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Abstract

Background: Multiple Sclerosis (MS) is a chronic neurological disease that commonly affects women during their reproductive years, influencing fertility and family planning decisions. This study explores the psychological, social, and medical factors associated with reproductive choices in women with MS. **Objectives:** To identify factors influencing reproductive choices in women with MS and assess the role of psychological, social, and disease-related variables in fertility decision. **Methods:** A cross-sectional study was conducted among 103 women diagnosed with MS, recruited from specialized clinics and support groups. Participants completed validated questionnaires assessing social support, psychological well-being, relationship dynamics, reproductive motivation, and quality of life. Binary logistic regression was performed to identify independent predictors of childbearing. **Results**: Women with relapsing-remitting MS (73.9%) were significantly more likely to have children than those with progressive forms ($p = 0.001$), while those using fingolimod (100%) remained childless ($p = 0.008$). Higher mental health scores ($p = 0.035$) and fatalistic motivation ($p = 0.005$) were associated with childbearing, while increased health-related concerns ($p = 0.006$) were more prevalent among mothers. Marital status ($p = 0.001$) was a significant factor, with all unmarried women being childless. However, logistic regression analysis did not identify any single independent predictor of childbearing ($p > 0.05$), suggesting that reproductive decisions are influenced by multiple interrelated factors rather than a single dominant variable. **Conclusions:** This study highlights the complex interplay of disease progression, psychological resilience, and treatment choices in reproductive decisions among women with MS. Findings emphasize the need for individualized reproductive counseling, considering both medical and psychosocial factors. Future research should incorporate longitudinal studies to better understand the evolving reproductive trajectories of women with MS.

Keywords: multiple sclerosis; fertility; parenthood motivation; psychological factors; reproductive decision-making

1. Introduction

Multiple sclerosis (MS) is a chronic neurological disease that affects both physical and cognitive functions, potentially influencing fertility and pregnancy outcomes [1,2]. MS is more prevalent

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among women than men, particularly during reproductive years, with its onset typically occurring between the ages of 20 and 40 [3]. Approximately 2.8 million people worldwide have been diagnosed with MS, with 1 million cases in Europe alone [4]. In Greece, approximately 13,000 individuals are affected by the disease, with the initial symptoms appearing between the third and fifth decades of life [5].

The disease's impact, combined with side effects from medical treatments, can significantly alter reproductive health and decision-making in affected individuals [6,7]. Recent advancements in medical treatments have enabled many women with chronic illnesses and disabilities to conceive and experience motherhood [8]. Although research indicates that pregnancy is generally safe for women with MS and does not negatively affect neonatal outcomes, studies suggest a higher prevalence of voluntary childlessness and pregnancy terminations among MS patients [9,10]. Given that MS is often diagnosed during reproductive years and predominantly affects women, decision-making regarding family planning becomes a critical concern for this population.

Women with MS face numerous concerns that influence their decision to pursue pregnancy [11]. Historically, particularly in the early 20th century, women with MS were often discouraged from childbearing due to concerns that pregnancy might exacerbate the disease [12]. However, contemporary research highlights shifting perceptions and experiences. A study in New Zealand reported that women with MS expressed significant concerns about pregnancy [13], while research in Australia emphasized the need for fertility and parenting considerations to be integrated into MS care [14]. Data from the US indicates that women with MS and their partners often viewed childbearing as an irresponsible decision due to uncertainties surrounding disease progression [15].

This study aims to explore the factors influencing fertility and family planning decisions in individuals with MS, assess psychological resilience, and propose strategies for personalized perinatal obstetric care. Addressing these concerns through targeted interventions may empower MS patients to make informed reproductive choices without unnecessary constraints imposed by their condition.

2. Materials and Methods

This cross-sectional observational study aimed to explore factors influencing fertility and family planning decisions among women diagnosed with MS, conducted from June 1 to December 31, 2024.

Participants were women aged 18–50 with a diagnosis of MS within the past three years, in an early disease stage, cognitively intact, not on antidepressants, and in a stable relationship. Eligible participants were either childless or had one child under age three. Exclusion criteria included progressive MS, major psychiatric disorders affecting cognition, or use of medications known to impair fertility. Recruitment occurred through the Medically Assisted Reproduction Unit (MARU), the Gynecological and Neurology Clinics of the Naval Hospital of Athens (NHA), and the Greek Multiple Sclerosis Society (GMSS).

Data were collected using a structured self-administered questionnaire (Supplementary File 1), comprising:

a) Demographics & Reproductive History – Age, education, employment, marital status, children, pregnancies, fertility treatments; b) Chronic Disease History – MS duration, type, comorbidities, and medication use; c) Oslo Social Support Scale (OSSS-3) – Assesses social support across three dimensions (validated in Greek) [16,17].

d) Dyadic Adjustment Scale – Evaluates relationship quality (Greek version validated) [18–20]; e) CES-D – Measures depressive symptoms over the past week (Greek version validated) [21,22]; f) Big Five Personality Inventory (BFI) – Assesses five personality traits (Greek version validated) [23,24]; g) MSQOL-54 – Evaluates quality of life in MS patients across 12 dimensions plus 2 standalone items (Greek version used) [25,26]; h) Motivation for Parenthood Questionnaire (PM2) – Captures four motivational subtypes: altruistic, fatalistic, narcissistic, and instrumental (Greek validation completed with forward-backward translation, pilot testing, EFA/CFA, and high reliability: ICC = 0.80, CFI = 0.93, TLI = 0.91, RMSEA = 0.05, $\chi^2/df = 2.19$) [27]; i) Positivity Scale – An 8-item measure of

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positive outlook (Greek adaptation and validation included forward-backward translation, pilot testing, and psychometric analysis: Cronbach's α = 0.86, ICC = 0.82, CFI = 0.94, TLI = 0.92, RMSEA = 0.048) [28].

A formal application seeking approval for the research plan and methodology was submitted to the scientific council of the University of West Attica Ethics Committee, ensuring compliance with the General Data Protection Regulation (GDPR) guidelines [95813/18-10-2023]. Participants received questionnaires along with an informative brochure highlighting the voluntary nature of their participation in the study. Their personal information and responses were handled with the utmost confidentiality and anonymity, and all collected data were deleted after the survey. Participants were also informed of their right to withdraw from the research at any time and were provided with comprehensive information about the study's objectives and aims.

Acknowledging the time-intensive nature of completing the questionnaires, participants were given the option to fill them out either immediately or outside the hospital setting. Completed questionnaires were returned to the researchers during subsequent in-person appointments. The first author provided instructions on completing the questionnaires, emphasizing the importance of spontaneous and honest responses to ensure accurate data collection.

Analyses were performed in SPSS v26. Normality was assessed via the Kolmogorov-Smirnov test. Means and SDs described continuous variables; frequencies described categorical data. Independent t-tests, ANOVA, chi-square, and Fisher's exact test were used for group comparisons. Pearson's r examined correlations. Internal consistency of scales was evaluated using Cronbach's α. EFA and CFA were conducted to assess the structure of questionnaires. Test-retest reliability was examined via ICC. Binary logistic regression explored predictors of fertility-related decisions, with significance set at $p < 0.05$.

3. Results

The sample included 103 women with a mean age of 38.05 years (SD = 7.01). Table 1 presents detailed demographic data, Table 2 summarizes obstetric-gynecological data, and Table 3 summarizes the history of chronic disease.

Table 1. Demographic Characteristics of Participants.

Parameter	Mean	Standard deviation
Age (years)	38.05	7.01
Nationality	N	%
Greek	99	96.1
Other	4	3.9
Educational Level		
Primary School	0	0
Middle School	2	1.9
High School	29	28.2
Vocational Institute	8	7.8
Technological Educational Institute	29	28.2
Bachelor's Degree	26	25.2
Master's Degree	7	6.8
Doctoral Degree	2	1.9
Marital Status		
Married	81	79.4
Unmarried	16	15.7
Divorced	4	3.9
Widowed	0	0
Civil Partnership	1	1.0
Age (years)	38.05	7.01

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Table 2. Obstetric-Gynecological History.

Parameter	N	%
Number of children		
0	32	31.1
1	46	44.7
2	25	24.3
Conception method		
Natural conception	49	69.0
IVF	21	29.6
Intrauterine insemination	1	1.4
Mode of delivery		
Did not give birth	32	31.1
Vaginal ≥37 weeks with epidural	3	2.9
Vaginal <37 weeks with epidural	1	1.0
Vaginal ≥37 weeks without epidural	18	17.5
Vaginal <37 weeks without epidural	12	11.7
Cesarean ≥37 weeks	17	16.5
Cesarean <37 weeks	20	19.4
Attempted conception		
No	19	59.4
Yes	13	40.6
Infertility factors		
None	33	50.8
Tubal	15	23.1
Ovarian	5	7.7
Age-related	1	1.5
Male	6	9.2
Unexplained	5	7.7
Number of spontaneous abortions		
0	86	86.9
1	8	8.1
2	5	5.1
Number of elective abortions		
0	91	93.8
1	5	5.2
2	1	1.0

3.1. OSLO Social Support Scale (OSSS-3)

The OSSS-3 scores ranged from 4 to 10 (mean = 5.89, SD = 1.32), with a Cronbach's alpha of 0.73, indicating acceptable reliability. Supplementary Table 2 presents detailed OSSS-3 responses.

3.2. Dyadic Adjustment Scale (DAS)

Total DAS scores ranged from 54 to 96 (mean = 68.12, SD = 5.51; α = 0.70). Subscale scores and reliabilities were as follows (Supplementary Table 3): Dyadic Consensus: 8–46 (mean = 20.89, SD = 5.12; α = 0.80); Dyadic Satisfaction: 23–37 (mean = 28.40, SD = 2.11; α = 0.76); Dyadic Cohesion: 7–20 (mean = 15.26, SD = 2.19; α = 0.74) and Affectional Expression: 0–8 (mean = 3.56, SD = 1.33; α = 0.70).

Table 3. Chronic Disease History.

Parameter	N	%
Chronic mental illness		
No	103	100
Yes	0	0
Years diagnosed with Multiple Sclerosis		
<1	6	6.0
1	5	5.0

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2	25	25.0
3	50	50.0
>3	14	14.0
Disease progression category		
Benign	4	4.0
Relapsing-remitting	88	88.0
Relapsing-progressive	2	2.0
Chronic-progressive	6	6.0
Treatment		
Corticosteroids	8	7.8
Beta interferons	73	70.9
Glatiramer acetate	5	4.9
Fingolimod	4	3.9
Mitoxantrone	2	1.9

Supplementary Table 4 presents full DAS responses.

Table 4. Chronic Disease History.

Parameter	Having children		p
	No	Yes	
	Mean value (standard deviation)		
Age (years)	35.56 (8.67)	39.75 (5.72)	0.017
OSSS-3	6.06 (1.50)	5.80 (1.22)	0.367
Dyadic Adjustment Scale (overall score)	67.54 (5.96)	68.38 (5.32)	0.485
Dyadic Consensus Scale	20.22 (5.54)	21.18 (4.94)	0.388
Dyadic Satisfaction Scale	28.35 (1.90)	28.42 (2.21)	0.883
Dyadic Cohesion Scale	15.61 (2.20)	15.11 (2.18)	0.292
Affectional Expression Scale	3.35 (1.25)	3.66 (1.37)	0.289
CES-D score	20.58 (3.53)	20.14 (4.13)	0.608
BFI- Extraversion	22.48 (3.11)	22.87 (3.51)	0.596
BFI- Agreeableness	30.96 (3.03)	31.78 (3.24)	0.234
BFI- Conscientiousness	29.70 (4.72)	30.53 (4.18)	0.380
BFI- Neuroticism	25.77 (4.69)	24.46 (3.52)	0.123
BFI- Openness	32.83 (4.68)	31.64 (4.15)	0.204
BFI- Overall score	141.77 (9.62)	141.30 (9.82)	0.826
MSQOL-54- Physical Function	43.22 (19.64)	43.07 (14.75)	0.965
MSQOL-54- Role Limitations Due to Physical Problems	11.71 (25.38)	13.92 (21.12)	0.647
MSQOL-54- Role Limitations Due to Emotional Problems	23.95 (27.08)	27.61 (26.60)	0.523
MSQOL-54-Pain	46.04 (18.98)	43.64 (10.19)	0.409
MSQOL-54-Social Function	50.87 (14.01)	56.74 (12.35)	0.035
MSQOL-54- Energy	38.50 (12.84)	41.94 (12.15)	0.195
MSQOL-54- Health Perceptions	26.71 (12.08)	32.00 (13.97)	0.068
MSQOL-54- Social Function	57.77 (18.03)	63.76 (12.61)	0.108
MSQOL-54- Cognitive Function	71.25 (21.28)	77.00 (15.09)	0.175
MSQOL-54-Health Distress	44.06 (23.08)	57.14 (16.93)	0.006
MSQOL-54-Sexual Function	49.48 (29.26)	44.88 (22.36)	0.434
MSQOL-54-Overall Quality of Life	62.23 (16.79)	67.49 (10.91)	0.112
MSQOL-54-Physical Health Score	37.51 (13.36)	40.85 (7.98)	0.219
MSQOL-54-Mental Health Score	48.56 (16.76)	54.78 (12.56)	0.067
Positivity Scale score	23.59 (4.24)	22.46 (3.40)	0.154
PM2-Altruistic	39.16 (3.58)	36.86 (4.67)	0.173
PM2-Fatalistic	44.08 (3.50)	47.86 (2.92)	0.005
PM2-Narcissistic	45.83 (1.94)	44.00 (3.87)	0.148
PM2-Instrumental	51.81 (3.57)	51.66 (2.87)	0.906
Educational Level	N (%)	N (%)	0.778

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Middle School	1 (50)	1 (50)	
High School	7 (24.1)	22 (75.9)	
Vocational Institute	3 (37.5)	5 (62.5)	
Technological Educational Institute	10 (34.5)	19 (65.5)	
Bachelor's Degree	9 (34.6)	17 (65.4)	
Master's Degree	1 (14.3)	6 (85.7)	
Doctoral Degree	1 (50)	1 (50)	
Marital Status			0.001
Married	13 (16)	68 (84)	
Unmarried	16 (100)	0 (0)	
Divorced	2 (50)	2 (50)	
Civil Partnership	1 (100)	0 (0)	
Years diagnosed with MS			0.129
<1	3 (50)	3 (50)	
1	2 (40)	3 (60)	
2	7 (28)	18 (72)	
3	12 (24)	38 (76)	
>3	8 (51.7)	6 (42.9)	
Disease progression category			0.001
Benign	2 (50)	2 (50)	
Relapsing-remitting	23 (26.1)	65 (73.9)	
Relapsing-progressive	1 (50)	1 (50)	
Chronic-progressive	6 (100)	0 (0)	
Corticosteroids			0.251
No	28 (29.5)	67 (70.5)	
Yes	4 (50)	4 (50)	
Beta Interferons			0.003
No	16 (53.3)	14 (46.7)	
Yes	16 (21.9)	57 (78.1)	
Glatiramer acetate			0.172
No	29 (29.6)	69 (70.4)	
Yes	3 (60)	2 (40)	
Fingolimod			0.008
No	28 (28.3)	71 (71.7)	
Yes	4 (100)	0 (0)	
Mitoxantrone			0.094
No	30 (29.7)	71 (70.3)	
Yes	2 (100)	0 (0)	

3.3. Center for Epidemiological Studies – Depression Scale (CES-D)

CES-D scores ranged from 12 to 32, with a mean of 20.27 and a standard deviation of 3.95. The internal consistency of the scale was acceptable, with a Cronbach's alpha of 0.73 (Supplementary Table 5).

Table 5. Logistic regression for identifying an independent factor associated with having children.

Parameter	B	S.E.	p	OR	95% C.I. for OR	
					Lower	Upper
Age	-0.022	0.283	0.937	0.978	0.561	1.704
Marital status	-2.201	1.301	0.091	0.111	0.009	1.418
Category pf disease progression	-1.232	1.808	0.496	0.292	0.008	10.086
Beta interferons	1.356	2.744	0.621	3.880	0.018	83.827
MSQOL-54- Emotional well-being	0.047	0.136	0.730	1.048	0.803	1.367
MSQOL-54-Health distress	0.058	0.165	0.727	1.059	0.767	1.463
PM2-Fatalistic	0.468	0.381	0.219	1.597	0.757	3.368

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Responses to the CES-D are presented in Supplementary Table 6.

Table 6. Logistic regression for identifying an independent factor associated with having children.

Parameter	Number of children			p
	0	1	2	
	Mean value (standard deviation)			
Age (years)	35.56 (8.67)	37.72 (5.02)	43.48 (5.1)	0.001
OSSS-3	6.06 (1.50)	5.70 (1.06)	6.00 (1.47)	0.457
Dyadic Adjustment Scale (overall score)	67.54 (5.96)	67.93 (6.11)	69.20 (3.39)	0.515
Dyadic Consensus Scale	20.22 (5.54)	21.00 (5.46)	21.52 (3.87)	0.636
Dyadic Satisfaction Scale	28.35 (1.90)	28.39 (2.39)	28.48 (1.87)	0.976
Dyadic Cohesion Scale	15.61 (2.20)	15.02 (2.16)	15.28 (2.26)	0.279
Affectional Expression Scale	3.35 (1.25)	3.52 (1.36)	3.92 (1.38)	0.514
CES-D score	20.58 (3.53)	20.32 (4.15)	19.80 (4.16)	0.762
BFI- Extraversion	22.48 (3.11)	23.17 (3.68)	22.32 (3.15)	0.572
BFI- Agreeableness	30.96 (3.03)	32.32 (2.95)	30.80 (3.57)	0.075
BFI- Conscientiousness	29.70 (4.72)	30.43 (3.52)	30.72 (5.25)	0.659
BFI- Neuroticism	25.77 (4.69)	24.56 (4.01)	24.28 (2.44)	0.254
BFI- Openness	32.83 (4.68)	31.45 (4.28)	32.00 (3.96)	0.394
BFI- Overall score	141.77 (9.62)	141.95 (8.82)	140.12 (11.54)	0.735
MSQOL-54- Physical Function	43.22 (19.64)	42.44 (12.64)	44.20 (18.18)	0.912
MSQOL-54- Role Limitations Due to Physical Problems	11.71 (25.38)	13.33 (20.36)	15.00 (22.82)	0.862
MSQOL-54- Role Limitations Due to Emotional Problems	23.95 (27.08)	29.62 (25.84)	24.00 (28.08)	0.573
MSQOL-54-Pain	46.04 (18.98)	43.07 (10.46)	44.66 (9.81)	0.638
MSQOL-54-Social Function	50.87 (14.01)	54.66 (12.12)	60.48 (12.12)	0.021
MSQOL-54- Energy	38.50 (12.84)	42.04 (12.04)	41.76 (12.60)	0.432
MSQOL-54- Health Perceptions	26.71 (12.08)	28.66 (8.88)	38.00 (18.92)	0.003
MSQOL-54- Social Function	57.77 (18.03)	62.59 (12.24)	65.94 (13.27)	0.122
MSQOL-54- Cognitive Function	71.25 (21.28)	76.22 (17.32)	78.40 (10.07)	0.267
MSQOL-54-Health Distress	44.06 (23.08)	55.11 (19.11)	60.80 (11.51)	0.004
MSQOL-54-Sexual Function	49.48 (29.26)	42.60 (23.52)	48.99 (19.90)	0.403
MSQOL-54-Overall Quality of Life	62.23 (16.79)	6591 (10.63)	70.33 (11.04)	0.070
MSQOL-54-Physical Health Score	37.51 (13.63)	39.64 (8.78)	43.10 (5.75)	0.132
MSQOL-54-Mental Health Score	48.56 (16.76)	53.97 (13.63)	56.23 (10.47)	0.100
Positivity Scale score	23.59 (4.24)	22.58 (3.23)	22.24 (3.76)	0.338
PM2-Altruistic	39.16 (3.58)	36.66 (5.52)	37.16 (3.48)	0.393
PM2-Fatalistic	44.08 (3.50)	48.77 (2.48)	46.50 (3.20)	0.009
PM2-Narcissistic	45.83 (1.94)	42.88 (4.16)	45.66 (2.94)	0.088
PM2-Instrumental	51.81 (3.57)	52.11 (3.51)	51.00 (1.54)	0.803
Educational Level				0.079
Middle School	1 (50)	0 (0)	1 (50)	
High School	7 (24.1)	9 (31)	13 (44.8)	
Vocational Institute	3 (37.5)	5 (62.5)	0 (0)	
Technological Educational Institute	10 (34.5)	12 (41.4)	7 (24.1)	
Bachelor's Degree	9 (34.6)	15 (57.7)	2 (7.7)	
Master's Degree	1 (14.3)	4 (57.1)	2 (28.6)	
Doctoral Degree	1 (50)	1 (50)	0 (0)	
Marital Status				0.001
Married	13 (16)	43 (53.1)	25 (30.9)	
Unmarried	16 (100)	0 (0)	0 (0)	
Divorced	2 (50)	2 (50)	0 (0)	
Civil Partnership	1 (100)	0 (0)	0 (0)	
Years diagnosed with MS				0.044
<1	3 (50)	2 (33.3)	1 (16.7)	

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1	2 (40)	3 (60)	0 (0)	
2	7 (28)	16 (64)	2 (8)	
3	12 (24)	21 (42)	17 (34)	
>3	8 (57.1)	3 (21.4)	3 (21.4)	
Disease progression category				0.005
Benign	2 (50)	1 (25)	1 (25)	
Relapsing-remitting	23 (26.1)	43 (48.9)	22 (25)	
Relapsing-progressive	1 (50)	1 (50)	0 (0)	
Chronic-progressive	6 (100)	0 (0)	0 (0)	
Corticosteroids				0.200
No	28 (29.5)	42 (44.2)	25 (26.3)	
Yes	4 (50)	4 (50)	0 (0)	
Beta Interferons				0.006
No	16 (53.3)	11 (36.7)	3 (10)	
Yes	16 (21.9)	35 (47.9)	22 (30.1)	
Glatiramer acetate				0.312
No	29 (29.6)	44 (44.9)	25 (25.5)	
Yes	3 (60)	2 (40)	0 (0)	
Fingolimod				0.011
No	28 (28.3)	46 (46.5)	25 (25.3)	
Yes	4 (100)	0 (0)	0 (0)	
Mitoxantrone				0.152
No	30 (29.7)	46 (45.5)	25 (24.8)	
Yes	2 (100)	0 (0)	0 (0)	

3.4. Big Five Inventory (BFI)

The overall BFI scale demonstrated satisfactory reliability with a Cronbach's alpha of 0.74. The subscales also showed good internal consistency: Extraversion (α = 0.76), Agreeableness (α = 0.77), Conscientiousness (α = 0.78), Neuroticism (α = 0.79), and Openness (α = 0.71). Detailed reliability metrics are shown in Supplementary Table 7.

Supplementary Table 8 presents detailed BFI responses.

3.5. Multiple Sclerosis Quality of Life (MSQOL-54)

The MSQOL-54 includes 12 dimensions and 2 standalone items, yielding summary scores for physical and mental health. Descriptive statistics for each subscale showed acceptable to excellent internal consistency, with Cronbach's alpha values ranging from 0.70 to 0.91. Physical Function (α = 0.87) had a mean score of 43.12 (SD = 16.31), while the lowest mean was seen in Role Limitations Due to Physical Problems (mean = 13.24, SD = 22.45; α = 0.70). Cognitive Function scored relatively high (mean = 75.20, SD = 17.38; α = 0.73), as did Social Function (mean = 61.89, SD = 14.70; α = 0.70). Emotional Well-being, Pain, Energy, and Sexual Function domains showed moderate mean scores and satisfactory internal consistency. Individual item analysis revealed a mean of 40.93 (SD = 15.25) for Change in Health and 49.30 (SD = 22.29) for Satisfaction with Sexual Function. The Physical Health Composite Score ranged from 11.96 to 66.01 (mean = 39.83, SD = 9.99), and the Mental Health Composite Score ranged from 13.30 to 88.86 (mean = 52.83, SD = 14.23). Supplementary Table 9 provides participants' responses to MSQOL-54.

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Table 9. Association between the factors of the Motivation for Parenthood Scale (PM2) and various categorical parameters.

Factors of Motivation for Parenthood (PM2)	Educational Level							p
	Middle school	High school	Vocational training diploma	Technical university degree	Bachelor's degree	Master's degree	Doctoral degree	
Altruistic	33.00 (-)	38.20 (2.86)	34.00 (2.82)	36.16 (3.06)	40.37 (3.50)	34.66 (6.65)	43.50 (2.12)	0.044
Fatalistic	51.00 (-)	44.80 (1.64)	50.50 (0.70)	45.50 (4.27)	45.12 (3.04)	49.00 (4.58)	45.00 (5.65)	0.230
Narcissistic	45.00 (-)	46.20 (3.11)	41.50 (3.53)	46.33 (2.06)	44.25 (2.86)	45.00 (2.00)	42.00 (8.48)	0.444
Instrumental	51.00 (-)	51.40 (2.96)	54.50 (0.70)	52.50 (3.56)	51.14 (3.67)	52.00 (1.73)	49.50 (4.94)	0.808

	Marital status				p
	Married	Unmarried	Divorced	Civil partnership	
Altruistic	36.62 (4.41)	40.40 (2.07)	38.50 (4.94)	45.00 (-)	0.211
Fatalistic	47.31 (3.28)	43.20 (3.56)	46.00 (4.24)	41.00 (-)	0.128
Narcissistic	44.50 (3.07)	45.20 (2.38)	41.50 (7.77)	48.00 (-)	0.343
Instrumental	52.06 (3.06)	51.60 (2.88)	54.50 (2.12)	46 (-)	0.183

	Years diagnosed with Multiple Sclerosis					p
	<1	1	2	3	>3	
Altruistic	39.20 (3.27)	46.00 (1.41)	37.00 (3.74)	36.00 (4.34)	37.80 (3.49)	0.040
Fatalistic	44.40 (3.78)	43.50 (3.53)	47.40 (2.88)	46.75 (3.95)	46.40 (4.15)	0.592
Narcissistic	45.80 (3.11)	44.50 (4.94)	43.80 (5.35)	44.75 (2.25)	44.80 (3.49)	0.939
Instrumental	51.40 (2.60)	46.00 (0.00)	52.40 (3.50)	52.87 (2.41)	52.50 (3.69)	0.083

	Category of disease progression				
	Benign	Relapsing/remitting	Relapsing/progressive	Chronic/progressive	p
Altruistic	41.00 (1.41)	37.60 (4.64)	39.00 (4.24)	38.00 (-)	0.771
Fatalistic	42.50 (2.12)	46.30 (3.71)	46.50 (4.94)	48.00 (-)	0.542
Narcissistic	43.50 (0.70)	44.95 (3.44)	43.00 (5.65)	47.00 (-)	0.747
Instrumental	53.00 (2.82)	51.75 (3.27)	51.50 (4.94) -	-	0.873

	Corticosteroids		p
	No	Yes	
Altruistic	37.80 (3.89)	38.16 (5.98)	0.862
Fatalistic	46.42 (3.26)	45.33 (5.12)	0.530
Narcissistic	44.61 (3.41)	45.50 (2.73)	0.568
Instrumental	51.80 (3.10)	51.50 (3.44)	0.841

	Beta interferons		p
	No	Yes	
Altruistic	37.44 (3.98)	38.77 (5.01)	0.459
Fatalistic	46.22 (3.87)	46.11 (3.44)	0.943
Narcissistic	45.22 (2.60)	44.00 (4.33)	0.367
Instrumental	51.70 (3.19)	51.77 (3.15)	0.957

	Glatiramer acetate		p
	No	Yes	
Altruistic	37.37 (4.10)	42.00 (4.35)	0.079
Fatalistic	46.33 (3.72)	45.00 (3.60)	0.563
Narcissistic	45.00 (3.34)	43.33 (2.08)	0.413
Instrumental	52.00 (2.89)	49.66 (4.72)	0.230

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3.6. Motivation for Parenthood Questionnaire (PM2)

Scores on the PM2 subscales were as follows: Altruistic Motivation ranged from 29 to 47 (mean = 37.89, SD = 4.31), Fatalistic Motivation from 40 to 53 (mean = 46.19, SD = 3.67), Narcissistic Motivation from 36 to 51 (mean = 44.81, SD = 3.25), and Instrumental Motivation from 46 to 57 (mean = 51.73, SD = 3.12), the latter showing the highest average.

Supplementary Table 10 presents the full breakdown of first-choice responses for each question.

Table 10. Correlations between the Motivation for Parenthood Scale (PM2) factors and other continuous parameters.

Other parameters		Factors of Motivation for Parenthood (PM2)			
		Altruistic	**Fatalistic**	**Narcissistic**	**Instrumental**
Altruistic	Pearson Correlation	1	-0.697	-0.199	-0.420
	p		0.000	0.318	0.033
Fatalistic	Pearson Correlation	-0.697	1	-0.246	0.058
	p	0.001		0.217	0.779
Narcissistic	Pearson Correlation	-0.199	-0.246	1	-0.394
	p	0.318	0.217		0.046
Instrumental	Pearson Correlation	-0.420	0.058	-0.394	1
	p	0.033	0.779	0.046	
Age (years)	Pearson Correlation	-0.321	0.311	-0.061	-0.154
	p	0.103	0.114	0.762	0.454
OSSS-3	Pearson Correlation	-0.179	0.229	-0.053	0.060
	p	0.392	0.271	0.800	0.781
Dyadic Adjustment Scale (overall score)	Pearson Correlation	-0.461	0.504	-0.058	0.113
	p	0.016	0.007	0.775	0.583
Dyadic Consensus Scale	Pearson Correlation	-0.435	0.486	-0.149	0.171
	p	0.023	0.010	0.459	0.405
Dyadic Satisfaction Scale	Pearson Correlation	0.044	0.043	0.093	-0.208
	p	0.829	0.833	0.643	0.309
Dyadic Cohesion Scale	Pearson Correlation	-0.440	0.560	-0.352	0.262
	p	0.022	0.002	0.072	0.196
Affectional Expression Scale	Pearson Correlation	0.068	-0.215	0.302	-0.071
	p	0.738	0.281	0.126	0.730
CES-D score	Pearson Correlation	0,199	0.006	-0.123	-0.185
	p	0.320	0.978	0.540	0.365
BFI- Extraversion	Pearson Correlation	0.380	-0.238	-0.106	-0.186
	p	0.050	0.232	0.598	0.364
BFI- Agreeableness	Pearson Correlation	0.264	-0.156	0.020	-0.209
	p	0.182	0.437	0.921	0.305
BFI-Conscientiousness	Pearson Correlation	0.450	-0.272	-0.235	-0.189
	p	0.019	0.169	0.239	0.354
BFI- Neuroticism	Pearson Correlation	-0.154	-0.033	0.245	0.116
	p	0.444	0.868	0.219	0.571
BFI-Openness	Pearson Correlation	0.284	-0.201	0.087	-0.188
	p	0.151	0.315	0.667	0.359
BFI- Overall score	Pearson Correlation	0.463	-0.341	0.000	-0.240
	p	0.015	0.082	0.998	0.237
MSQOL-54-Physical function	Pearson Correlation	-0.324	0.412	0.047	-0.121
	p	0.099	0.033	0.815	0.557
MSQOL-54- Role Limitations due to physical problems	Pearson Correlation	-0.146	0.189	0.022	-0.122
	p	0.467	0.344	0.912	0.554
	Pearson Correlation	-0.185	0.273	-0.021	-0.073

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MSQOL-54- Role Limitations due to emotional problems	p	0.354	0.168	0.918	0.723
MSQOL-54-Pain	Pearson Correlation	-0.230	0.388	0.131	-0.294
	p	0.248	0.046	0.516	0.145
MSQOL-54-Emotional well-being	Pearson Correlation	-0.147	0.289	-0.216	0.120
	p	0.466	0.143	0.278	0.559
MSQOL-54- Energy	Pearson Correlation	-0.199	0.433	-0.109	-0.135
	p	0.319	0.024	0.589	0.512
MSQOL-54- Health perceptions	Pearson Correlation	0.165	-0.001	-0.139	-0.118
	p	0.410	0.995	0.490	0.567
MSQOL-54- Social function	Pearson Correlation	-0.299	0.465	-0.051	-0.021
	p	0.146	0.019	0.809	0.924
MSQOL-54-Cognitive function	Pearson Correlation	-0.309	0.528	-0.243	0.114
	p	0.117	0.005	0.222	0.578
MSQOL-54-Health distress	Pearson Correlation	-0.197	0.422	-0.306	0.140
	p	0.326	0.028	0.120	0.494
MSQOL-54-Sexual function	Pearson Correlation	-0.002	0.076	-0.158	0.099
	p	0.991	0.705	0.432	0.630
MSQOL-54-Overall quality of life	Pearson Correlation	-0.139	0.222	-0.047	0.001
	p	0.490	0.265	0.817	0.996
MSQOL-54-Physical health score	Pearson Correlation	-0.313	0.554	-0.141	-0.051
	p	0.127	0.004	0.502	0.814
MSQOL-54-Mental health score	Pearson Correlation	-0.232	0.403	-0.174	0.047
	p	0.244	0.037	0.384	0.820
Positivity Scale Score	Pearson Correlation	0.090	-0.005	-0.102	0.021
	p	0.655	0.978	0.613	0.918

3.7. Positivity Scale

Scores on the Positivity Scale ranged from 15.00 to 36.00, with a mean of 22.82 and a standard deviation of 3.71. The scale demonstrated satisfactory internal consistency (Cronbach's α; see Supplementary Table 11). Supplementary Table 12 summarizes participants' responses to the Positivity Scale.

3.8. Investigation of Factors Related to Having Children or Attempting to Have Children

3.8.1. Factors Associated with Having Childrena

Age was significantly higher among women with children (mean = 39.75, SD = 5.72) compared to those without (mean = 35.56, SD = 8.67; p = 0.017). Mental Functioning (MSQOL-54) was significantly better in women with children (mean = 56.74, SD = 12.35) than those without (mean = 50.87, SD = 14.01; p = 0.035). Health Worries were also higher among mothers (mean = 57.14, SD = 16.93) compared to non-mothers (mean = 44.06, SD = 23.08; p = 0.006). Fatalistic Motivation was more pronounced in women with children (mean = 47.86, SD = 2.92) than in those without (mean = 44.08, SD = 3.50; p = 0.005). Marital Status showed a strong association (p = 0.001); 84% of married women had children, while all unmarried women were childless. MS Progression Type was also significant (p = 0.001); all women with chronic/progressive MS were childless, whereas 73.9% with relapsing/remitting MS had children. Beta Interferon use was associated with childbearing (p = 0.003); 78.1% of women receiving this treatment had children. Fingolimod use was negatively associated (p = 0.008); all women on fingolimod (n = 4) were childless.

Table 4 presents these associations. However, logistic regression analysis did not identify any of the above variables as independently predictive (Table 5).

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3.8.2. Factors Associated with Number of Children

Age increased with parity: mean age was 35.56 (no children), 37.72 (one child), and 43.48 (two children); p = 0.001. Mental Functioning improved with number of children: 50.87 (none), 54.66 (one), and 60.48 (two); p = 0.021. Health Perceptions were more positive in women with two children (mean = 38.00, SD = 18.92) than in those with none or one (means = 26.71 and 28.66 respectively; p = 0.003). Health Worries increased with child number (means = 44.06, 55.11, and 60.80 for none, one, and two children respectively; p = 0.004). Fatalistic Motivation peaked in women with one child (mean = 48.77, SD = 2.48), compared to those with none (44.08) or two children (46.50); p = 0.009.

Marital Status again showed significance (p = 0.001), with most married women having one or two children, while all unmarried women were childless. Years Since Diagnosis influenced childbearing: a longer disease duration was associated with higher rates of childlessness (p = 0.044). MS Progression Type mattered (p = 0.005); no woman with chronic/progressive MS had children, while those with relapsing/remitting MS had higher parity. Beta Interferon use was positively associated with higher parity (p = 0.006), and fingolimod use was again negatively associated, with all users being childless (p = 0.011).

Table 6 provides a summary of the association between the number of children and various parameters.

3.8.3. Investigation of Factors Related to the Attempt to Have a Child Among Childless

Women who have attempted to have children score significantly lower on the Affectional Expression Scale compared to those who have not attempted (p = 0.030). Marital status is significantly associated with the attempt to have children, with married women being more likely to have attempted compared to unmarried women (p = 0.048).

Table 7 provides a summary of the association between the attempt to have a child among childless participants and various parameters.

Next, an analysis was conducted to determine whether any of these factors were independently associated with the attempt to have children (Table 8).

The Affectional Expression Scale has a statistically significant, negative, and independent association with the attempt to have children among childless participants (p = 0.047, OR = 0.427).

3.9. Investigation of Factors Related to Motivations for Having Children

Altruistic motivation for parenthood was significantly associated with educational attainment (p = 0.044). Figure 1 illustrates these differences, highlighting the particularly high scores among doctoral degree holders.

The time since MS diagnosis was also significantly associated with altruistic motivation (p = 0.040).

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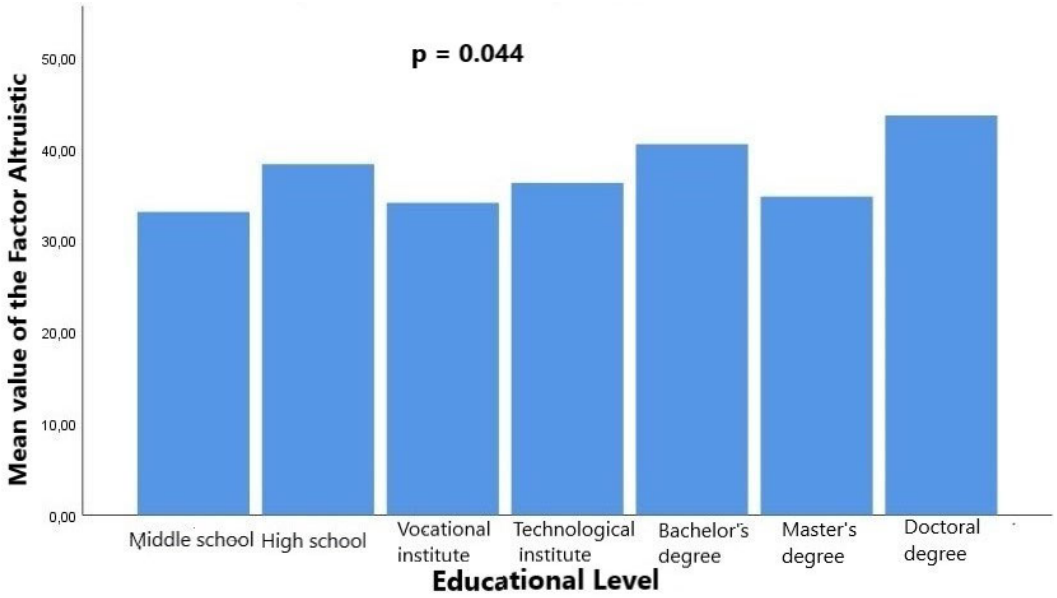

Figure 1. Statistically significant differences in the mean altruistic motivation score, with Doctoral degree holders showing the highest values.

3.10. Correlations Among Motivation for Parenthood Scale (PM2) Factors

Altruistic motivation is strongly and negatively correlated with fatalistic motivation ($r = -0.697$, $p < 0.001$) and moderately negatively correlated with instrumental/utilitarian motivation ($r = -0.420$, $p = 0.033$). Narcissistic motivation is moderately and negatively correlated with instrumental/utilitarian motivation ($r = -0.394$, $p = 0.046$).

3.11. Correlations Between Motivation for Parenthood Scale (PM2) Factors and Psychosocial Variables

Altruistic motivation is moderately and negatively correlated with the total score of the Dyadic Adjustment Scale ($r = -0.461$, $p = 0.016$), the Dyadic Consensus Scale ($r = -0.435$, $p = 0.023$), and the Dyadic Cohesion Scale ($r = -0.440$, $p = 0.022$). Conversely, fatalistic motivation is moderately and positively correlated with the total score of the Dyadic Adjustment Scale ($r = 0.504$, $p = 0.007$), the Dyadic Consensus Scale ($r = 0.486$, $p = 0.010$), and the Dyadic Cohesion Scale ($r = 0.560$, $p = 0.002$).

3.12. Correlations Between Motivation for Parenthood Scale (PM2) Factors and Quality of Life (MSQOL-54)

Fatalistic motivation is moderately and positively correlated with various quality-of-life dimensions, including Physical Functioning ($r = 0.412$, $p = 0.033$), Pain ($r = 0.388$, $p = 0.046$), Energy ($r = 0.433$, $p = 0.024$), Social Functioning ($r = 0.465$, $p = 0.019$), Cognitive Functioning ($r = 0.528$, $p = 0.005$), Health Worries ($r = 0.422$, $p = 0.028$), Physical Health Score ($r = 0.554$, $p = 0.004$), and Mental Health Score ($r = 0.403$, $p = 0.037$).

Table 10 provides a summary of the correlations between the Motivation for Parenthood Scale (PM2) factors and other continuous parameters.

4. Discussion

This study examined factors influencing reproductive decisions in women with MS. Women with children were significantly older, had better mental functioning, and reported more health concerns than those without. Fatalistic motivation emerged as a significant factor, suggesting that women who view childbearing as a natural or inevitable life event are more likely to have children, despite concerns related to MS. Marital status strongly influenced childbearing, with all unmarried

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women remaining childless. Disease course also played a role—relapsing-remitting MS was associated with higher childbirth rates, while the chronic/progressive form was not.

Treatment-related findings indicated that women receiving beta interferons were more likely to have children, whereas fingolimod use was negatively associated with childbirth. Among childless women, those who had tried to conceive reported lower scores in affectional expression and were more likely to be married. Higher educational attainment was linked to stronger altruistic motivations for parenthood, and a more recent MS diagnosis was also associated with higher altruistic motivation. Furthermore, fatalistic motivation was positively correlated with quality of life scores.

These results support existing research showing that MS-related concerns often shape reproductive decisions. Prior studies have reported increased voluntary childlessness due to fears of disease worsening or treatment effects [29–34]. For instance, a large European survey found that 56% of pwMS acknowledged MS influenced their family planning, and 14% decided against having children due to related concerns [29]. Other studies highlight uncertainty about motherhood [30], avoidance of pregnancy post-diagnosis [31], discouragement by healthcare professionals [32], and fears related to genetics and parenting capacity [33,34]. Our findings are consistent with these trends.

The observed link between higher education and altruistic motivation may reflect a greater emphasis on child well-being and prosocial values among more educated women. Similarly, the association between recent diagnosis and altruistic motivation might indicate a phase of life reevaluation, where nurturing roles become more meaningful. The correlation between fatalistic beliefs and a better quality of life may suggest that acceptance and reduced cognitive distress contribute to psychological resilience in the context of MS.

These findings highlight the need to integrate fertility counseling into MS care, especially early in the disease course. Tailored support should address concerns about disease progression, treatment interruptions, and quality of life [35]. Given the importance of mental well-being in reproductive decisions, psychosocial support and counseling could be especially beneficial. Moreover, occupational therapists can contribute to developing adaptive parenting strategies36. An interdisciplinary approach involving neurologists, gynecologists, psychologists, and occupational therapists is essential. Structured fertility education programs tailored to MS-specific concerns—fatigue, mobility, and medication management—are recommended [36].

The study's strengths include the validation of the PM2 and Positivity Scale in Greek, offering robust psychometric properties via EFA and CFA. It addresses an underexplored topic using multidimensional assessment tools and a diverse recruitment strategy, enhancing generalizability. Clinically, it identifies both modifiable and fixed factors relevant to fertility decisions in women with MS.

The cross-sectional design inherently limits the ability to infer causality. Selection bias may be present, as the sample was obtained from clinics and support groups. With a moderate sample size (n = 103), there is a risk of not detecting subtle effects within subgroups, and the use of self-reported data may introduce recall or social desirability biases. Moreover, the study did not track pregnancy outcomes or consider partner perspectives, both of which are vital for a thorough understanding.

Longitudinal research is needed to explore how reproductive decisions change over time. Future studies should assess the effects of newer MS treatments on fertility, and qualitative research could provide more profound insights into patient perspectives and decision-making processes.

5. Conclusions

This study highlights key factors influencing fertility decisions in women with MS, including age, marital status, disease progression, and psychological factors. Women with relapsing-remitting MS and those on beta interferons were more likely to have children, whereas those on fingolimod remained childless. Higher mental health scores, fatalistic motivation, and positive health perceptions were associated with childbearing, while greater health-related distress was more common among mothers. Despite its cross-sectional design, these findings underscore the need for

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personalized reproductive counseling and further longitudinal research to assess long-term reproductive and psychological outcomes in women with MS.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

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Data Availability Statement: The dataset used and analyzed during this study is available from the corresponding author on reasonable request.

Institutional Review Board Statement: "The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the University of West Attica Ethics Committee (approval code: 95813) on 18/10/2023."

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Abbreviations

The following abbreviations are used in this manuscript:

MS	Multiple Sclerosis
MARU	Medically Assisted Reproduction Unit
NHA	Gynecological and Neurology Clinics of the Naval Hospital of Athens
GMSS	Greek Multiple Sclerosis Society
OSSS	Oslo Social Support Scale
DAS	Dyadic Adjustment Scale
PM2	Motivation for Parenthood Questionnaire
PS	Positivity Scale
CI	Confidence Interval
MSQO	Multiples Sclerosis Quality of Life
BFI	Big Five Personality Inventory
OR	Odds ratio
SE	standard error

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