.9	0.058	–0.01	0.80
Age	0.74	0.32	2.3	0.022	0.11	1.38
Income	0.01	0.60	0.01	0.993	–1.18	1.19
Marriage	–1.08	0.59	–1.83	0.068	–2.24	0.08
Sex	0.52	0.52	0.99	0.320	–0.51	1.55
Constant	–0.12	0.89	–0.14	0.891	–1.86	1.62

COVID-19: Coronavirus disease 2019; PwMS: Patients with multiple sclerosis; SE: Standard error; CI: Confidence interval; MS: Multiple sclerosis; EDSS: Expanded Disability Status Scale; Pseudo R^2=0.140.

pandemic. A 56-year-old male patient expressed being anxious upon hearing that there were COVID-19 patients in hospitals and felt it was not safe to go to a hospital.

Although there was no significant difference between female and male patients in terms of physical symptoms and their levels of isolation, independence, and mobility, a notable distinction emerged in their self-reported psychological experiences. Among female patients, 59.1% reported experiencing psychological changes, while only 7% of male patients observed such differences (Table 2). This discrepancy was significant. Self-reported changes included anxiety (n=24), mood swings (n=21), sleep deprivation (n=3), loss of motivation (n=4), irritability (n=4), and an increase in some obsessions (n=3). Most of the male patients stated they did not observe any psychological differences (n=18; 69.2%). In contrast, this ratio was 37.5% among female patients.

Family relationships of female and male patients did not change significantly (p=0.617). However, a quarter of patients (27.2%) reported a decrease in their levels of communication within the family compared to the prepandemic period. On the other hand, 7% (n=8) mentioned that the quality of time spent together increased after COVID-19. As illustrated by the narratives, 20.2% of female patients noted that their family members became more protective compared to the pre-COVID-19 period. In contrast, only 8% of male patients reported experiencing such a change (p=0.329).

A 27-year-old female patient stated that his son was afraid of infecting her during the COVID-19 quarantine, so the whole family paid attention to wearing masks and hygiene. A 32-year-old female patient stated that her spouse had become more sensitive and constantly warned those around him due to his job, which was not the case before. The patient described this as a positive change for their family communication, as they got to know each other more. She added that her family had been considerate, that they had become closer, and that she had come to respect her family more.

Furthermore, most patients (64.9%) did not alter their behavior toward family members. However, 21.1% reported a negative shift in their attitude, characterized by decreased tolerance towards family members, increased anxiety for the family, or self-isolation. As one 42-year-old male patient emphasized: "Anxiety, irritability, difficulty concentrating on my children." No significant sex differences were observed in patient attitudes (p=0.505).

Fifty percent (n=57) of patients, irrespective of sex (p=0.339), increased their technology usage during COVID-19. Specifically, 10 (8.8%) patients reported spending more time on computers due to changes in work styles, such as working from home or engaging in long-distance learning. Additionally, 7% (n=8) of patients mentioned that they constantly followed COVID-19-related news, while two (1.8%) patients decreased their screen time due to anxiety from following the news.

Patients reporting significant perceived changes in physical and psychological well-being (p=0.029; 95% confidence interval [CI]: –2.86 to –0.15), coupled with a longer duration of MS (p=0.051; 95% CI: 0.00-1.07), had an increased likelihood of a more severe MS course in terms of EDSS (Table 3). When assessing self-reported changes in MS-related health issues, individuals with a disease duration of 10 to 20 years, as well as those in their early middle age compared to younger individuals, were prone to experiencing an escalation in MS-related health issues (refer to Appendix Table 1). Furthermore, when sex is factored in, sex inequality emerged as a significant factor in the changes in disease-related symptoms during the peak of the COVID-19 pandemic (Table 4). Among male patients, heightened anxiety within the family stemming from the patient's condition and worries about COVID-19, along with a decrease in independence, had a detrimental effect on psychological parameters (Table 5).

While access to healthcare was initially found to be a significant predictor of psychological well-being (Table 4), this effect was attenuated in the extended model presented in Table 5. The introduction of the technology access variable, reflecting broader digital engagement, revealed a partial mediation effect. This suggested that individuals with greater use of digital platforms may have compensated for limited healthcare access, thus reducing the direct impact of the latter in the extended specification. Notably, access to healthcare remained marginally significant at the 10% level, indicating its continued relevance alongside digital alternatives.

The multivariate logistic regression revealed that the female group experienced significantly milder psychological symptoms (p=0.002; 95% CI: 0.64-2.70), and this decrease was partially alleviated by the presence of a supportive family network (p=0.048; 95% CI: –2.71 - –0.01) and access to formal healthcare services (p=0.030; 95% CI –2.20 - –0.11; Table 4). In other words, although females expressed experiencing more psychological problems compared to males during this process, if females had family support and access to regular hospital services, they experienced fewer negative psychological outcomes. The marginal effect analysis revealed that having EDSS scores higher than 4 and being male increased the likelihood of reporting psychological complaints (Appendix Table 2). Contrary to the observed descriptive difference of females reporting more psychiatric symptoms, the regression analysis indicated that being female was associated with a reduced likelihood of experiencing psychiatric symptoms.

The limitations in individual independence levels during COVID-19 (p=0.001; 95% CI: –2.44 - 0.26) and problems regarding access to the healthcare system (p=0.005; 95% CI: –3.76 - –0.65) significantly impacted and undermined the reported physical health parameters. Additionally, our multivariate analysis revealed the confounding effect of age on self-reported physical health parameters (Table 6).

DISCUSSION

The COVID-19 period has induced alterations in the quality of life, particularly amplifying challenges for individuals with disabilities and chronic illnesses.[12,13] In our research, we concentrated on assessing the repercussions of COVID-19 on the functionality and health status of PwMS. This involved evaluating various aspects of MS functionality, levels of isolation, mobility, psychological well-being, and physical health, as well as vulnerability in the job market.

Studies have emphasized increased levels of anxiety in PwMS during the COVID-19 pandemic.[14-17] A comparative cross-sectional investigation by Koc et al.[18] found that PwMS exhibited notably elevated levels of depression, anxiety, and fatigue compared to a control group of healthy individuals. However, Capuano et al.[12] and Yalcin et al.[8] reported that depression and anxiety levels in their MS cohort did not worsen during the COVID-19 period. During the initial phases of the pandemic, characterized by stringent isolation protocols, individuals with higher EDSS scores (>3) reported heightened levels of depression and anxiety.[18] In Australia, Learmonth et al.[19] investigated the concerns of individuals diagnosed with MS regarding both COVID-19 and bushfires. Forty-six percent of participants with moderate to severe disability expressed high levels of concern. The primary areas of concern included the severity of COVID-19 in the context of MS and the potential impact of MS medications on susceptibility to the virus.

Our study found similar associations between physical and psychological changes and higher EDSS scores. After COVID-19 infection, MS symptoms may exacerbate; however, in the long term, COVID-19 does not appear to have a negative effect on disease severity.[1,20,21] There was no significant change in the overall physical condition of male and female patients during the pandemic, but an increase in disease-related symptoms was observed regardless of a previous COVID-19 infection.

Learmonth et al.[19] also highlighted in free-text responses the apprehensions regarding reduced social interactions with family and friends, loss of home support and caregiving, and limited access to healthcare and wellness services among PwMS. Various factors, such as social support, aid PwMS in adapting to the condition more effectively and shielding themselves from adverse consequences.[22] Enhanced social support correlates with diminished depressive symptoms, decreased levels of anxiety, and improved quality of life.[16,23] Our study supported these findings, revealing that both male and female patients experienced limitations in physical mobility and a decrease in independence. However, male patients experienced social isolation and loss of social interaction more acutely, which in turn had a more severe impact on their psychological well-being compared to female patients.

Physical mobility not only negatively affects participation in physical and social activities but also access to healthcare services. The fear of contracting COVID-19 in the hospital environment is very high among PwMS. As a result of this fear, PwMS report a decrease in regular hospital visits. However, decreased access to healthcare was found to negatively affect self-reported mental health parameters. Telemedicine approaches could be a way of maintaining continuity of care for PwMS, providing a safe alternative to in-person visits and potentially alleviating fears of infection exposure. A study on patients with movement disorders found telemedicine to be an effective option for evaluation during the pandemic.[24] Most issues were resolved after just two telemedicine consultations, with only approximately 17% of patients requiring additional follow-up.

Due to both the closures resulting from COVID-19 and the decrease in physical mobility, patients spent more time at home with their families. Patients reported no significant change in their relationships with their families during the COVID-19 period, mirroring the findings of Lynch et al.[13] However, female patients express that their families were more protective of them during this period. Experiencing the pandemic as PwMS was associated with negative psychological impacts, with females being more negatively affected than males. One of the most important findings of the study is that females experience less psychological impact when they received family support and continued to receive hospital services.

The findings from our extended regression model highlighted the evolving role of digital tools in healthcare access. While traditional health system access remains crucial, our results indicated that the ability to access information and support via online platforms may partially mitigate the psychological burden experienced by PwMS during the pandemic. This underscored the importance of integrating digital health solutions into care models for chronic illness management, particularly under crisis conditions where physical access may be constrained.

This study has several limitations. Firstly, the significant gender imbalance (77.2% female participants) reflects the higher prevalence of MS among women in Türkiye but may underrepresent the experiences of male patients. Secondly, reliance on self-reported data via telephone interviews introduces potential recall and social desirability biases, particularly regarding psychological symptoms and social dynamics. Thirdly, while regression analyses identified associations (e.g., between family support and psychological outcomes), the modest sample size restricted subgroup analyses (e.g., detailed comparisons by MS subtype or socioeconomic strata) and may have reduced statistical power for detecting complex interactions. Finally, the focus on clinic patients may overlook those who disengaged from healthcare during the pandemic, potentially excluding the most vulnerable individuals. These constraints highlight the need for longitudinal studies with more diverse samples in future research.

In conclusion, it is clear from these findings that, even before COVID-19, continuous and multidimensional healthcare access was essential for individuals with chronic conditions such as MS. The pandemic has intensified this need, creating prolonged healthcare access challenges at a critical time for chronic patients. This raises concerns about neglect, undermonitoring, and undertreatment of this vulnerable group. Our study emphasizes that family medicine practitioners, particularly at the primary level, should proactively engage with chronically vulnerable populations to ensure access to all levels of care. Enhancing the psychological well-being of PwMS and strengthening social support systems is crucial. Developing online social and psychological support mechanisms can address PwMS' emotional needs, reduce isolation, and provide accessible assistance, particularly during extraordinary circumstances such as pandemics. Telemedicine is vital in offering continuous care, improving mental health, and supporting the MS trajectory during times of heightened health needs.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX TABLE 1
The marginal effects of age and MS duration

Delta-method	Coefficient	SE	z	p>|z|	95% CI	
MS duration*						
0	Not estimable					
1	0.68	0.08	8.46	0.000	0.52	0.84
2	Not estimable					
Age group**						
0	Not estimable					
1	0.68	0.08	8.43	0.000	0.52	0.83
2	Not estimable					
3	Not estimable					

MS: Multiple sclerosis; SE: Standard error; CI: Confidence interval; * MS duration was categorized into three groups based on disease length: short-term (0-2 years), medium-term (>2-10 years), and long-term (>10 years); ** Participants were ranked by age and subsequently divided into four equal-sized age groups using the "xtile" command in Stata.

APPENDIX TABLE 2
Marginal effects on MS-related symptoms for sex

Delta-method	Margin	SE	z	p>|z|	95% CI	
MS severity						
≤4 EDSS	0.582	0.052	11.290	0.000	0.482	0.683
>4 EDSS	0.522	0.085	6.130	0.000	0.355	0.688
Sex						
Male	0.307	0.094	3.280	0.001	0.124	0.491
Female	0.642	0.051	12.690	0.000	0.543	0.741

MS: Multiple sclerosis; SE: Standard error; CI: Confidence interval; EDSS: Expanded Disability Status Scale.