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Traumatic Experiences and Somatoform Dissociation in Women with Fibromyalgia

Annunziata Romeo[a], Valentina Tesio[a*], Ada Ghiggia[a], Marialaura Di Tella[a], Giuliano Carlo Geminiani[a, b], Benedetto Farina[c], Lorys Castelli[a]

[a]Department of Psychology, University of Turin, Turin, Italy

[b]'Città della Salute e della Scienza' Hospital, Turin, Italy

[c] Universita` Europea di Roma, School of Psychology, Rome, Italy

*Corresponding author

Valentina Tesio, Department of Psychology, University of Turin,

Via Verdi 10, 10123 Turin, Italy

E-mail: valentina.tesio@unito.it

Abstract

Objective: Psychological factors like traumatic life events seem to affect the etiopathogenesis and the exacerbation of fibromyalgia (FM), a chronic widespread musculoskeletal pain syndrome. This study investigated the prevalence of traumatic events, with a particular attention to the whole life span, and both psychoform and somatoform dissociation in patients with FM, compared to healthy controls (HC). In addition, the possible effects of traumatic events and dissociative experiences on FM symptoms have been analyzed.

Method: Traumatic experiences, dissociative symptoms, and psychological distress were assessed in 99 consecutive patients with FM and 107 healthy women. Student t-tests for two independent samples were used to determine differences between the FM and HC groups. A hierarchical multiple regression analysis was used to explore the possible contribution of trauma and dissociation to FM symptoms.

Results: Results revealed that the levels of both somatoform and psychoform dissociation were higher among patients with FM than HC ($p < .001$). Moreover, patients with FM experienced significantly more negative life events than HC ($p < .001$). Finally, the data suggested that the severity of FM disabilities was significantly predicted by the presence of depressive symptoms, somatoform dissociation, cumulative trauma, and educational level. The final model explained 40% of the variance.

Conclusions: Results suggest that the construct of somatoform dissociation could serve as a useful framework to improve our understanding of FM symptoms, and stressed the importance of evaluating the effects of multiple traumas in cumulative form because this has substantial implications for the evaluation and treatment of patients.

Clinical Impact Statement

The present study suggests that the presence of cumulative trauma and somatoform dissociation seem to have a relevant and direct impact on the severity of FM symptoms. These results stressed the importance of evaluating the effects of multiple traumas in cumulative form because this pattern characterizes the experiences of the majority of patients with FM. The presence of cumulative trauma and somatoform dissociation should be considered a worse prognostic factor that requires clinical caution and specific therapeutic strategies associated with more conventional therapies in patients with FM.

Key words: Fibromyalgia; trauma; somatoform dissociation; psychoform dissociation; psychological distress.

Introduction

Fibromyalgia (FM) is a chronic syndrome characterized by widespread musculoskeletal pain associated with fatigue, nonrestorative sleep, and cognitive deficits (Wolfe et al., 2016) with high incidence among women (Branco et al., 2010). Patients with FM also show high levels of anxiety and depressive symptoms (Di Tella et al. 2017; Tesio et al., 2018).

The etiopathogenesis of FM syndrome is largely unknown, and researchers have proposed a biopsychosocial model of interacting variables that can activate and exacerbate FM symptoms (Sommer et al., 2012). Among the environmental factors, psychological factors like stressful life events have been considered (Nakamura et al., 2014).

Trauma and major life stress are unlikely to cause fibromyalgia per se. In genetically susceptible persons, it is likely that early trauma and prolonged stress in adulthood will influence brain modulatory circuitry of both pain and emotions (Crofford, 2007; Schweinhardt et al., 2008) which could explain the increased pain responses and symptoms of patients with FM. Traumatic events have been shown to influence pain severity (Bote et al., 2013). Moreover, it is well known that trauma may lead to a disruption in the normal integration of different mental functions, such as consciousness, sense of self identity, emotive perception and control, behavioral control, body representation, and certain movements that form a set of disturbances better known as "dissociation" (American Psychiatric Association, 2013, p. 291). According to the ways in which dissociative symptoms may manifest, they have been classified as psychoform dissociation (dissociative amnesia, depersonalization, derealization, and fragmentation of identity) and somatoform dissociation, which includes symptoms that are manifestations of a disruption of normal integration of bodily functions, sensations, and movement. Thus, somatoform dissociation includes dissociative symptoms that phenomenologically involve the body and are related to the sensory and motor components of experiences, such as hearing, feeling, seeing, speaking,

and moving, including conversion symptoms (Ninjenhuis et al., 1996). Specifically, Ninjenhuis (2001) distinguishes these somatic symptoms in negative dissociative symptoms (like anesthesia, analgesia, and motor inhibitions), and positive dissociative symptoms (like localized pain, and alternation of taste and smell preferences/aversions), emphasizing a clear similarity with the 19th century symptoms of hysteria. Moreover, somatoform symptoms can be considered somatic consequences of traumatization, in other words, a sensorimotor organization of traumatic memories (Van Der Kolk, 1994).

Psychoform and somatoform dissociation are highly correlated in both clinical (Nijenhuis, 2009; MacPhee, 2013) and nonclinical samples (Maaranen et al., 2005; Farina et al., 2011a), thereby suggesting that these types of dissociation are overlying but not the same manifestations of a common process. High levels of both psychoform and somatoform dissociative symptoms are well-known components of clinical populations affected by medical unexplained symptoms (MUS) (Ross et al., 1989; Saxe et al., 1994; Brown, et al., 2005). Recently, researchers have also found high levels of dissociative symptoms in conversion disorder (Espirito-Santo and Pio-Abreu, 2009; Dar and Hasan, 2018), in youth with psychogenic non-epileptic seizures (Myers et al., 2019), in psychogenic female sexual dysfunctions (Farina et al., 2011b), and in rheumatic disorders, including FM (Leavitt and Kratz, 2003; Näring, et al., 2007; Bohn et al., 2013; Berkol et al., 2017). However, previous studies on patients with FM mainly focused on psychoform dissociation (Leavitt et al., 2002; Leavitt and Kratz, 2003; Berkol et al., 2017; Duarte et al., 2019) and, to the best of our knowledge, only one investigated simultaneously both dissociation experiences (Kilic et al., 2014). Furthermore, those studies that focused on the possible association between trauma and somatoform dissociation in FM have been limited to childhood trauma (Näring, et al., 2007; Bohn et al., 2013), despite the evidence of a high presence of traumatic and stressful life events during the whole lifetime of patients with FM.

For these reasons, going further with previous studies, the aims of the current study were to investigate (1) the prevalence of traumatic events, with a particular attention to the whole life span, and (2) the presence of both psychoform and somatoform dissociative experiences in a sample of patients with FM, compared to a pain-free healthy control group (HC). In addition, we evaluated (3) the effects of traumatic events, dividing them into childhood, adult, and cumulative trauma, as well as the effect of dissociative experiences (both somatoform and psychoform dissociation) on FM symptoms. Based on a literature review, we hypothesized that the presence of trauma and dissociative symptoms could negatively influence the FM symptoms. Moreover, we speculated that somatoform dissociation could be more impactful on FM symptoms than psychoform dissociation.

Materials and Methods

Participants and procedure

Ninety-nine consecutive patients with fibromyalgia (FM) in the Città della Salute e della Scienza Hospital, University of Turin, agreed to participate in the study between September 2016 and January 2018. All of the recruited participants were patients in the Fibromyalgia Integrated Outpatient Unit, a multidisciplinary unit based on the collaboration between rheumatologists, psychologists and psychiatrists. Due to the high prevalence of FM in women and the decision to exclude sex-related effects, only women were enrolled in the study. The FM diagnoses of all patients were made by an expert rheumatologist according to the diagnostic criteria of the American College of Rheumatology (Wolfe et al., 2010). These criteria include the presence of chronic widespread pain (CWP) for >3 months and the evaluation of the severity of two other main measures: the widespread pain index (WPI) and the symptom severity scale (SSS). The WPI comprises 19 areas of the body and the patient has to indicate in which he/she had pain in the past week, whereas the SSS score is

determined considering the severity of fatigue, unrefreshing sleep, cognitive manifestations and somatic symptoms. The exclusion criteria were as follows: patients < 18 years of age, low educational level (< 5 years of education), lack of Italian language fluency, and the presence or previous history of a neurological or severe psychiatric disorder. During a separate session, subjects completed psychological scales after clinical and psychological interviews that assessed sociodemographic and clinical characteristics.

As the HC group, 107 healthy women that were balanced for age and educational level also participated between September 2016 and January 2018. Healthy voluntary women were enrolled from different social and cultural backgrounds in a community sample in Turin. Participants filled in paper-and-pencil versions of the questionnaires, during a face-to-face meeting. In addition to the aforementioned exclusion criteria, subjects in the HC group also had no history of rheumatologic pathologies or chronic pain. The ethic committee of the hospital approved the study that was conducted in accordance with the Declaration of Helsinki. All patients provided written informed consent.

Measures

Sociodemographic and clinical information

Participants were asked to provide sociodemographic (i.e., age, educational level, marital status, and occupation) and clinical information (i.e., duration and severity of illness).

Fibromyalgia-related symptoms

The severity of disabilities resulting from FM was evaluated using the Italian version of the Revised Fibromyalgia Impact Questionnaire (FIQ-R; Bennett et al., 2009; Salaffi et al., 2013). The FIQ-R comprises 21 items, each of which requires responses to be recorded on an 11-point rating scale. The higher total score indicates greater impact of the condition. The item that assessed the average intensity of pain experienced by the respondent during the past week

was used as the pain intensity measure. The FIQ-R has demonstrated good concurrent validity, test-retest reliability, and internal consistency with Cronbach's $\alpha = 0.94$–0.95 (Bennett et al., 2009; Salaffi et al., 2013).

Trauma

The Traumatic Experiences Checklist (TEC) is a retrospective self-report questionnaire that investigates about 29 types of potential trauma, including criterion A events of post-traumatic stress disorder (PTSD) and other potentially overwhelming events: loss of significant others; life threatening disease or assault, war experience, emotional neglect, emotional abuse, physical abuse, sexual harassment, and sexual trauma (Nijenhuis et al., 1998b; 2002). The TEC total score is the sum of events experienced by each subject to date. Based on our interest in treating adult, childhood, and cumulative trauma separately, from the TEC total scores we calculated three additional indices: "Adult trauma" including only traumatic events occurring after the age of 18, "Childhood trauma" including only traumatic events up to the age of 18, and "Cumulative trauma" in order to include all traumatic experiences that occurred before the age of 18 and continued into adulthood. Furthermore, for each trauma type, patients indicated their age in years when the experience occurred or the period when it continued, as appropriate. They also reported the level of impact that each event still has on their present life on 5-point scales ranging from "not at all" to "very serious." The TEC total trauma composite score indicates the global severity score, thereby representing the severity of maltreatment in childhood until the age of 18. The TEC total trauma composite score ranged from 0–69, with higher scores representing more severe maltreatment. A slightly extended version of the TEC was shown to have good psychometric properties: good concurrent validity, test-retest reliability, and internal consistency with Cronbach's $\alpha = 0.86$-0.90 (Nijenhuis et al., 2002).

Dissociative experiences

Somatoform dissociative symptoms were measured using the Somatoform Dissociation Questionnaire (SDQ-20; Nijenhuis, et al. 1996), a 20-item questionnaire that includes the negative symptoms of anesthesia, analgesia, and motor inhibitions, as well as the positive symptoms of localized pain and the alternation of taste and smell preferences/aversions. Five-point scales are used to indicate the degree to which the statements apply. The total score ranges from 20 to 100. A score ≥ 35 indicates a possible dissociative disorder. The reliability of the scale is high, the construct validity is good, and the internal consistency of the SDQ-20 was excellent with Cronbach's $\alpha = 0.96$ (Nijenhuis et al., 1998a).

Psychoform dissociative symptoms were measured using the Dissociative Experiences Scale II (DES-II; Carlson & Putnam, 1993), a 28-item self-report measure of dissociative experiences (e.g., emotional involvement, depersonalization, derealization, compartmentalization, and amnesia). The items assess the percentage of time that individuals experience these symptoms. The overall score of the DES-II is the average score of the 28 items and ranges from 0% to 100%. A score ≥ 30 indicates a possible dissociative disorder. We used the Italian translation of the DES-II (Schimmenti, 2016). The psychometric properties of the DES-II are good with, good test-retest reliability, good convergent validity, and excellent internal consistency with Cronbach's $\alpha = 0.94$ (Schimmenti, 2016).

Psychological distress

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; Costantini et al., 1999; Castelli et al. 2009) is a self-report instrument used to assess depression and anxiety symptoms. It comprises 14 items that represent two subscales: anxiety (HADS-A) and depression (HADS-D). Each subscale has 7 items, and the response to each item is recorded on scales ranging from 0 to 3 yielding a total composite score range of 0–21. Scores of 8 or higher are indicative of clinically significant levels of depression or anxiety symptoms. The

HADS has demonstrated good concurrent validity, test-retest reliability, and internal consistency with Cronbach's α = 0.82–0.90 (Bjelland et al., 2002).

Statistical analyses

Student t-tests for two independent samples and χ^2 tests were used to determine whether there were any differences in the demographic and psychological variables between the FM and HC groups, and Cohen's d was used to assess effect sizes. Pearson correlations were used to analyze the relationship between demographic, clinical, and psychological variables. A hierarchical multiple regression analysis was used to investigate whether traumatic experiences and dissociative symptoms were significant contributing factors for the explanation of FM-related symptoms while controlling for other potentially confounding and competing predictor constructs. The FIQ-R total score was used as a dependent variable. Given the exploratory nature of the study, competing predictors (depressive and anxiety symptoms) were entered into the regression model after the predictor groups. A stepwise method was used. To avoid unnecessary reductions in statistical power, competing predictor variables were included in the regression models only when they were significantly correlated with the dependent variables. Collinearity was assessed using the statistical factors of tolerance and the variance inflation factor. All analyses were performed using the Statistical Package for Social Sciences version 25 (SPSS-25). P-values < 0.05 were considered statistically significant.

Results

Sociodemographic and clinical data

The sociodemographic and clinical characteristics of patients with FM and HC are presented in Table 1. Results of the *t*-tests displayed for patients with FM and HC were balanced for age and educational level. Regarding the clinical characteristics of the FM group, patients had

their illness for an average of 8 years. They reported high levels of pain intensity (FIQ-R

Pain: 7.55 ± 1.85) and moderate/high levels of disability severity (FIQ-R TOT: 64.19 ±

17.67).

Traumatic experiences, dissociative symptoms and psychological distress

Regarding traumatic experiences, the *t*-tests analyses showed that patients with FM obtained

significantly higher levels in the TEC total trauma composite score ($p < .001$, $d = 0.961$), TEC

total score ($p < .001$, $d = 1.156$), TEC impact of trauma ($p < .001$, $d = 1.211$), TEC adult

trauma ($p < .001$, $d = 0.582$), TEC childhood trauma ($p < .001$, $d = 0.707$), and TEC

cumulative trauma ($p < .001$, $d = 0.774$) scores compared to the HC group (Table 2). Further,

regarding dissociative symptoms, patients with FM obtained higher scores compared to HC

on DES-II ($p < .001$, $d = 0.827$) and SDQ-20 ($p < .001$, $d = 0.616$) that represent psychoform

and somatoform dissociation, respectively (Table 2). Specifically, 18.2% of patients with FM

showed clinically significant levels of psychoform dissociation (DES-II > 30), and 48.5%

showed clinically significant levels of somatoform dissociation (SDQ-20 > 35). In contrast,

1.9% of HC showed clinically significant levels of psychoform dissociation (DES-II > 30),

and 2.8% showed clinically significant levels of somatoform dissociation (SDQ-20 > 35).

Finally, regarding psychological distress, patients with FM obtained significantly higher

scores on the anxiety ($p < .001$, $d = 1.172$) and depression ($p < .001$, $d = 1.146$) subscales of

the HADS compared to HC (Table 2). Specifically, 65% of patients with FM showed

clinically significant levels of depression (HADS-D > 8), and 74% showed clinically

significant levels of anxiety (HADS-A > 8).

Correlations

Results of the bivariate correlations are presented in Table 3. The FIQ-R total score was

significantly associated with both HADS-D ($p < .001$) and HADS-A ($p < .001$) scores and it

was significantly and positive associated with cumulative trauma (TEC_CuT; p =.026), DES-II (p = .011), and SDQ-20 (p < .001) scores.

Concerning trauma, the TEC total score (p =.003), childhood trauma (TEC_CT; p =.004), and the impact of trauma (TEC_I; p =.004) were significantly associated with SDQ-20. Moreover, we found that adult trauma (TEC_AT; p =.003) and impact of trauma (TEC_I; p =.047) were significantly associated with DES-II.

Finally, DES-II scores were significantly and positive associated with both HADS-D (p =.002) and HADS-A (p =.003) scores. We also found significant and positive correlations between SDQ-20 scores and both HADS-D (p =.044) and HADS-A (p < .001) scores.

Hierarchical multiple regression

A hierarchical multiple regression analysis was run to explore the relative contributions of traumatic events and dissociative experiences on the FIQ-R total score (Table 6). Educational level was included in the regression analyses in the first regression block and it negatively predicted the dependent variable (β = -.243, p = .016). Regarding trauma, only the cumulative trauma subscale of TEC correlated with the dependent variable. When it was entered into the second block, it significantly predicted the dependent variable (β = .248, p = .004). When dissociation variables were entered into the third block, somatoform dissociation significantly predicted the dependent variable (β = .331, p < .001), while psychoform dissociation did not. Somatoform dissociation, cumulative trauma, and educational level continued to be significant predictive factors even when competing predictors were added in the fourth block with the stepwise method. The final model explained 40% of the variance of FIQ-R total scores (F(4,92) = 15.28, p < .001). Depressive symptoms appeared to be the strongest contributor (β = .405, p < .001) followed by cumulative trauma (β = .260, p =.002), SDQ-20 (β = .255, p =.003), and educational level (β = -.200, p =.019). Psychoform dissociation and anxiety symptoms did not significantly contribute to the explanation of the FM symptoms.

Discussion

The present study aimed to investigate the role of traumatic events and dissociative symptoms on FM symptomatology. In particular, to fill the gap in the literature, we investigated the prevalence of traumatic events, paying particular attention to the whole life span, the prevalence of both psychoform and somatoform dissociative experiences, and the prevalence of psychological distress (depressive and anxiety symptoms) in a sample of patients with FM, compared to a pain-free HC group.

Our results, in line with previous studies (Berkol et al., 2017; Duarte et al., 2019) revealed that the levels of psychoform dissociation were higher among patients with FM than HC. Our results also showed that the level of somatoform dissociation, often neglected in previous studies, was higher among patients with FM than HC.

Indeed, to our knowledge, no studies have explored the level of somatoform dissociation of patients with FM compared to a control group. Nonetheless, a previous study found higher rates of somatoform dissociative symptoms in patients with FM, compared to patients with rheumatoid arthritis (RA; Näring et al., 2007), and a previous one inquired the possible relationships between childhood trauma, anger, psychoform and somatoform dissociation, and depressive phenomena among patients with fibromyalgia or rheumatoid arthritis (Kilic et al., 2014). As for traumatic events, in accordance with previous studies (Anderberg et al., 2000; Hauser et al.,2011), our results reveal that patients with FM reported more frequent traumatic events during childhood than HC women and they reported greater impact of trauma. Furthermore, our data showed that patients with FM experienced significantly more negative life events than healthy women also in adulthood. In addition, our results reveal that the amount of cumulative trauma—referring to multiple traumas extended from childhood to adulthood—was higher among patients with FM than HC. Individuals with previous trauma history were more likely to experience several episodes of traumatic experiences rather than a

single traumatic exposure (Kessler, 2000). Moreover, in accordance with previous findings, our results showed higher levels of depressive and anxious symptoms among patients with FM compared to HC (Fietta & Manganelli; 2007; Marangell et al., 2011; Berkol et al., 2017). One of the most intriguing results of the present study is that only somatoform dissociation (not psychoform dissociation) was correlated with the high levels of pain intensity experienced. In fact, no significant correlation was found between pain intensity and psychoform dissociative symptoms. A possible explanation for these results could be that the disintegrative power of traumatic experiences in patients with FM involves more the integration of somatic self-experiences rather than psychological functions like consciousness, memory, or identity (Maaranen et al., 2005; Nijenhuis, 2009). Indeed, MUS, like pain in patients with FM, could be the result of dissociation-induced alterations in the processing of physical sensations in which abnormal central processing of somatic sensations leads to aberrant amplification of subthreshold body sensations. The absence of correlation between psychoform dissociative symptoms and pain is in contrast with previous studies (Leavitt et al, 2002; Berkol et al., 2017). However, methodological issues like the small sample size (Berkol et al., 2017) or the different instruments used to evaluate both dissociation and pain (Leavitt et al, 2002) could account for these differences.

Considering the severity of FM disabilities, our data revealed that patients with FM with more severe symptomatology tended to show high levels of psychological distress, they experienced major cumulative trauma during their life and, eventually, dissociated more often with both somatoform and psychoform phenomena. These findings differ from the study of Näring et al. (2007) in which neither correlations between FM symptoms and trauma nor those between FM symptoms and somatoform dissociation were found. These differences could also be caused by dissimilar characteristics of the FM samples, such as sample size, duration of illness, and the level of somatoform dissociation and trauma indices.

Our results suggest there are significant associations between trauma in childhood and somatoform dissociation and also between trauma in adulthood and psychoform dissociation. A previous study on patients with FM highlighted a correlation between traumatic experiences and somatoform dissociative symptoms, and trauma was found to be a marginally significant predictor of somatoform dissociation (Näring et al., 2007). In Bohn et al. (2013), even when childhood trauma was significantly correlated with somatoform dissociative symptoms it did not emerge as a significant predictor of somatoform dissociative symptoms. In line with previous findings, our results confirmed the association between psychological distress and dissociation. Kilic et al. (2014) found that women with lifetime diagnoses of depressive disorder had higher scores for somatoform and psychoform dissociation than non-depressive patients.

To determine whether traumatic events and dissociative symptoms could be significant predictors of FM symptomatology, a hierarchical multiple regression analysis was performed. In line with our hypothesis, data suggested that psychoform dissociative symptoms did not significantly contribute to the explanation of the severity of FM disabilities; instead, the latter was significantly predicted by the presence of somatoform dissociative symptoms and by having experienced cumulative trauma during life. Summarizing, although the presence of trauma and dissociation is a phenomenon that characterizes FM compared to the general population, our findings suggest that only the presence of cumulative trauma and somatoform dissociation seem to have a relevant and direct impact on the severity of symptoms.

It has been widely demonstrated and clinically relevant to note that trauma-based dissociation, when concomitant with other disorders, is often associated with more severe psychopathology that worsens the prognosis of comorbid disorder and leads to specific therapeutic difficulties (Farina & Imperatori, 2017). Indeed, comorbidities with dissociative phenomena seem to characterize patient subgroups with histories of traumatic development and low responses to

treatment (Farina et al 2019). It is also possible for patients with FM that the presence of cumulative trauma and somatoform dissociation should be considered a worse prognostic factor that requires clinical caution and specific therapeutic strategies associated with more conventional therapies.

The present study has some limitations. First, the use of self-reported instruments might have led some patients to underreport or exaggerate the severity of their symptoms or the prevalence of their trauma based on retrospective recollection. Second, we evaluated only the prevalence and impact of traumatic events while neglecting the specific types of trauma. Third, cross-sectional studies do not permit concrete conclusions to be drawn about the causality of emergent relationships. Therefore, longitudinal studies are needed to investigate in greater depth the association between trauma and dissociation among patients with FM. Despite these limitations, our results suggest that the construct of somatoform dissociation, more than that of psychoform dissociation, could serve as a useful framework to improve our understanding of FM symptoms, and to formulate specific interventions after taking into consideration the role that this construct plays in the impact of the FM syndrome.

This result also opens the way to a new research question, namely the relationships between somatoform dissociation and the different psychosomatic syndromes in FM. Indeed, even though it is well known that FM is often labeled as a condition with a major psychosomatic component, only one previous study explored in deep this topic evaluating the prevalence of psychosomatic symptoms in patients with FM by means of the Diagnostic Criteria for Psychosomatic Research (DCPR) (Ghiggia et al., 2017). It would now be interesting to evaluate the association between dissociation experiences and the different psychosomatic syndromes, to better clarify the association between somatoform dissociation and psychosomatic features.

Finally, the present results stressed the importance of evaluating not only childhood trauma but also the effects of multiple traumas in cumulative form because this pattern characterizes the experiences of the majority of patients with FM and has substantial implications for the evaluation and treatment of patients.

References

Anderberg, U. M., Marteinsdottir, I., Theorell, T., & Von Knorring, L. (2000). The impact of life events in female patients with fibromyalgia and in female healthy controls. *European Psychiatry*, *15*(5), 295-301. https://doi.org/10.1016/S0924-9338(00)003977

Bennett, R. M., Friend, R., Jones, K. D., Ward, R., Han, B. K., & Ross, R. L. (2009). The revised fibromyalgia impact questionnaire (FIQR): validation and psychometric properties. *Arthritis research & therapy*, *11*(4), R120. https://doi.org./10.1186/ar2783

Berkol, T. D., Balcioglu, Y. H., Kirlioglu, S. S., Erensoy, H., & Vural, M. (2017). Dissociative features of fibromyalgia syndrome. *Neurosciences*, *22*(3), 198. https://doi.org./10.17712/nsj.2017.3.20160538

Bjelland, I., Dahl, A. A., Haug, T. T., & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale: an updated literature review. *Journal of psychosomatic research*, *52*(2), 69-77. https://doi.org./10.1016/s0022-3999(01)00296-3

Bohn, D., Bernardy, K., Wolfe, F., & Häuser, W. (2013). The association among childhood maltreatment, somatic symptom intensity, depression, and somatoform dissociative symptoms in patients with fibromyalgia syndrome: a single-center cohort study. *Journal of Trauma & Dissociation*, *14*(3), 342-358. https://doi.org./10.1080/15299732.2012.736930

Bote, M. E., Garcia, J. J., Hinchado, M. D., & Ortega, E. (2013). Fibromyalgia: anti-inflammatory and stress responses after acute moderate exercise. *PloS one*, *8*(9). https://doi.org./10.1371/journal.pone.0074524

Branco, J. C., Bannwarth, B., Failde, I., Carbonell, J. A., Blotman, F., Spaeth, M., Saraiva F., Nacci, F., Thomas, E., Caubère, J. P., Le Lay, K., Taieb, C., & Matucci-Cerinic M. (2010). Prevalence of fibromyalgia: a survey in five European countries. In *Seminars in arthritis and rheumatism 39*(6), 448-453. https://doi.org./10.1016/j.semarthrit.2008.12.003

Brown, R. J., Schrag, A., & Trimble, M. R. (2005). Dissociation, childhood interpersonal

trauma, and family functioning in patients with somatization disorder. *American Journal of*

Psychiatry, *162*(5), 899-905. https://doi.org./10.1176/appi.ajp.162.5.899

Carlson, E. B., & Putnam, F. W. (1993). An update on the dissociative experiences scale.

Dissociation: progress in the dissociative disorders.

Castelli, L., Binaschi, L., Caldera, P., & Torta, R. (2009). Depression in lung cancer patients:

is the HADS an effective screening tool? *Supportive Care in Cancer*, *17*(8), 1129-1132.

https://doi.org.t/10.1007/s00520-009-0604-8

Costantini, M., Musso, M., Viterbori, P., Bonci, F., Del Mastro, L., Garrone, O., Venturini,

M., & Morasso, G. (1999). Detecting psychological distress in cancer patients: validity of

the Italian version of the Hospital Anxiety and Depression Scale. *Supportive Care in*

Cancer, *7*(3), 121-127. https://doi.org./10.1007/s005200050241

Crofford, L. J. (2007). Violence, stress, and somatic syndromes. *Trauma, Violence, &*

Abuse, *8*(3), 299-313. https://doi.org./10.1177/1524838007303196

Dar, L. K., & Hasan, S. (2018). Traumatic experiences and dissociation in patients with

conversion disorder. *The Journal of the Pakistan Medical Association*, *68*(12), 1776-1781.

Di Tella, M., Ghiggia, A., Tesio, V., Romeo, A., Colonna, F., Fusaro, E., Torta, R. & Castelli,

L. (2017). Pain experience in Fibromyalgia Syndrome: The role of alexithymia and

psychological distress. *Journal of affective disorders*, *208*, 87-93.

https://doi.org./10.1016/j.jad.2016.08.080

Duarte, J. M., Crow, C., Antik, A., Appiani, F., & Caride, A. (2019). Fibromyalgia and

dissociative symptoms. *CNS spectrums*, 1-4. https://doi.org.t/10.1017/S1092852918001608

Espirito-Santo, H., & Pio-Abreu, J. L. (2009). Psychiatric symptoms and dissociation in

conversion, somatization and dissociative disorders. *Australian and New Zealand Journal*

of Psychiatry, *43*(3), 270-276. https://doi.org./10.1080/00048670802653307

Farina, B., Mazzotti, E., Pasquini, P., Nijenhuis, E., & Di Giannantonio, M. (2011a).

    Somatoform and Psychic dissociation among students. *Journal of clinical psychology*,

    67(7), 665-672. https://doi.org/10.1002/jclp.20787

Farina, B., Mazzotti, E., Pasquini, P., & Giuseppina Mantione, M. (2011b). Somatoform and

    psychoform dissociation among women with orgasmic and sexual pain disorders. *Journal*

    of Trauma & Dissociation, *12*(5), 526-534. https://doi.org/10.1080/15299732.2011.598124

Farina, B., and Imperatori, C. (2017). What if dissociation were a psychopathological

    dimension related to trauma? Authors' reply to diagnostic challenges leading to

    underdiagnosis of dissociative disorders. *Neuropsychiatr. Dis. Treat.* 13, 409- 410.

    https://doi.org/10.2147/NDT.S131439

Farina, B., Liotti, M., & Imperatori, C. (2019). The role of attachment trauma and

    disintegrative pathogenic processes in the traumatic-dissociative dimension. *Frontiers in*

    psychology, *10*, 933. https://doi.org/10.3389/fpsyg.2019.00933

Fietta, P., Fietta, P., & Manganelli, P. (2007). Fibromyalgia and psychiatric disorders. *Acta*

    Biomedica-Ateneo Parmense, *78*(2), 88.

Ghiggia, A., Torta, R., Tesio, V., Di Tella, M., Romeo, A., Colonna, F., Geminiani, G. C.,

    Fusar, E., Batticiotto, A., & Castelli, L. (2017). Psychosomatic syndromes in

    fibromyalgia. *Clin Exp Rheumatol*, *35*(Suppl 105), 106-111.

Häuser, W., Kosseva, M., Üceyler, N., Klose, P., & Sommer, C. (2011). Emotional, physical,

    and sexual abuse in fibromyalgia syndrome: A systematic review with meta-analysis.

    Arthritis Care & Research, *63*, 808–820. https://doi.org.t/10.1002/acr.20328

Kessler, R. C. (2000). Posttraumatic stress disorder: The burden to the individual and to

    society. *Journal of Clinical Psychiatry,* 61(5), 4–12.

Kilic, O., Sar, V., Taycan, O., Aksoy-Poyraz, C., Erol, T. C., Tecer, O., Emul, M. H., &

    Ozmen, M. (2014). Dissociative depression among women with fibromyalgia or

rheumatoid arthritis. *Journal of Trauma & Dissociation*, *15*(3), 285-302.

    https://doi.org./10.1080/15299732.2013.844218

Leavitt, F., Katz, R. S., Mills, M., & Heard, A. R. (2002). Cognitive and dissociative

    manifestations in fibromyalgia. *Journal of Clinical Rheumatology*, *8*(2), 77-84.

    https://doi.org./10.1097/00124743-200204000-00003

Leavitt, F., & Katz, R. S. (2003). The dissociative factor in symptom reports of rheumatic

    patients with and without fibromyalgia. *Journal of Clinical Psychology in Medical*

    Settings, *10*(4), 259-266. https://doi.org/10.1023/A%3A1026345203022

Maaranen, P., Tannskanen, A., Haatanen, K., Honkalampi, K., Koivumaa-Honkanen, H.,

    Hintikka, J., & Viinamäki, H. (2005). The relationship between psychoform and

    somatoform dissociation in the general population. *Journal of Nervous and Mental*

    Disease, 193, 690–692. https://doi.org./10.1080/j.1440-1614.2005.01701.x

MacPhee, E. (2013). Dissociative disorders in medical settings. *Current psychiatry*

    reports, *15*(10), 398. https://doi.org./10.1007/s11920-013-0398-8

Myers, L., Trobliger, R., Bortnik, K., Zeng, R., Segal, E., & Lancman, M. (2019).

    Dissociation and other clinical phenomena in youth with psychogenic non-epileptic

    seizures (PNES) compared to youth with epilepsy. *Seizure*, *70*, 49-55.

    https://doi.org.t/10.1016/j.seizure.2019.06.028

Nakamura, I., Nishioka, K., Usui, C., Osada, K., Ichibayashi, H., Ishida, M., Turk, D. C.,

    Matsumoto, Y., & Nishioka, K. (2014). An epidemiologic internet survey of fibromyalgia

    and chronic pain in Japan. *Arthritis care & research*, *66*(7), 1093-1101.

    https://doi.org/10.1002/acr.22277

Näring, G. W. B., Van Lankveld, W. G. J. M., & Geenen, R. (2007). Somatoform dissociation

    and traumatic experiences in patients with rheumatoid arthritis and fibromyalgia. *Clinical*

    & Experimental Rheumatology, 25(6), 872-877.

Nijenhuis, E. R., Spinhoven, P., Van Dyck, R., Van Der Hart, O., & Vanderlinden, J. (1996). The development and psychometric characteristics of the Somatoform Dissociation Questionnaire (SDQ-20). *Journal of Nervous and Mental Disease*.184, 688-94. https://doi.org/10.1097/00005053-199611000-00006

Nijenhuis, E. R., Spinhoven, P., van Dyck, R., van der Hart, O., & Vanderlinden, J. (1998a). Psychometric Characteristics of the Somatoform Dissociation Questionnaire: A Replication Study. *Psychotherapy and Psychosomatics*, *67*(1), 17-23. https://doi.org/10.1159/000012254

Nijenhuis, E. R., Spinhoven, P., Van Dyck, R., van der Hart, O., & Vanderlinden, J. (1998b). Degree of somatoform and psychological dissociation in dissociative disorder is correlated with reported trauma. *Journal of traumatic stress*, *11*(4), 711-730. https://doi.org/10.1023/A:1024493332751

Nijenhuis, E. R. (2001). Somatoform dissociation: Major symptoms of dissociative disorders. *Journal of trauma & dissociation*, *1*(4), 7-32. https://doi.org/10.1300/J229v01n04_02

Nijenhuis, E. R., Van der Hart, O., & Kruger, K. (2002). The psychometric characteristics of the Traumatic Experiences Checklist (TEC): First findings among psychiatric outpatients. *Clinical Psychology & Psychotherapy: An International Journal of Theory & Practice*, *9*(3), 200-210. https://doi.org/10.1002/cpp.332

Nijenhuis, E. R. (2009). Somatoform dissociation and somatoform dissociative disorders. *Dissociation and the dissociative disorders: DSM-V and beyond*, 259-276.

Ross, C. A., Heber, S., Norton, G. R., Anderson, D., Anderson, G., & Barchet, P., (1989). Somatic symptoms in multiple personality disorder. *Psychosomatics*, *30,* 154–160. https://doi.org/10.1016/s0033-3182(89)72296-9

Salaffi, F., Franchignoni, F., Giordano, A., Ciapetti, A., Sarzi-Puttini, P., & Ottonello, M. (2013). Psychometric characteristics of the Italian version of the revised Fibromyalgia

Impact Questionnaire using classical test theory and Rasch analysis. *Clin Exp Rheumatol*, *31*(6 Suppl 79), S41e9.

Saxe, G. N., Chinman, G., Berkowitz, R., Hall, K., Lieberg, G., Schwartz, J., & Kolk, B. A. V. D. (1994). Somatization in patients with dissociative disorders. *American Journal of Psychiatry*, *151*(9), 1329-1334. https://doi.org/10.1176/ajp.151.9.1329

Schimmenti, A. (2016). Dissociative experiences and dissociative minds: exploring a nomological network of dissociative functioning. *Journal of Trauma & Dissociation*, *17*(3), 338-361. https://doi.org/10.1080/15299732.2015.1108948

Schweinhardt, P., Sauro, K. M., & Bushnell, M. C. (2008). Fibromyalgia: a disorder of the brain? *The Neuroscientist*, *14*(5), 415-421. https://doi.org/10.1177/1073858407312521

Sommer, C., Häuser, W., Burgmer, M., Gerhold, K., Petzke, F., Schmidt-Wilcke, T., Späth, M., Toole, T., Nurcan Üçeyler, Wang, H., Thieme, K. (2012). Ätiologie und Pathophysiologie des Fibromyalgiesyndroms und von Schmerzen in mehreren Körperregionen [Etiology and pathophysiology of fibromyalgia syndrome and chronic widespread pain]. *Der Schmerz*, *26*, 297–310. https://doi.org/ 10.1007/s00482-012-1174-0

Tesio, V., Di Tella, M., Ghiggia, A., Romeo, A., Colonna, F., Fusaro, E., Geminiani G. C., & Castelli, L. (2018). Alexithymia and depression affect quality of life in patients with chronic pain: a study on 205 patients with fibromyalgia. *Frontiers in psychology*, *9*, 442. https://doi.org/10.3389/fpsyg.2018.00442

Van der Kolk, B. A. (1994). The body keeps the score: Memory and the evolving psychobiology of posttraumatic stress. *Harvard review of psychiatry*, *1*(5), 253-265. https://doi.org/10.3109/10673229409017088

Wolfe, F., Clauw, D. J., Fitzcharles, M. A., Goldenberg, D. L., Katz, R. S., Mease, P., Russell, A. S., Russell, I. J., Winfield, J.B., & Yunus, M. B. (2010). The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of

symptom severity. *Arthritis care & research*, *62*(5), 600-610.

https://doi.org/10.1002/acr.20140

Wolfe, F., Clauw, D. J., Fitzcharles, M. A., Goldenberg, D. L., Häuser, W., Katz, R. L.,

Mease, P. J., Russell, A.S., Russell, I. J., & Walitt, B. (2016). 2016 Revisions to the

2010/2011 fibromyalgia diagnostic criteria. In *Seminars in arthritis and rheumatism.* 46

(3), 319-329. WB Saunders. https://doi.org/10.1016/j.semarthrit.2016.08.012

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta*

psychiatrica scandinavica, *67*(6), 361-370. https://doi.org/10.1111/j.1600-

0447.1983.tb09716.x

Table 1. Sociodemographic and clinical characteristics of the patients with fibromyalgia and Healthy Controls. Mean (SD), percentage, and *t*-test are listed.

	FM (n=99)	HC (n=107)	t test (df)	*p*
Age (years)	50.16 (10.6)	47.37(10.4)	1.909(204)	.058
Educational level (years)	11.82 (3.4)	12.58 (3)	-1.691(195.999)	.092
Marital status				
Single	12 (12.2%)	14 (13.1%)		
Cohabiting	11(11.2%)	11 (10.3%)		
Married	53 (54.1%)	72 (67.3%)		
Divorced	16 (16.3%)	10 (9.3%)		
Widowed	6 (6.1%)	0 (0%)		
Work status				
Student	3 (3%)	6 (5.6%)		
Employed	63 (63.6%)	86 (80.4%)		
Unemployed	9 (9.1%)	2 (1.9%)		
Housewife	16 (16.2%)	7 (6.5%)		
Retired	8 (8.1%)	6 (5.6%)		
Duration of illness (months)	97.35(95.1)	–		
FIQ-R Pain	7.55 (1.85)	–		
FIQ-R Total	64.19 (17.67)	–		

FM = Fibromyalgia; HC = Healthy Controls; df = Degrees of freedom; FIQ-R = Fibromyalgia Impact Questionnaire Revised version.

Table 2. Traumatic experiences, dissociative symptoms and anxiety-depressive symptoms in patients with fibromyalgia vs. Healthy Controls. Mean (SD), *t*-test, and Cohen's *d* are listed.

	FM (n= 99)	HC (n= 107)	t test (df)	*p*	d
Traumatic experiences					
TEC-TCS	10.74 (10.73)	2.64 (5.18)	6.812(138.89)	**<.001**	0.961
TEC-Total	6.34 (3.74)	2.74 (2.32)	8.224(161.11)	**<.001**	1.156
TEC-AT	2.46 (1.9)	1.46 (1.51)	4.160(186.22)	**<.001**	0.582
TEC-CT	2.69 (3.01)	1.05 (1.30)	5.000(131.37)	**<.001**	0.707
TEC-CuT	1.08 (1.44)	0.21(0.67)	5.455(136.47)	**<.001**	0.774
TEC-I	5.76(3.6)	2.21(2.05)	8.600(153.04)	**<.001**	1.211
Dissociative symptoms					
DES-II	18.45 (15.22)	8.75 (6.55)	5.857(131.16)	**<.001**	0.827
SDQ-20	36.03 (11.21)	22.45 (4.94)	11.038(131.16)	**<.001**	0.616
Psychological distress					
HADS-A	9.90 (4.34)	5.34 (3.38)	8.366 (184.95)	**<.001**	1.172
HADS-D	9.30 (4.15)	4.81 (3.67)	8.231(204)	**<.001**	1.146

FM = Fibromyalgia; HC = Healthy Controls; df = Degrees of freedom TEC=Traumatic Experiences Checklist; TCS (total composite score); CT (childhood trauma); AT (adulthood trauma); CuT (cumulative trauma); I (impact); DES-II= Dissociative Experiences Scale; SDQ-20= Somatoform Dissociation Questionnaire; HADS-A and HADS-D = Anxiety and Depression subscales of the Hospital Anxiety and Depression Scale.

Table 3. Pearson correlations among FM symptoms, traumatic experiences, dissociative symptoms, and psychological distress in patients with FM (99).

	FIQ-R pain	FIQ-R tot	TEC-TCS	TEC_TOT	TEC-AT	TEC-CT	TEC-CuT	TEC-I	DES-II	SDQ-20
Age	.004	-.068	-.183	-.047	**.280**	-.104	**-.281**	.024	-.071	-.109
Ed. level	-.191	**-.267**	**.248***	.104	-.056	.104	.183	.111	-.045	-.060
Illness d.	.031	-.074	.022	.014	-.025	-.021	.065	.052	-.137	-.130
FIQ-R										
Pain	-	**.705**	.165	.079	-.003	.056	.147	.139	.068	**.248***
Total	**.705**	-	.152	.066	-.035	.008	**.225***	.115	**.256***	**.363**
HADS-D	**.247***	**.495**	.054	-.051	-.019	-.040	-.004	-.030	**.308**	**.204***
HADS-A	**.201***	**.360**	.084	.023	-.062	.105	-.059	.086	**.296**	**.356**
DES-II	-	-	-.034	.194	**.294**	.107	-.084	**.200***	-	**.548**
SDQ-20	-	-	.095	**.292**	.106	**.288**	.054	**.297**	-	-

TEC= Traumatic Experiences Checklist; TCS (total composite score); CT (childhood trauma); AT (adulthood trauma); CuT (cumulative trauma); I (impact); HADS-A and HADS-D = Anxiety and Depression subscales of the Hospital Anxiety and Depression Scale; DES-II= Dissociative Experiences Scale; SDQ-20= Somatoform Dissociation Questionnaire; * p < .05; **p<.001.

Table 4. Hierarchical multiple regression with total score of FIQ-R as dependent variable (N=97).

	Predictor	R^2	Adj R^2	F	F- ΔR^2	B	SE B	β	*p*
1		.059	.049	5.973*	5.973**				
	Ed. level					-1.236	.506	-.243	.016
2		.137	.119	7.491**	8.536**				
	Ed. level					-1.492	.495	-.294	.003
	TEC-CuT					3.346	1.145	.248	.004
3		.246	.221	10.102***	13.355***				
	Ed. level					-1.350	.467	-.266	.005
	TEC-CuT					3.091	1.079	.263	.005
	SDQ-20					.503	.138	.331	<.001
4		.399	.373	15.284***	23.499***				
	Ed. level					-1.014	.424	-.200	.019
	TEC-CuT					3.057	.968	.260	.002
	SDQ-20					.388	.126	.255	.003
	HADS-D					1.669	.344	.405	<.001

HADS-D: Hospital Anxiety and Depression Scale-Depression; SDQ-20 Somatoform Dissociation Questionnaire; TEC-CuT: Traumatic Experiences Checklist-cumulative trauma. * p < .05; ** p<.01; ***p<.001.