

Article

Resilience and Sense of Coherence among Female Fibromyalgia Patients Living in a Conflict Zone Who Underwent Fibrotherapy Intervention

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Abstract: Objective: This study sought to examine whether the sense of coherence (SoC) and resilience among female fibromyalgia (FM) patients increased after participation in a fibrotherapy intervention program (FTI) and whether SoC and resilience increased among female FM patients (FFMPs) exposed to security threats who changed their coping strategies to problem-oriented coping. Methods: Ninety-six FFMPs aged 19–75 enrolled in the FTI program led by Rabbi Firer in Sderot, Israel. The intervention program is divided into three stages, each comprising a distinct weekly treatment plan. The treatment plans encompass the following modalities: physiotherapy adapted to FM conditions, group therapy, hydrotherapy, horticultural therapy/cooking therapy, Pilates, pottery therapy, and kundalini yoga. Each stage spans a duration of 10 weeks, culminating in a total program duration of 30 weeks. Results: The findings show that after participating in FTI, the problem-orientation level of coping and health indicators, including functional ability and physiological scores (pre- and post-exertion), increased while psychological distress levels decreased. Overall, all the physiological scales measured before and after the FTI showed a significant improvement among the entire sample. FFMPs with problem-oriented strategies reported higher levels of SoC and resilience after participating in the FTI program. Conclusions: The FTI provided FFMPs with tools to understand the meaning of their disease and its management, whereas before they were preoccupied with the presence of the disease and its negative impact on their lives. The participation of FFMPs in the FTI leads to a perceptual change, the adoption of problem-oriented coping strategies, and the increased utilization of coping resources, namely, SoC and resilience. Problem-oriented coping combined with high SoC and resilience led FFMPs to adopt health strategies such as physical activity and other empowering activities that raised their physical and mental health indicators.

Keywords: fibromyalgia; fibrotherapy; sense of coherence; resilience; problem-oriented coping



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1. Introduction

Fibromyalgia (FM) is a complex condition characterized by chronic pain, fatigue, sleep disorders, cognitive impairments, and other somatic symptoms [1]. FM falls under the category of medically unexplained functional somatic syndromes and is considered a somatization disorder [2]. The exact classification of FM remains imprecise [2,3]. Individuals with FM experience widespread chronic pain throughout the musculoskeletal system [4] and often exhibit central physical sensitivity and persistent pain [5,6]. Chronic pain, which persists or recurs for over three months, is a primary feature of FM [7]. It is recognized as “chronic primary pain” and is considered a separate condition [8]. FM is associated with neurosensitivity and reduced conditioned pain modulation (CPM) [9]. The concept of nociplastic pain arises from the understanding that nociception changes within the

peripheral and central nervous system can lead to pain even without evidence of tissue damage or disease [10,11].

The prevalence of FM in the general population ranges from 0.2% to 6.6%, with higher rates among women (2.4–6.8%) [12]. The prevalence of FM symptoms among female teachers in Israel was 11.4%, significantly higher than the rate among male teachers (1.5%) [13]. While the exact etiology of FM remains unclear, trauma is recognized as a significant risk factor. FM patients commonly experience symptoms of post-traumatic stress disorder (PTSD) [14]. Early adverse experiences or prolonged traumatic stress in adulthood can affect the central nervous system circuits involved in pain regulation and stress response, potentially contributing to increased pain sensitivity in FM [15,16].

1.1. The Effect of Exposure to a Security Threat on FM Patients

This paper focuses on the coping strategies of female FM patients (FFMPs) who live in the Gaza Envelope in southern Israel, which is exposed to security threats. The effects of the security threats on residents in this region range from mild stress reactions to severe stress reactions, such as mood changes, hyper-arousal, anxiety, depression, and psychological distress, and somatic symptoms, such as muscular pain and symptoms of joint inflammation [17,18]. Ablin et al. [19] have found that there are more FM patients in the Gaza Strip than in other areas of the country and that the security threat has real physical consequences for FM patients. The diagnosis of FM is usually clinical, and doctors often treat the pain symptoms rather than the causes of the disease. FM patients' main challenge is managing the disease, and coping resources and strategies are essential issues [5,20].

1.2. The Salutogenic Theory

Salutogenesis, a term coined by Aaron Antonovsky [21], proposes that life experiences contribute to shaping one's SoC. Antonovsky's salutogenic theory suggests that developing a sense of coherence is a resilience factor in coping with stressful situations, reducing stress reactions, and maintaining physical and mental health against negative experiences. SoC is the central concept in the salutogenic model and is perceived as an internal coping resource that enables a person to cope positively with stress and maintain mental and physical health [22,23]. SoC provides the basis for mobilizing and activating coping resources, which is essential in promoting health and developing resistance and resilience [24]. Salutogenesis is a conceptual framework for studies investigating internal coping resources that enable individuals such as FFMPs to cope optimally with their syndrome [25].

1.3. Resilience

Resilience is a multifaceted construct that encompasses various psychological and social dimensions. It has been recognized as a pivotal concept in human development and developmental psychopathology [26]. Resilience is characterized by positive adaptation patterns in the face of adversity and stressful life events [27,28]. Its conceptualization is grounded in the notion that individuals can withstand the impact of significant risk factors and adverse experiences without suffering from detrimental outcomes or deviating from their expected developmental trajectory [29]. Furthermore, resilience implies that individuals can recover and return to their prior level of functioning, with or without external support, following a setback or developmental crisis.

1.4. Coping Strategies in Stressful Situations

Coping involves cognitive and behavioral efforts to manage or tolerate internal or external demands caused by a stressful event or situation. Coping strategies are influenced by an individual's appraisal of a situation as a threat or challenge and the perception of internal and external resources [30,31]. The study focuses on three coping strategies: problem-oriented coping, emotion-oriented coping, and avoidant coping. Problem-oriented coping aims to solve or change the source of the stress and includes coping planning and actions to manage the situation. Emotion-oriented coping is maladaptive and can lead to

mental health problems. In contrast, avoidant coping involves disengagement behavior and denial [32]—internal resources such as a sense of coherence (SoC) and resilience influence coping strategies. Positive health outcomes were associated with problem-oriented coping, while negative health outcomes were linked with emotion-oriented and avoidant coping strategies [33,34].

We posit that an intervention program has the potential to enhance focused coping mechanisms in dealing with challenges in FFMPs. Following recent studies that have found the potential for promoting resilience [35–37] and a sense of coherence [38,39] through intervention programs, we aimed to investigate whether a specialized intervention program tailored for FFMPs would impact their coping patterns, thereby enhancing resilience and SoC in the face of the challenges experienced by these patients. In the current study, we have chosen to concentrate on the fibrotherapy intervention program (FTI) which was developed at the Ezra Le'Marpe (Help for Healing) Rehabilitation Medical Center, headed by Rabbi Avraham Elimelech Firer. The program helps FFMPs through holistic body and mind treatment. It combines physical therapy, Pilates, hydrotherapy, emotional response in therapeutic groups, gardening, cooking therapy, and a ceramics workshop that summarizes the process that FFMPs go through.

From this, the following hypotheses have emerged:

The study hypotheses

H1: *Following the FTI program, a positive relationship will be found between problem-focused coping and the SoC, so a high tendency to use a problem-focused coping strategy will be expressed in an increasing SoC.*

H2: *Following the FTI program, a negative relationship will be found between the SoC and the level of symptoms of the disease; the higher the SoC, the less the psychological distress, the physiological indices (increase in endurance), and the functional difficulty.*

H3: *Following the FTI program, a positive relationship will be found between problem-focused coping and resilience, so a high tendency to use a problem-focused coping strategy will increase resilience.*

H4: *Following the FTI program, a negative relationship will be found between resilience and the level of symptoms of the disease; the higher the resilience, the less the psychological distress, the physiological indices (increase in endurance), and the functional difficulty.*

2. Materials and Methods

A total of 96 female FM patients aged 19–75 residing in the Gaza Envelope area who received fibrotherapy intervention at the Medical Rehabilitation Center Ezra Le'Marpe in 2020 were recruited to participate in the study. The socio-demographic characteristics of the sample are presented in Table 1. To be eligible for the study, participants needed to meet the following criteria: (1) medical diagnosis by a physician of FM for at least one year; (2) age between 19 and 75; (3) Jewish women who speak Hebrew to minimize the potential for data bias resulting from language and cultural differences; and (4) due to confidentiality and accessibility issues, it was more realistic to approach patients who were treated at the Ezra Le'Marpe Rehabilitation Medical Center. The sample was selected based on convenience, and the data collection process was concluded after reaching 100 subjects.

All methods were performed in accordance with the relevant guidelines and regulations. We confirm that all experimental protocols have been approved by an institutional and/or licensing committee on behalf of the Ariel University Ethics Committee. Informed consent was obtained from all subjects.

Table 1. Socio-demographic characteristics of the study sample ($n = 96$).

Variable	Values	<i>n</i>	%	M	SD	Range
Marital status	Single	9	9.4			
	Married	69	71.9			
	Divorced/separated	15	15.6			
	Widow	3	3.1			
Religious affiliation	Secular	33	34.4			
	Traditional	29	30.2			
	Religious	24	25			
	Orthodox	10	10.4			
Residence	City/town	65	67.7			
	Community village	2	2.1			
	Rural village	21	21.9			
	Kibbutz	7	7.3			
	Other	1	1			
Age				53.03	13.08	19–75
Years since diagnosis				7.94	6.34	1–30
Number of children				3.55	2.01	0–10

2.1. Tools

The quantitative data collection process was carried out in two stages: at the beginning and end. At each stage, we distributed 96 questionnaires (a total of 192 questionnaires).

2.2. Socio-Demographic Data

The questionnaires included socio-demographic variables: age, socio-economic status, religious belief, and degree of proximity to the Gaza Strip. In addition, the questionnaires included the number of years since the diagnosis of FM.

2.3. Brief COPE

The Brief COPE [40] questionnaire was designed to examine coping tendencies. The reliability measures in similar studies were as follows: problem-oriented $\alpha = 0.85$; emotion-oriented $\alpha = 0.67$; avoidance $\alpha = 0.65$ [41].

2.4. Sense of Coherence Scale

The SoC questionnaire [22] was administered in its abbreviated version with 13 items with predictive validity [26]. The reliability in similar studies was $\alpha = 0.85$ [42].

2.5. CD-RISC-10 Scale

The original Connor–Davidson [28] resilience scale was shortened to 10 items by Campbell-Sills and Stein [43]. The internal reliability of the original Connor–Davidson study was $\alpha = 0.89$.

2.6. Health Survey (SF-36)

The SF-36 questionnaire was tested and validated by Lewin-Epstein et al. [44], with the Cronbach's alpha coefficient of its dimensions ranging from 0.76 to 0.93.

2.7. The Scale of Psychological Distress

The questionnaire was developed initially by Ben-Sira [45], with a shortened version of the questionnaire adapted by Sagy and Dotan [46]. The questionnaire contains five items from the Langer index [47] to measure psychological balance. The reliability in similar studies was $\alpha = 0.75$.

2.8. Exposure to Stressful Events

The five-item questionnaire was designed to build an index of the level of exposure by combining the items [42].

2.9. Fibromyalgia Impact Questionnaire—Revised (FIQR)

The FIQR questionnaire examined FM symptoms. A previous study revealed a reliability of $\alpha = 0.95$ [48].

2.10. The 6MW Test

The primary variable measured is the total distance the FMP walked. The 6MW test provides information that may better measure a patient's ability to perform daily activities as a correlate of standard quality of life [49].

2.11. Intervention Program: The Fibrotherapy Model

Table 2 describes the FTI, which is carried out in three rounds of 10 weeks each, and at each stage, the patient receives a different set of 3 therapy sessions per week (for a total of 30 weeks).

Table 2. The FTI program.

Stage	Activity	Duration (min)
Stage 1 (10 weeks)	Physiotherapy adapted to FM conditions ¹	60
	Group therapy	60
	Hydrotherapy ²	30
Stage 2 (10 weeks)	Horticultural therapy/cooking therapy	60
	Hydrotherapy	30
	Pilates	60
Stage 3 (10 weeks)	Pottery therapy	90
	Hydrotherapy	30
	Kundalini yoga ³	60

¹ The physiotherapy sessions were based on tailored physical exercises for fibromyalgia, encompassing activities aimed at alleviating pain and promoting proper functionality (sitting and standing) to mitigate discomfort.

² Hydrotherapy is a form of physiotherapy conducted in water. Due to the water's temperature being maintained at 34 °C coupled with the advantages of physical exertion in water (buoyancy), some women exhibited a higher capacity to perform exercises with greater intensity in water compared to on land. ³ While there is no conclusive scientific evidence to suggest that kundalini yoga is specifically better for women who suffer from pain compared to other types of yoga, some practitioners and proponents of kundalini yoga believe that it can be beneficial for women [50]. Kundalini yoga places a significant emphasis on various breathing techniques (pranayama). Proper breathing can have a calming effect on the nervous system and may contribute to pain management and stress reduction [51].

2.12. Data Analysis

The data obtained from the questionnaires were coded in SPSS software. The testing of the hypotheses was first carried out through correlations by Pearson tests regarding the research variables among the entire sample. Later, regressions were conducted for each of the dependent variables. Subjects who did not respond to certain variables were not included in the analyses referring to these variables.

3. Results

Table 3 presents the change levels of coping patterns, problem-oriented patterns, psychological distress, functional ability, physiological scales, and SoC after the intervention program.

Table 3. Mean differences in SoC before and after FTI according to the level of change in coping patterns ($n = 96$).

	SoC before FTI ($n = 96$)		SoC after FTI ($n = 96$)		t (df)
	M	SD	M	SD	
Did not use problem-oriented strategies	4.04	0.78	4.07	0.63	194.0 –39
Used problem-oriented strategies	4.12	1.49	4.43	1.18	2.463 –55

The distribution of change levels of coping patterns after the intervention program, which was published previously by the authors of this paper [52,53], shows that before and after the intervention, about two-thirds consistently used problem-oriented coping and one-third shifted from avoidant or emotion-oriented coping to problem-oriented coping after the program. Those who used problem-oriented coping showed reduced psychological distress post-intervention, and their health-related quality of life notably improved. Participants who did not employ problem-oriented coping did not significantly reduce psychological distress, and no notable improvement in health-related quality of life was found. All the participants showed an increase in a distance scale pre-exertion. Findings also showed mixed changes in physiological scales, with some decreases and increases post-intervention. Overall, problem-oriented coping was associated with positive changes in psychological distress, functional ability, and some physiological measures post-intervention. In contrast, non-problem-oriented coping showed mixed results in these areas.

The mean differences in SoC before and after FTI according to the level of change in coping patterns, which were published previously by the authors of this paper [53], are presented in Table 3. The findings supported our second hypothesis and showed a significant difference in the level of SoC resilience among problem-oriented FFMPs before and after participating in FTI ($t(55) = 2.46, p = 0.02$), as this group reported a higher level of SoC following FTI. There was no significant difference in the level of SoC before and after participating in FTI among FFMPs who did not use problem-oriented coping [53].

Analysis of the distribution of resilience data before and after participation in FTI among problem-oriented FFMPs showed a significant improvement in the level of resilience among problem-oriented FFMPs ($t(55) = 9.38, p < 0.001$), as this group reported a higher level of resilience following FTI ($M = 2.96, SD = 0.50$) compared to the level of resilience before participating in FTI ($M = 2.04, SD = 0.58$). The extent of the effect between the two measurement dates was high (Cohen's $d = 1.68$) [54] (Figure 1).

Analysis of the distribution of resilience data before and after participation in FTI among FFMPs who did not use problem-oriented coping showed a significant improvement in levels of resilience ($t(39) = 5.05, p < 0.001$), as this group reported a higher level of resilience following FTI ($M = 2.82, SD = 0.74$) compared to the level of resilience before participating in FTI ($M = 2.02, SD = 0.62$). The extent of the effect between the two measurement dates was high (Cohen's $d = 1.16$) [54] (Figure 2). We found that participation in FTI improved the level of resilience among the study subjects, problem-oriented and non-problem-oriented FFMPs. However, the effect size index significantly improved among problem-oriented FFMPs. Hence, our third hypothesis was confirmed.

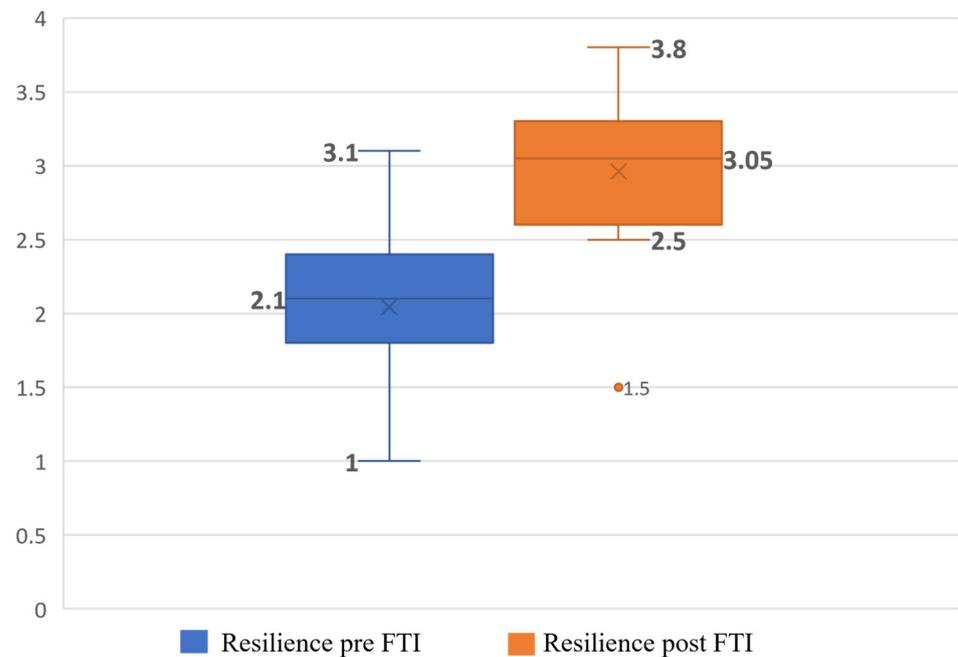


Figure 1. Distribution of resilience data before and after participation in FTI among problem-oriented FFMPs.

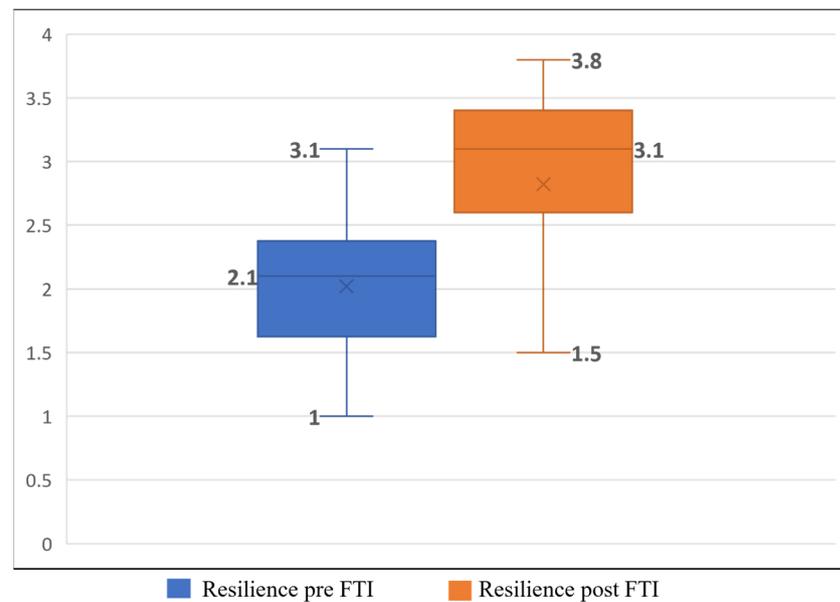


Figure 2. Distribution of resilience data before and after participation in FTI among FFMPs who could be more problem-oriented.

4. Discussion

This paper examined how coping strategies affect the SoC and resilience levels among FFMPs under a prolonged security threat after participating in the FTI program. research [52,53] also established a link between stressful situations, such as security threats, and intensified FM symptoms. Qualitative findings from elaborate research by the authors of this paper [54–56] revealed physical conditions among FFMPs under security threats that included pain and stiffness during sirens to the point of entering a state of physical paralysis for hours after the threat had passed. Findings from these studies suggest that FFMPs transitioning from emotion-oriented or avoidance coping to problem-oriented strategies during FTI demonstrated significant improvement.

The secondary outcomes of our study show that problem-oriented coping involves adapting to stressors by modifying difficulties due to chronic illness, leading to a better quality of life.

Previous analyses [54–56] revealed that participation in FTI group therapy fostered attitude changes, transforming feelings of isolation into shared experiences and common goals among FFMPs. This shift from individual coping to collective participation led to increased optimism and a more assertive approach to managing the disease. In addition, problem-oriented coping post-FTI correlated with reduced psychological distress, improved physiological measures, and enhanced functional ability, indicating comprehensive health enhancement. According to Paterson [57], the perception of reality provides the basis for the way people with chronic illness interpret and cope with their illness. Most treatments for FM patients address pain, imbalance, and sleep disorders. However, a few studies proposed to follow a program for resilience and sense of coherence among patients [58,59].

Patients who have developed or use problem-oriented coping patterns use what Antonovsky [22,25] called “generalized resistance resources” (GRRs), that is, the qualities or resources that provide support and assistance in coping with daily stressors. According to Shing et al. [60], one major factor contributing to resilience is harnessing positive emotions, even during a difficult or stressful time. Positivity improves resilience in two main ways. First, positive emotions help construct social, psychological, and physical resources over time and develop coping skills for future times of stress. Second, according to Fredrickson’s broaden-and-build theory [61], positive emotions can help people expand their thoughts, actions, and attention to the moments around them. Our data show that the level of mental resilience of the FFMPs increased following their participation in the FTI. This finding has great significance since “resilience” combines flexibility and the ability to return to life with elements related to accepting and adapting to change and coping with the consequences of FM. The more a person adapts, the higher their resilience level, allowing them to cope better with stressful situations [62].

Our analysis revealed increased mental resilience among FFMPs following FTI participation, highlighting the significance of positivity and adaptability in coping with FM consequences. Problem-oriented coping led to higher levels of improvement, emphasizing the acquisition of coping resources and engagement in various proactive actions to manage FM. Contrary to Antonovsky’s [21] claim that SoC develops between childhood and age 30 and is less likely to change after that, as can be established from previous studies [63,64], our data indicate that SoC increased following the FTI program.

The study’s primary focus was on how coping strategies, particularly problem-oriented coping, influenced SoC, resilience, and overall health outcomes among FFMPs in the context of prolonged security threats. The findings indicated substantial improvements across various health indicators post-FTI, particularly among those who adopted problem-oriented coping strategies.

5. Conclusions

The study highlighted the immense impact of FFMPs’ participation in FTI on transforming coping strategies. It notably shifted many women from disease preoccupation to active disease management. Through shared experiences in the program, FFMPs adopted problem-oriented coping, engaging in actions like physical exercises to enhance their quality of life despite the enigmatic nature of FM. Despite FM remaining a complex condition without definitive causes or diagnostic tests, our research demonstrated that FTI participation improved health. Emotional engagement during the program allowed participants to explore, discuss, and accept their condition, suggesting the scope for intervention programs to empower FFMPs and foster problem-oriented coping.

Moreover, participation in FTI enabled FFMPs to comprehend the disease’s significance, manage it effectively, and enhance their SoC. While empirical changes in SoC were lower than anticipated post-FTI, qualitative insights revealed substantial cognitive and behavioral shifts, emphasizing meaningfulness, understanding, and management of FM.

This suggests the importance of comprehensively considering both emotional perceptions and empirical data in understanding chronic diseases.

Additionally, the study concluded that problem-oriented coping strategies facilitated the acquisition of resilience among participants. Facing and coping with challenges using this strategy reflected mental flexibility, aiding individuals in rebounding from setbacks and confronting life's adversities. Furthermore, the research emphasized the pivotal role of physical activity in coping with FM symptoms, and engaging in purposeful physical activity, driven by the desire to manage the condition, notably improved health indicators despite the pervasive musculoskeletal pain experienced by FFMPs.

6. Limitations

The study included only female participants; thus, the results may not be generalized to male FM patients or patients from different cultural backgrounds. The study did not include a control group, making it difficult to determine whether the observed improvements were due to the intervention program or other factors.

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Data Availability Statement: The data supporting the findings of this study are available from the Ethics Committee of Ariel University. However, there are restrictions on the availability of these data, which were used under license for the current study and are therefore not publicly available. However, the data are available from the authors upon reasonable request and with the approval of the ethics committee. Also, some of the data form a basis for further research.

Conflicts of Interest: The authors declare no conflicts of interest.

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