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ORIGINAL PAPER

Sexual Rehabilitation and Relational Satisfaction in People with Multiple Sclerosis and their Partners

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Abstract
Sexuality is an integral part of our existence. Multiple Sclerosis (MS) can complicate the lifelong course of sexual development and the ways in which one defines and expresses sexuality. Unfortunately, these issues are not adequately addressed by the health professionals involved in the rehabilitation process. Present research attempts to study the effect that can arise on the sexual and relational satisfaction of couples having a partner with MS after the implementation of a sexual rehabilitation program. 60 couples where one partner has MS and the other does not, were divided into three groups and accepted the PLISSIT (PLISSIT stands for Permission, Limited Information, Specific Suggestions, Intensive Therapy) sexual rehabilitation program as follows: Group a (n=40, control group) completed self-referencing questionnaires at three times (initial measurement, after 10 weeks and 6 months later), group b (n=40) did 10 weeks of sexual counselling and completed the same questionnaires at the same times and group c (n=40) followed the PLISSIT programme and was evaluated in the same way at the same times. The implementation of PLISSIT improved Sexual Dysfunction (SD) levels, increased sexual satisfaction between partners along with general relational satisfaction. PLISSIT can be used by professionals involved in the management of the disease as a comprehensive psychosexual rehabilitation program for MS patients and their partners.

Keywords Multiple sclerosis · Sexual dysfunction · Satisfaction · PLISSIT · Sexual rehabilitation · Greece

Introduction

Sexual function and romantic relationships can be affected by the onset of a chronic disease like MS [1]. Sexual dysfunction (SD) is a common symptom of MS and can occur throughout the disease course [2–4]. The disease has been found to affect the sexual expression

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and function of patients at high levels for both sexes, thus affecting the sexual satisfaction of the couple with their relationship [5–7]. Unfortunately, these issues are not adequately addressed by the health professionals involved in the rehabilitation process [8]. The World Health Organization has defined rehabilitation as seeking to restore clients to the 'highest level of adaptation attainable' [9–11] in all areas of life, but despite reported rates of sexual dysfunction of up to 60%, the issue of sexuality among neurological populations has often been neglected in rehabilitation settings [5, 8, 12–16]. Over the past 20 years, the literature on the provision of rehabilitation services to people with disabilities has begun to include sexual rehabilitation as a field of these programs [16–20]. Thus, interdisciplinary programs were created, and health professionals involved in the rehabilitation of people with disabilities can provide specified solutions as needed [21–23]. Recently, studies have shown the effectiveness of these programs [22–24].

One of the first intervention programs on sexual dysfunctions of patients with chronic diseases or disabilities is the PLISSIT model. The original model was created by psychologist Jack Annon, and since then it has been widely used by health professionals who work for the sexual rehabilitation of patients or people with disabilities [25–27]. The word PLISSIT is an acronym from the words **P**ermission, **L**imited **I**nformation, **S**pecific **S**uggestions, and **I**ntensive Therapy which refer to the intervention levels of the specialist therapist-sexologist [38, 39]. According to Annon [25, 28], most people experience sexual dysfunctions that they can deal with if given permission (**P**ermission) to be sexual, to desire sexual activity and to be able to discuss such issues if they receive the necessary minimal information (**L**imited **I**nformation) on sexual issues, and are given specific suggestions (**S**pecific **S**uggestions) or ways to deal with these issues (**I**ntensive **T**herapy). As the level of intervention increases, more knowledge, training and qualifications are needed both on the part of the therapist and on the part of the patient. Although its initial operation was intended for specific chronic diseases and disabilities, along the way it seemed that the model can work effectively for other health conditions [27]. In MS, the PLISSIT program has been tested in women suffering from MS in two different studies [16, 29] showing positive results in these population. More specifically, in the first study done by Khakbazan et al. [16] results showed that utilizing the PLISSIT model as a framework for sexual counselling can improve sexual function in women who are sexually active and suffer from SD due to MS.and in the second study done by Kazemi et al. [29] results showed that 2 weeks and 2 months after the intervention, the overall level of sexual quality of life in the experimental group was significantly better than the control group ($P < .05$). PLISSIT has also been used in other chonic diseases such as type 2 Diabetes mellitus [30], breast and prostate cancer [31], after stroke [32], spinal cord injury, [33], cardiological patients [34] and people with obsessive compulsive disorder [35].

Sexual Rehabilitation in MS

According to Foley [6, 36] sexual problems in multiple sclerosis (MS) can stem from primary, secondary, or tertiary sources. Primary sexual dysfunction stems from lesions in the cortex and spinal cord affecting the neural pathways involved in the sexual response and/or sexual feelings. Symptoms, can include partial or total loss of libido (sexual desire), unpleasant or decreased sensations in the genitals, decreased vaginal lubrication or erectile capacity, and decreased frequency and/or intensity of orgasm. Secondary sexual dysfunc-

tion refers to MS-related to physical symptoms or dysfuction that indirectly affect the sexual response. Bladder and/or bowel dysfunction, fatigue, spasticity, muscle weakness, problems with attention and concentration, hand tremors, and non-genital alterations in sensation are amongst the most common. Tertiary sexual dysfunction refers to psychosocial and cultural issues that can interfere with sexual feelings and sexual response. Depression, performance anxiety, changes in family roles, lowered self-esteem, body-image concerns, loss of confidence, and internalized beliefs and expectations in the context of having a disability can contribute to tertiary sexual dysfunction. It has also been shown that proportion of SD in MS is greater than in other neurological diseases [37]. Prevalence reports on sexual dysfunction range from 40 to 80% in women and 50–90% in men. [1, 2]. In the only study conducted so far for this issue in Greek MS patients (in both sexes) Tzitzika et al. [1] report that prevalence of sexual dysfunction among Greek patients is present in both sexes in high levels similar to other studies [38–41] with women having higher scores in Primary SD and men having higher scores in the other two subscales. Although the incidence of sexual dysfunctions in MS is common [41, 42] there is not enough experience on how to deal with them, and often healthcare professionals neglect their evaluation [43]. The reasons for this are mainly due to the lack of education to health professionals as well as to opinions among them that the issue does not concern their specialty or due to lack of time [44, 45]. Previous research in Greece [1, 2, 46] has been limited to highlighting the need to evaluate SD on MS patients but without providing solutions. However, there is need for appropriate and effective interventions depending on the symptoms and difficulties that occur not only in patients with MS but also in their partners. Counselling and psychoeducation have been identified as possible ways of dealing with sexual dysfunctions in MS despite a few interventional studies [16, 41, 47–49]. The PLISSIT model has been proposed as a "guide" in counselling on sexual rehabilitation and in the case of MS [16, 48, 49].

Objectives The present research attempts to study the effect that can arise in the sexual and relational satisfaction of a couple where one partner suffers from MS and the other partner is at the same time a caregiver after the implementation of a psychosexual rehabilitation program. It attempts in this way to highlight the aspect of sexual rehabilitation and its importance for partners through the PLISSIT model in MS.

Materials and methods

For the conduct of the research, it was decided to involve couples where one partner had MS and the other partner was acting as the main caregiver. Caregivers were included in the study if they provide a variety of services, including personal care, homemaking and assistance with daily activities, mobility and leisure activities to the partner with MS. Patients were initially evaluated for the occurrence of sexual dysfunctions due to the disease. Subsequently, both partners completed an array of questionnaires of self-report on the characteristics of their relationship and their satisfaction. Couples were divided into three groups (randomly) and underwent a program of psychosexual rehabilitation for 10 weeks as follows:

Group A (Intervention Group) A comprehensive 10-week sexual rehabilitation program (PLISSIT) was implemented in these couples,

Group B (Councelling Group) In these couples, psychoeducation and counselling sessions including mapping exercises and couple therapy [50] were implemented as part of a program of 10 weekly sessions,

Group C (Control Group) Follow up visits were applied to these couples without any other intervention after a period of 10 weeks from their initial evaluation and recording.

All couples were reassessed by completing the same questionnaire array at the end of the 10 weeks and there was also a follow up meeting with re-evaluation 6 months after the end of the intervention and completion of the questionnaires.

Participants and Questionnaires

60 couples from all over Greece participated in the study. They all came to the special Outpatient Clinic of Neurourology and Sexual Medicine of the National Rehabilitation Center in Athens and the Special Outpatient Clinic of Neurourology in General Hospital of Larissa. The reason why these two special clinics were chosen is that they are reference points for patients with MS who face neurogenic bladder and sexual dysfunctions, having the appropriate infrastructure and staff to deal with them. Also, the selection of the cities and the specific hospitals was made with geographical criteria, since both Athens and Larissa are large urban centers, with Larissa being geographically located in the middle of mainland Greece, serving patients from neighboring prefectures.

Participants were approached and informed about the conduct of the research from two sources: Initially there was an update from the medical staff of the clinics as well as from the Associations of Patients with MS all members of the Panhellenic Federation of Persons with Multiple Sclerosis. All participants were informed of the purpose of the survey and gave their written consent for their participation. The research was approved by the Scientific Council and the Ethics Committee of the National Rehabilitation Center, the Scientific Council and the Research Committee of the General Hospital of Larissa, along with the scientific committee of Panteion University. The collection of the material took place from November 2019 to September 2021. Inclusion criteria were the confirmed MS, age over 18, and active sex life in the last six months.

Measures

The Greek validated version of the Multiple Sclerosis Intimacy and Sexuality Questionnaire – 15 (MSISQ-15) [51]. The MSISQ-15 [52] is a self-report measure that evaluates the influence of MS symptoms on sexual activity and satisfaction over the preceding 6 months. It is a valid and reliable short version of the MSISQ-19 [53] and consists of 15 items. The MSISQ-15 is divided in three domains to allow focus on the specific domain of sexual concerns; primary symptoms (items 8, 12, 13, 14, 15), secondary symptoms (items 1, 2, 3, 4, 5)

and tertiary symptoms (items 6, 7, 9, 10, 11). Each item is rated on a five-point Likert scale ranging from 0 (never) to 5 (always). the higher the score the greater the impact of sexual dysfunction on patients' lives. All answers with score "4" or "5" should be discussed with health care specialists. The maximum total score is 75 with acceptable psychometric properties. Reliability analysis yielded very satisfactory results for every assessment (baseline assessment:α=0.867, 2nd assessment 10 weeks after: α=0.870, six months later α=0.877).

The Global Measure of Sexual Satisfaction (GMSEX)

The Global Measure of Sexual Satisfaction is one of the three self-reported measures of the IEMSS Questionnaire [54]. The Interpersonal Exchange Model of Sexual Satisfaction (IEMSS) Questionnaire assesses the components of the IEMSS [55], a conceptual framework for understanding sexual satisfaction. The Global Measure of Sexual Satisfaction (GMSEX) assesses overall sexual satisfaction. Responders rate their sex life on five 7-point dimensions: Good-Bad, Pleasant-Unpleasant, Positive-Negative, Satisfying-Unsatisfying, Valuable-Worthless. Ratings are summed such that possible scores range from 5 to 35 with higher scores indicating greater sexual satisfaction. Internal consistency have been found high (ranging from 0.91 to 0.96 in the original paper and from 0.90 to 0.934 in the present study).

The Global Measure of Relation Satisfaction (GMREL)

The Global Measure of Relational Satisfaction (GMREL) [54] is similar to GMSEX and evaluates the overall relationship satisfaction. Responders rate their satisfaction from relationship on the same five 7-point dimensions as GMSEX. Higher summed scores indicate greater relationship satisfaction. Internal Consistency was found high ranging from 0.91 to 0.96 in the original study, and from 0.894 to 0.932 in the present study.

Also, all couples completed a Demographic questionnaire.

Results

The sample of 120 participants consisted of 60 couples with 51.75% being women and 48.3% men since two couples were same-sex while all the other heterosexuals. The mean age of the participants was 47.84 years (StD=6,363, range 34–86 years). In the groups respectively the same measures were for the control group 47 years (StD=5.204), counselling group 45.98 years (StD=5.886) και intervention group 50,55 years (StD=7.071). The majority of participants declared themselves married (78.3%), with the remaining 21.7% being in relation with cohabitation, while most of the sample (66.6.%) had one or more children. All demographic data and clinical characteristics are presented in Table 1.

Before the intervention of the PLISSIT psychosexual rehabilitation program [25] we evaluated the prevalence of SD among MS patients who took part in the study. From the analysis it become clear that the majority of patients had high scores in SD in all subscales. Specifically, for primary SD the mean score was 13.87 (range 0–21), StD=4.382, for secondary SD mean score=10.48 (range 0–16), StD=2.581, for tertiary SD mean score=13.78 (0–20), StD=3.880. In order to calculate and evaluate the differences in the averages

Table 1 *Demographic and clinical characteristics (Mean and standard deviation) of the sample*

	Control Group N=40, %	Councelling Group, N=40, %	PLISSIT group N=40, %	Total N=120, %
Age (in years)	47±5.204	45,98±5.886	50,55±7.071	47,84±6.363
Gender				
Men	19, 47.5%	20, 50%	21, 52.5%	60
Women	21, 52.5%	20, 50%	19, 47.5%	60
Education Level				
University	17, 42.5%	15, 37.5%	14, 35%	46, 38.5%
High School	22, 55%	23, 57.5%	24, 60%	69, 57.5%
Basic Education	1, 2.5%	2, 5.0%	2, 5.0%	5, 4 .2%
Place of Residence				
Attica	28, 70%	28, 70%	30, 80%	86, 71.7|%
Thessaloniki	4, 10%	4, 10%	4, 10%	12, 10%
Macedonia	4, 10%	2, 5%	0	6 5.0%
Peloponesse	2, 5%	4, 10%	4, 10%	10, 8.3%
Evia	2, 5.0%	2 5.0%	0	4 3.3%
Eptanisa	0	0	2 5.0%	2 1.7%
Type of relation				
Marriage	30, 32%	34, 36%	30, 32%	94, 78.3%
Cohabitation	10, 38%	6 23%	10, 38%	26 21.7%
No of Children				
0	14, 35%	12, 30%	14, 35%	40, 33,3%
1	12, 33%	12, 33%	12. 33%	36, 30%
2	12, 35%	12, 35%	10, 29%	34, 28,3%
3	3 20%	4 40%	4 40%	10, 8,3%
Duration of relationship	16.70±6.726	18,25±8,289	21.13±11.404	18.03±9.231
Diagnose of MS before relationship				
Yes	19 37%	12 24%	20 39%	51 42.5%
No	21 30%	28 41%	20 29%	69 57.5%

Table 2 *t-test results comparing males and females on prevalence of SD*

	Men N=58	Women N=61	Criterion t test
Primary SD	10.36	4.16	t(117)= -4.863, p=<0,001
Secondary SD	7.31	3.70	t(117)= -3.718, p=<0,001
Tertiary SD	9.86	4.74	t(117)=-3.947, p=<0,001
Total SD	27.53	12,61	t(117)= -4.294, p=0,00

between the two sexes we ran a independent samples t-test. It was found that there was a stastistically significant difference between men and women in the occurrence of all levels of SD with men having higher rates in all subscales. Results are shown in Table 2.

In order to determine whether the PLISSIT psychosexual rehabilitation program [25] had an effect on the variables of interest of the research, a series of 2 (Companion) X 3 (Time) X 3 (Type of Intervention) mixed ANOVA models were conducted and are described separately for each variable below. The variables within participants were the variable of the "Partner" with two levels (1: Patient, 2: Caregiver) and the variable of "Time" with three levels, which represented each of the three time points (1: Initial measurement, 2: 10 weeks

Table 3 *Averages, standard deviations (StD) and mixed ANOVA* results *for SD*

	Time					
	Baseline	10 weeks after	6 months after	Mixed ANOVA		
	Average (StD)	*Average (StD)*	*Average (StD)*	Effect	Ratio *F*	η_p^2
Control Group (n=20)						
Patient	34.45 (11.71)	32.25 (9.78)	32.50 (9.89)	T	18.89***	0.25
Counselling Group (n=20)				G	1.89	0.06
Patient	38.40 (9.48)	37.75 (8.72)	37.80 (8.49)	T * G	7.33**	0.21
Intervention Group (n=20)						
Patient	41.55 (5.59)	36.15 (8.04)	34.25 (8.93)			

Note. Effect: T=Time (3 levels), G=Groups (Control, Counselling, Intervention). ***p<.001, **p<.01

later and 3: 6 months after). The independent variable between participants was the "Group of participants" with three levels, 1: Control group, 2: Advisory group and 3: Intervention Group.

For the investigation of post hoc testing of main effects, lower order interactions and higher order interactions, see each analysis separately.

Symptoms of SD in patients with MS. For the effect of the PLISSIT sexual rehabilitation program on the intensity of the symptoms of SD (only patients) as investigated by the Questionnaire of Intimacy and Sexuality in MS – 15 (MSISQ-15) [51], see Table 3.

Mixed ANOVA results for symptoms of SD showed a primary effect of time ($F_{1, 57} = 18.89$, $p<.001$, *partial* $\eta^2=0.25$) and interaction of time and group of participants ($F_{2, 56} = 7.33$, $p=.001$, *partial* $\eta^2=0.21$). The main effect of the group of participants was not found to be statistically significant ($p>.05$). Further investigation of the interaction between partner type and time showed that patients in the intervention group in general, while having the highest scores in MSISQ-15, 6 months after the intervention scored scores not statistically different from the control group ($p>.05$). The control group had similar scores at all times and differed from the counselling group at all times and with the intervention group at the first and second time points ($p<.01$). Finally, the counselling group differed from both the other two at the first time, only with the control group at the second time ($p<.05$) and at the third time point in time with both ($p<.01$).

Sexual and relational satisfaction. For the effect of variables on partners' sexual satisfaction and relationship satisfaction, as investigated by the GMSEX Global Measure of Sexual Satisfaction Questionnaire, and the Global Measure of relational satisfaction [54] see Table 4 for sexual satisfaction and Table 5 for the relational satisfaction. To control for the potential effects of age and gender, two mixed ANCOVA models were applied.

The results of mixed ANCOVA for global sexual satisfaction showed a main effect of group of participants, while from the interactions the interaction of "time and group of participants" was found important. In particular, on general sexual satisfaction group of participants had a significant effect ($F_{2,55} = 3.33$, $p=.043$, *partial* $h^2=0.11$) and the interaction of time and group of participants ($F_{2.55} = 7.48$, $p=.001$, *partial* $h^2=0.21$). In addition, the main effect of the covariate of age was found to be significant ($F_{1.55} = 7.23$, $p=.009$, *partial*

Table 4 *Averages, standard deviations (StD) and mixed ANCOVA* results *for global sexual satisfaction*

	Time					
	Baseline	10 weeks after	6 months after	Mixed ANCOVA		
	Average (StD)	*Average (StD)*	*Average (StD)*	Effect	Ratio *F*	η_p^2
Control Group (n=20)						
Patient	26.25 (5.77)	28.10 (3.92)	28.00 (5.35)	P	3.12	0.05
Caregiver	27.40 (4.36)	29.00 (4.12)	28.50 (4.32)	T	0.66	0.01
Counselling Group (n=20)				G	3.33*	0.11
Patient	24.75 (5.81)	26.75 (4.89)	25.80 (5.82)	P*T	0.02	<0.01
Caregiver	26.45 (6.52)	28.45 (5.20)	27.30 (6.50)	P*G	0.35	0.01
Intervention Group (n=20)				T*G	7.48**	0.21
Patient	26.20 (2.53)	30.10 (2.40)	30.70 (1.72)	T*T*G	1.56	0.05
Caregiver	26.80 (3.78)	29.45 (4.11)	29.75 (3.64)			

Note. Effect: P=Partner (Patient, Caregiver), T=Time (3 levels), G=Groups (Control Group, Counselling Group, Intervention Group). Covariates of the model: Sex (Male, Female) and Age. Significant interactions with covariates, Partner * Sex: F1,55 = 4.10, p=.048, partial eta2=0.07. ***p<.001, **p<.01.

$h^2=0.12$) and the interaction between the partner type and sex ($F_{1,55}=4.10$, $p=.048$, *partial eta*$^2=0.07$). All other possible sources of variability of the model were found to be non-statistically significant ($p>.05$).

Further investigation of the main effect of the covariate of age revealed that younger caregivers had at all three time points lower sexual satisfaction than older participants especially in the first and the third time point (Time 1: $B=$ -0.33, SE=0.12, $p=.006$, Time 2: $B=$ -0.23, SE=0.11, $p=.033$, Time 3: $B=$ -0.34, SE=0.11, $p=.004$). Further investigation of the interaction between the partner type and sex revealed that women patients (*Average*=26.03, *StD*=4.01) had significantly less sexual satisfaction than men (*Average*=28.83, *StD*=3.41) ($p<.01$).

Further investigation of the interaction between time and group of participants showed that within the groups, the second sampling time (10 weeks later) showed the greatest differences from the initial measurement, while the final measurement (6 months later) was non-statistically different from the second time point in all groups of participants ($p<.05$). In particular, in the control group (Time 1: *Average*=26.83, *StD*=5.07, Time 2: *Average*=28.55, *StD*=4.02, Time 3: *Average*=28.25, *StD*=4.84), in counselling group (Time 1: *Average*=25.60, *StD*=6.17, Time 2: *Average*=27.60, *StD*=5.05, Time 3: *Average*=26.55, *StD*=6.16) and in intervention group (Time 1: *Average*=26.50, *StD*=3.16, Time 2: *Average*=29.78, *StD*=3.26, Time 3: *Average*=30.23, *StD*=2.68). Within each time, it was found that the three groups did not differ at the first time ($p>.05$), while at the second time of sampling the intervention group showed the highest score compared to the counselling group ($p>.05$), and at the third time the intervention group still had the highest score from the con-

Table 5 *Averages, standard deviations (StD) and mixed ANCOVA* results *for global relational satisfaction*

	Time					
	Baseline	10 weeks after	6 months after	Mixed ANCOVA		
	Average (StD)	*Average (StD)*	*Average (StD)*	Effect	Ratio *F*	η_p^2
Control Group (n=20)						
Patient	27.05 (3.56)	29.10 (3.63)	28.45 (3.93)	P	2.33	0.04
Caregiver	26.05 (4.84)	27.85 (3.79)	27.40 (3.58)	T	0.50	0.01
Counselling Group (n=20)				G	5.37**	0.16
Patient	25.90 (4.33)	27.50 (4.58)	26.50 (4.82)	P * T	0.77	0.01
Caregiver	25.80 (5.46)	27.25 (5.20)	26.55 (5.03)	P * G	0.46	0.02
Intervention Group (n=20)				T * G	7.65**	0.22
Patient	26.55 (2.82)	30.90 (3.31)	31.40 (2.76)	P * T * G	3.54*	0.11
Caregiver	26.50 (3.04)	29.95 (2.86)	29.55 (3.41)			

Note. Effect: P=Partner (Patient, Caregiver), T=Time (3 levels), G=Groups (Control Group, Counselling Group, Intervention Group). Covariates of the model: Sex (Male, Female) and Age. Significant interactions with covariates, Partner * Sex: F1,55 = 5.42, p=.024, partial eta2=0.09. ***p<.001, **p<.01, *p<.05

trol group ($p<.01$) and from the counselling group ($p<.001$). From that it can be concluded that intervention is more effective than simple counselling.

The results of mixed ANCOVA for global relational satisfaction showed a primary effect of group of participants and from the interactions both the interaction of partner type and time and the triple interaction of partner type, time and group of participants were statistically significant. In particular, type of group had a significant impact on global relational satisfaction ($F_{2, 55} = 5.37$, $p=.007$, *partial* $\eta^2=0.16$), the interaction of group of participants and time ($F_{2, 55} = 7.65$, $p=.001$, *partial* $\eta^2=0.22$) and the triple interaction ($F_{2, 55} = 3.54$, $p=.036$, *partial* $\eta^2=0.11$). In addition, the main effect of the covariate of age was found to be significant ($F_{1.55} = 6.69$, $p=.012$, *partial* $h^2=0.11$) and the interaction between the partner type and sex ($F_{1,55} = 5.42$, $p=.024$, *partial eta*$^2=0.09$). All other possible sources of variability of the model were found to be non-statistically significant ($p>.05$).

With respect to the covariates, the main effect of the covariate of age revealed that younger caregivers had at all three time points lower sexual satisfaction than older participants especially in the first time point (Time 1: B = -0.28, SE=0.11, $p=.010$, Time 2: B = -0.22, SE=0.10, $p=.024$, Time 3: B = -0.22, SE=0.10, $p=.028$). Further investigation of the interaction between the partner type and sex revealed that women patients (*Average*=26.48, *StD*=3.70) had significantly less sexual satisfaction than men (*Average*=28.98, *StD*=3.37) ($p=.11$). Further investigation of the triple interaction between partner type, time and group of participants showed that patients in general had higher levels of global relational satisfaction (Time 1: *Average*=26.50, *StD*=3.57, Time 2: *Average*=29.17, *StD*=3.84, Time 3: *Average*=28.78, *StD*=3.84) than caregivers (Time 1: *Average*=26.12, *StD*=4.45, Time 2:

Average=28.35, *StD*=3.95, Time 3: *Average*=27.83, *StD*=4.01), especially at the second and third time of sampling($p<.05$). Regarding time, the highest scores were found for the second and third time for the intervention group (Time 1: *Average*=26.53, *StD*=2.93, Time 2: *Average*=30.43, *StD*=3.09, Time 3: *Average*=30.48, *StD*=3.09), compared to counselling group (Time 1: *Average*=25.85, *StD*=4.90, Time 2: *Average*=27.38, *StD*=4.89, Time 3: *Average*=26.53, *StD*=4.93) and control group (Time 1: *Average*=26.55, *StD*=4.20, Time 2: *Average*=28.48, *StD*=3.71, Time 3: *Average*=27.93, *StD*=3.76). Overall, it was shown that the intervention is more effective than simple counselling and patients benefit more than caregivers, especially after 10 weeks (second sampling).

Discussion

The main objective of this research was to study the effect that can arise on the sexual and relational satisfaction of a couple where one partner suffers from MS and the other partner is also a caregiver, following the implementation of a sexual rehabilitation program. In this way, it attempts to highlight the aspect of sexual rehabilitation and its importance for partners through the PLISSIT model in MS. As already mentioned, there is no specific treatment for SD in patients with MS however, the use of a multidisciplinary rehabilitation approach is one of the most important components of caring for these people [27]. In this study sexual satisfaction was assessed through the model of interpersonal exchange model of sexual satisfaction [54]. As a theoretical starting point it has the theory of social exchange [56], where relationships are governed by costs and benefits between its members and the theory of Interdependence in relationships [57] on which the model of investment and commitment was based [58].

From the analysis, it appeared that the intervention through the PLISSIT model had a positive effect on the variables of the model investigated. Regarding the prevalence and intensity of SD syptoms in MS patients, it was found that both sexes had high rates of SD and that there was a statistically significant difference between the two sexes in the occurrence of SD in all levels with men showing higher rates. This is in accordance with our previous studies done with Greek MS patients [1, 51] and it demonstrates the problem of SD in this population. The Intervention of the PLISSIT rehabilitation program in this population showed that there was an effect in SD symptoms especially in the intervention group. It seems that patients following the full intervention of PLISSIT lowered their SD symptoms rather than patients who only were in the counselling or control group.

Regarding the relational satisfaction as measured by GMREL [54], the analysis showed a primary effect of group of participants and all interactions were statistically significant. Generally, patients had higher levers of global relational satisfaction from caregivers especially at the second and third time of sampling with highest scores found for the intervention group compared to counselling group. Women patients found to have significantly less satisfaction and younger caregivers had lower satisfaction at all three time points. These results are similar with other studies done with chronically ill population. Kazemi, et al., [29] in their study with married women having MS evaluated the effect of the PLISSIT program on the sexual satisfaction and quality of life of these women, found similar results. In this study, the control group and the intervention group did not have statistically significant differences in their satisfaction with the relationship during the start-up phase of the study

(before the intervention) ($p > .05$), but two weeks later and 2 months after the intervention (evaluation times based on the design of the research) the overall level of quality of life (and therefore the satisfaction) in the intervention group was significantly better than that of the control group ($p < .05$).

Further investigation of the interaction between time and group of participants showed that within the groups, the second sampling time (10 weeks later) showed the greatest differences from the initial measurement and the final (6 months later) in all groups of participants ($p < .01$). This finding is in line with the aforementioned data on the PLISSIT, since as it has already been supported by its creator and then confirmed in research by applying the first three stages of the PLISSIT model, 80 to 90% of sexual problems can be solved [25, 59]. So, it seems that, the fact that people who took part in the study had the opportunity to discuss these issues and fill in the reference questionnaires regardless of whether they simply received psychoeducation through counselling or integrated interventions worked in favor of their general satisfaction with the relationship. Overall, it was shown that the intervention is more effective than simple counselling and patients benefit more than caregivers, especially after 10 weeks (second sampling).

Similar were the results regarding the effect of the intervention on sexual satisfaction. The results of the mixed ANCOVA showed a main effect of group of participants while the interaction of time and group of participants was found important. In addition, the main effect of the covariate of age was found to be significant. Younger caregivers had at all three times points lower sexual satisfaction than older participants especially in the first and the third time. Women patients had significantly less sexual satisfaction than men. These differences were found in all times of sampling with the greatest found in the second time point while the final measurement showed non-statistically different from the second. Within each time, it was found that the three groups of participants did not differ at the first time while at the second time of sampling the intervention group showed the highest score compared to the control group and from the counselling group. From that it can be concluded that intervention is more effective than simple counselling.

The above findings support the research hypothesis that greater sexual and relational satisfaction from the relationship will be recorded after the application of psychosexual intervention. Sexual dysfunction has been recognized as one of the important factors associated with sexual satisfaction. Previous studies mainly in Western countries have shown a significant relationship between a person's sexual function and their sexual satisfaction [60–63]. Similarly, there was a study based on individual data that investigated the association between sexual dysfunction and sexual satisfaction in Hong Kong [64]. Based on this assumption, one can conclude that a psychosexual rehabilitation program that would improve the sexual function of individuals would have beneficial effects on their sexual satisfaction. This finding argues that sexual satisfaction may predict relational satisfaction according to aforementioned theoretical model. Similar effects on sexual satisfaction and its effect on general relational satisfaction have been found in other studies that have been done in people suffering from MS. Valvano et al. [65] in their research found a statistically significant correlation between sexual satisfaction and relational satisfaction in MS patients in the US. Also, Mallory [66] in a meta-analysis of 93 studies on the dimensions of sexual satisfaction, sexual communication and relational satisfaction states that sexual communication between partners leads to greater sexual satisfaction which in turn increases the levels of general satisfaction with the relationship as has been supported by the model of interper-

sonal exchanges of sexual satisfaction [55]. The interaction between sexual satisfaction and relational satisfaction in people with MS was also pointed out by McCabe et al. [67] stating that in a study of hers in 2002 [68] she found that sexual satisfaction and satisfaction from the relationship were related and this relationship was statistically important in a sample of men with MS and that for female patients in the sample there were strong interactions between sexual dysfunction, sexual satisfaction and satisfaction from the relationship.

Similar findings exist in other studies claiming that the implementation of the PLISSIT psychosexual rehabilitation program leads to higher levels of sexual satisfaction and overall satisfaction [16, 25–27, 68, 69] not only in neurological patients but also in other conditions of chronic disease or disability [29, 35].

Limitations of Research

This study is the first of its kind in the Greek population and attempted to investigate a topic that only recently began to concern health professionals involved in the management of MS. Of course, as in every initial effort there were several issues in its design and limitations in its implementation.

A first limitation was that while an effort was made to represent as many areas of the country as possible and age groups in order to have safe conclusions of reference to the entire target population, this was not possible, since the registration was made in only two hospitals in mainland Greece excluding the participation of people from the islands, Western Greece and perhaps Thrace.

Another limitation is that the sample of participants was a convenience sample, since it was limited to patients of the two hospitals and to people who were approached by the local MS Societies. MS Societies provided information about the conduct of the study to their members but this was done only partially due to Covid-19 restrictions resulting in many cases in a difficulty of informing partners to participate. Also, the timing of the research coincided with the beginning of the pandemic from Covid-19, which made it quite difficult to record due to the two lockdowns and travel bans from county to county for both the researcher and the participants in the survey. As a result, there was a long delay in the admission of couples to research, especially in the area of Larissa, and in some cases the meetings with the couples took place online.

Moreover, the fact that participants did not enter the study at the same time, habituation, adjustment, and acclimatization to the problems of relationship and everyday life may have influenced scores.

Finally, it should be emphasized that the interpretation of the results is likely to be mitigated by the fact that direct comparisons with other studies are complicated by differences in research projects, methods, type and size of the populations under study, the measures applied and other factors. Comparisons of research results are difficult due to the multiplicity of measurement tools, due to conceptual differences and differences in design.

Conclusion

In this study, a documented picture of the situation is given in couples in Greece where one partner suffers from MS and the other simultaneously performs the duties of an informal caregiver, regarding the levels of sexual function, along with sexual and relational satisfaction.

The most important practical application of this study is the identification of the factors that lead to issues related to the sexual life, functioning and expression of people suffering from MS and their partners due to the disease and the provision of integrated solutions through a psychosexual rehabilitation program (PLISSIT) [28].

Of course, based on the fact that research is an active process, and each time improves understanding around a topic, future ones in that field could focus their attention on the following:

The longitudinal study of sexual satisfaction of patients and partners of MS patients seems to be scientifically challenging in order to highlight the possible effects of MS on sexual function and expression, on relationship, care and satisfaction. Studies related to the longitudinal burden of MS have studied other fields such as the evolution and acceptance of disability related to the existence of marriage or general support from the partner of the patient [70, 71] but not directly sexual function and burden or sexual satisfaction from the relationship/marriage.

The implementation of a psychosexual rehabilitation program such as PLISSIT in the Greek population needs further documentation and it would be advisable in future research to have data through the inclusion of population samples from diseases other than MS in order to draw conclusions about any variations depending on the type of condition of the partner and the particularities of the provision of solutions per disease. The research that has already been done for the implementation of sexual rehabilitation programs in various chronic diseases and disabilities advocates the provision of specialized proposals depending on the difficulties faced by people who are ill and their partners [16, 25–28, 68, 69, 72].

These proposals seem scientifically provocative but also very useful and interesting for the continuation of the scientific dialogue on issues that may arise around the issue of sexual rehabilitation but also the improvement of satisfaction in individuals and their partners who experience any chronic disease or disability.

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Declarations

Conflict of interest The authors have no conflicts of interest to disclose.

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