



RESEARCH ARTICLE

EVALUATION OF TEMPERAMENT AND CHARACTER (TCI), INTRAPSYCHIC AND INTERPERSONAL EXPERIENCES AND DEPRESSION IN WOMEN AFFECTED BY FIBROMYALGIA SYNDROME: A CASE-CONTROL STUDY

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ARTICLE INFO

Article History:

Received xxxxxxxxxx, 2015  
Received in revised form xxxxxxxxxxxxxxxxxxxx, 2015  
Accepted xxxxxxxxxx, 2015  
Published online xxxxxxxx, 2016

Key words:

Personality, Temperament, Character, Intrapsychic factors, Fibromyalgia Syndrome.

ABSTRACT

**Background:** Personality has an important role in understanding fibromyalgia syndrome (FMS). Aims: In this paper, we explored the association between the clinical course of Fibromyalgia Syndrome (FMS) and patient’s response to emotional stress in terms of temperament and character and intrapsychic and interpersonal dimensions.

**Methods:** Participants: n=57 women with Fibromyalgia Syndrome; control group: n=203 healthy women. Tests: TCI, SASB (Structural Analysis of Interpersonal Behavior), CDQ and ASQ.

**Results:** FMS Patients presented: medium to high levels of depression (F = 110.702, p < .001); TCI: higher Impulsiveness(NS2) (p < .005); higher Harm avoidance (HA) (p < 0.001); Higher Fear of uncertainty(HA2) ( p < .001); Shyness (HA3) (p = .024); higher Fatigability (HA4) (, p < .001) higher Sentimentality(RD1) (p = .046); lower Persistence (P)(p = .025) lower Eagerness of effort(PS1) (p = .010). lower Ambitious (PS3) (F = 6.481, p = .012) than healthy women; SASB: lower levels of autonomy-C11 (p = .037), autonomy and Love-C12 (p < .005), Love-C13 (p < .005), Love and control-C14 (p = .010), than the control group; with higher levels of Control-C15(p < .001), Control and hate-C16 (p < .001), Hate-C17 (p < .001), and Hate and autonomy- C18 (p < .001) than healthy women.

**Conclusions:** Intrapsychic characteristics (tendency to depression) may be linked to difficulties in facing illness condition (pain, disabilities). Knowledge of these modalities could allow to plan a psychotherapeutic and multidisciplinary intervention aimed at overcoming the intrapsychic maladaptive modalities.

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**Citation:** Vespa, A., Giulietti, M. V., Ottaviani, M., Rossi, G., Giustozzi, M., Cloninger, R., Scendoni, P. and Meloni, C., 2016. “Evaluation of temperament and character (TCI), intrapsychic and interpersonal experiences and depression in women affected by fibromyalgia syndrome: a case-control study”, *International Journal of Current Research*, 8, (01), xxxxx-xxxxx.

INTRODUCTION

**Clinical implication of the study:** On the basis of the knowledge of both intrapsychic processes and temperament and character dimensions it is possible to hypothesize that a targeted psychotherapeutic intervention could help overcome the maladaptive intrapsychic modalities related to negative control. The psychotherapeutic intervention that allows the patient to overcome this modalities could also affect pain, favoring its decrease.

Background and Aim

Fibromyalgia syndrome (FMS) is a common form of widespread musculoskeletal pain and fatigue (asthenia) (Geisser et al., 2008), which affects 3 to 5 percent of the general Italian population (all ages). According to the American College of Rheumatology (ACR), Fibromyalgia syndrome (FMS) is defined as chronic widespread pain and awareness in at least 11 of the 18 points defined painfully, associated with sleeping disturbances, decreased physical functions, depression and deterioration of quality of life. It mainly affects the muscles and their insertions on the bones without causing deformity of the joint structures as arthritis (Geisser et al., 2008; Flodin et al., 2014; Ahumada et al., 2012). Over the past 10 years, however, fibromyalgia has been better defined through studies that have established guidelines

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for diagnosis. The symptoms of FMS patients are influenced by climatic factors (Macfarlane *et al.*, 2010), physical activity and psycho-physical stress (Ahumada *et al.*, 2012; Jones *et al.*, 2011; Verbunt *et al.*, 2008; White *et al.*, 2002; Scheidt *et al.*, 2014; Tander *et al.*, 2008; Börsbo *et al.*, 2010). Chronic pains are often associated with mood disorders (anxiety, depression) and particularly with sleeping disorders and fatigue, and create a state of stress in a vicious cycle leading to greater sensitivity to pain (Flodin *et al.*, 2014; Ahumada *et al.*, 2012; Verbunt *et al.*, 2008; White *et al.*, 2002; Scheidt *et al.*, 2014; Tander *et al.*, 2008; Börsbo *et al.*, 2010; Dick *et al.*, 2008). Fibromyalgia is associated with decreased connectivity between pain- and sensorimotor brain areas (Flodin *et al.*, 2014). The higher levels of disability in fibromyalgia can be explained by psychological distress (Börsbo *et al.*, 2010; Bennett, 1994; Thieme *et al.*, 2006; Maletic, 2009). The depressive symptoms (Scheidt *et al.*, 2014; Tander *et al.*, 2008) impair the quality of life of patients with FMS by increasing the sensation of pain and the perception of functional disability (Maletic, 2009; Bair *et al.*, 2003; Carbonell-Baeza *et al.*, 2011; Gormsen *et al.*, 2010). The bio-psycho-social model (13) tries to see the illness through the co-presence of various factors associated with greater or lesser strength in the individual: social, cognitive, behavioral, cultural, racial, social variables play a lot of importance in modulating the personal "unpleasant experience" of pain (Maletic, 2009; Gormsen *et al.*, 2010; Thieme *et al.*, 2004). and can affect the process that leads to the amplification of pain and its severity (Carbonell-Baeza *et al.*, 2011; Gormsen *et al.*, 2010; Thieme *et al.*, 2004).

Stress, anxiety, depression, beliefs and cultural meanings attributed to pain, personal strategies in response to pain (active, or passive), degree of self-esteem, mood, situations of fear-frustration are all important situations in the individual (Arnold *et al.*, 2012; Aguglia *et al.*, 2012; Van Houdenhove *et al.*, 2002; González *et al.*, 2010). Depression is an independent predictor of the physical performance variation in those patients (Maletic, 2009; Bair *et al.*, 2003; Carbonell-Baeza *et al.*, 2011). Psychological conditions like anxiety and depressed mood are both partly determined by personality (Okifuji *et al.*, 2000; Huber *et al.*, 2009; Malin *et al.*, 2012). Personality may be defined as those characteristics of the person that account for consistent patterns of feeling, thinking and behavior. There are several approaches to conceptualizing personality. In this study, we have implemented: 1) Benjamin's SASB model where the personality dimensions of intrapsychic modalities account for a large part of the variation in personality; 2) Cloninger's temperament and character dimensions (TCI). Moreover personality disorders are rarely associated with the FMS (Garcia-Fontanals *et al.*, 2014; Nordahl, 2007; Taymur *et al.*, 2014), while there are frequent symptoms indicative of psychological vulnerability (hypochondria, low self-esteem, catastrophic attitude, victimization, passivity, irritability, addiction, non-adaptive reactions) (Scheidt *et al.*, 2014; Aguglia *et al.*, 2012; Van Houdenhove *et al.*, 2002; González *et al.*, 2010; Fietta, 2007). It is well known that these psychiatric conditions are able to condition the variability of symptoms in patients (Scheidt *et al.*, 2014; Van Houdenhove *et al.*, 2002; González *et al.*, 2010; Okifuji *et al.*, 2000; Arnold *et al.*, 2006; Kröner-Herwig, 2009; Malin, 2012; Luyten, 2013; Fors *et al.*, 2002).

It can be said, in summary the psychological situations may represent a risk factor for the development of fibromyalgia considering its real presence in a good number of patients even if in some patients may also be a consequence of the disease (Aguglia *et al.*, 2012; González *et al.*, 2010; Okifuji *et al.*, 2000; Huber *et al.*, 2009; Nordahl, 2007; Taymur *et al.*, 2014). FMS is not, however, neither a purely psychiatric disorder nor a hypochondriac disorder from which it must be differentiated (Huber *et al.*, 2009; Taymur *et al.*, 2014; Fietta *et al.*, 2007; Arnold *et al.*, 2006). So, the treatment requires a multidisciplinary approach that includes a pharmacological physical (and psychological intervention (groups of psychological, psycho-educational groups) (Malin, 2012; Luyten, 2013; Fors *et al.*, 2002; van Eijk-Hustings *et al.*, 2013; Scheidt *et al.*, 2013; Köllner *et al.*, 2012; Vázquez-Rivera *et al.*, 2009). The specific aim of our study was to establish whether a difference existed in the prevalence of depression, of temperament and character dimension (TCI) and of intrapsychic and interpersonal dynamics of women with and without FMS. The investigation of intrapsychic and interpersonal processes by using SASB Model allow to understand which psychotherapeutic intervention may be planned to face on the maladjustment modalities in FMS woman which have special vulnerability to the effects of pain related to symptoms and functional impairment.

## MATERIALS AND METHODS

### Study population

Fifty seven women (age range: 35 to 65 years old) with diagnosed Fibromyalgia Syndrome (FMS) who met American College of Radiology criteria for fibromyalgia (ACR) (Wolfe *et al.*, 1990) (inclusion criteria) volunteered to participate in study protocol out of a total of one hundred and two (Tab.1). After completing this initial medical examination they were referred to the investigator. Selection criteria included age (35 –65 yrs), with diagnosis of Fibromyalgia Syndrome (from 1 to 11 years). Patients were excluded if: they refused to participate; were unable to provide informed consent; had other forms of disease (cancer, cardiopathy, diabetes and other chronic diseases); were using any type of psychotropic drugs (including antidepressants). Age and demographic data including marital status and educational levels were collected (Tab.1). The control group was composed of two hundreds and three healthy women based on the same independent variables of the case group (Tab.1). Both groups, case and control, were homogeneous for age, marital status and cultural level. All participants signed a consensus form regarding study protocol after detailed explanation by the physician at the Clinic. One hundred and two patients were approached in the clinic by the physician and asked to participate in the study. Only seventy-seven decided to participate, to fill out and sign the consent form and complete the questionnaires. Twenty patients didn't answer all the questions in the questionnaires: it was therefore decided not to consider them for the analysis. They completed the following questionnaires:

- Social schedule, including data on gender, age, marital status, educational level, profession.

- Temperament and Character Inventory TCI-R (Fossati *et al.*, 2007). (Appendix A) The TCI-R, listing 240 items and is rated on a five-point Likert scale. The TCI- provides a score for each major temperament (Novelty seeking, Harm Avoidance, Reward Dependence, and Persistence) and character (Self-directedness, Cooperativeness, and Self-transcendence) dimension of the TCI-R, as well as separate scores for each facet. The Italian translation of the TCI-R has been previously validated both in clinical (Fossati *et al.*, 2007) and nonclinical participants (Martinotti, 2008).
- SASB Model (Structural Analysis of Social Behavior)- Anint A Questionnaire (intrapyschic factors) by L.S. Benjamin (Benjamin *et al.*, 2006; Critchfield and Benjamin, 2010), validated on the basis of DSMIV. This test evaluates the intrapsychic and. interpersonal processes of the personality structure at the level. It includes 36 descriptive items of two series of 8 clusters, respectively of intrapsychic (Oneself) and interpersonal (Other) experiences.

The women interviewed had to respond to 36 questions of the questionnaire describing their behaviors during the last year. The 36 questions provide an exhaustive picture of intrapsychic experience from which the interpersonal one can be inferred. The 8 clusters of “Oneself” and “Other” are both complementary.

#### Intrapsychic Behaviors- 8 Clusters (Appendix B)

- SASB-Cluster (CI)1- Autonomy - Assertive and separating.  
 SASB-Cluster (CI)2- Autonomy and love - Self-accepting and exploring.  
 SASB-Cluster(CI) 3- Love - Self-supporting and appreciative.  
 SASB-Cluster (CI)4 - Love and control - Self-care and development.  
 SASB-Cluster (CI)5 - Control - Self-regulating and controlling.  
 SASB-Cluster (CI)6 - Control and hate - Self-critical and oppressive.  
 SASB-Cluster (CI)7 - Hate - Self-refusing and annulling.  
 SASB-Cluster (CI)8 - Hate and autonomy - Self-negligent and mentally absent.
- Interpersonal behaviors- 8 Clusters  
 SASB-Cluster (CI)1 - Autonomy - Liberating and forgetting  
 SASB-Cluster (CI)2 - Autonomy and love - Confirming and understanding.  
 SASB-Cluster(CI) 3 - Love - Caring and consoling.  
 SASB-Cluster (CI)4 - Love and control - Helping and protecting.  
 SASB-Cluster (CI)5 - Control - Looking after and managing.  
 SASB-Cluster (CI)6 - Control and hate - Belittling and blaming.  
 SASB-Cluster (CI)7 - Hate - Assaulting and refusing.  
 SASB-Cluster (CI)8 - Hate and autonomy - Ignoring and forgetting.

The variables of the two dimensions: “Oneself” and “Other” are complementary: a modality of interpersonal experience corresponds to an intrapsychic experience.

- ASQ and CDQ Tests by Cattell (Krug and Layughlin, 1976; Krug *et al.*, 1976) have been used as methods of self report which describe anxiety and depression respectively. These tests describe the actual experience of the subjects examined. The test has the appropriate reliability and

validity to evaluate anxiety and depression the range is subdivided as follows: 0-3 indicates absence of anxiety or depression; 4-7 indicates medium to medium-high level of anxiety and depression; 8-10 indicates a high level of depression and anxiety.

#### Statistical analysis

The data were analyzed using SPSS 21 (SPSS Inc. Chicago, Illinois). Variance analysis (ANOVA) was applied to evaluate if there are significant differences between the two groups of subjects (case and control groups) on the Scales TCI, SASB, ASQ and CDQ. To examine the relationship between SASB clusters and TCI and ASQ and CDQ dimensions Pearson’s correlation coefficients were used. The maximum significant level considered in this study was 0.05. To achieve an internal consistency of 0.80 and a medium effect size, a sample greater than 50 was required to detect a significant model.

## RESULTS

### ASQ- CDQ. Differences between FMS Group and healthy subjects

The results show a significant difference between the two groups (patients affected by FMS and healthy subjects) for the test CDQ describing depression ( $F = 110.702, p < .001$ ) and for the test ASQ describing anxiety ( $F = 93.901, p < .001$ ) as expected. The case group presented a medium-high score in anxiety (mean value = 7.46) and depression (mean value = 7.67) scale. The range of scores reached by the control group was medium-low. There was a statistically significant correlation between depression and anxiety for the case group ( $r = .513, p < .001$ ).

### TCI- Differences between FS Group and healthy subjects

“Temperament dimensions” Novelty seeking (NS) is a personality trait associated with exploratory activity in response to novel stimulation, impulsive decision making, extravagance in approach to reward cues, and quick loss of temper and avoidance of frustration. Impulsiveness (NS2) ( $F = 3.750, p < .005$ ) Impulsiveness involves a tendency to act on a whim, displaying behavior characterized by little or no forethought, reflection, or consideration of the consequences. FS Patients show higher values in this dimension compared to healthy subjects (Fig.1). Tot. Harm avoidance (HA) ( $F = 19.061; p < .001$ ) Harm avoidance (HA) is characterized by excessive worrying; pessimism; shyness; and being fearful, doubtful, and easily fatigued In general FS women show higher levels in excessive worrying, pessimism, shyness, and being fearful, doubtful, and easily fatigued dimensions of Harm avoidance of TCI personality than healthy subjects. Fear of uncertainty (HA2)  $F = 31.106, p < .001$ . FMS patients show higher fear of uncertainty than healthy subjects. Shyness (HA3) ( $F = 5.194 p = .024$ ) FMS patients show higher fear of Shyness for unknown things. Fatigability (HA4) ( $F = 16.219, p < .001$ ). Patients show more lack of energy than healthy subjects. SMF women show higher levels in this dimension expressing an excessive concern about fear of uncertainty. They feel fear for unknown things and fatigability.

Reward Dependence (RD) is characterized as a tendency to respond markedly to signals of reward, particularly to verbal signals of social approval, social support, and sentiment, and learning to maintain and pursue behaviors which were previously associated with such rewards. When reward dependence levels deviate from normal we see an increase of several personality and addictive disorders.

Sentimentality (RD1) ( $F = 4.028$ ,  $p = .046$ ). Patients show higher values than healthy subjects. Persistence ( $F = 5.088$ ;  $p = .025$ ) SF women show less Persistence than healthy subjects. Eagerness of effort (PS1) ( $F = 6.857$ ,  $p = .010$ ). Patients show lower Eagerness of effort than healthy subjects. Ambitious (PS3) ( $F = 6.481$ ,  $p = .012$ ) SF women showed lower persistence, ambition and eagerness of effort than healthy subjects. "Character" dimensions Self-directedness (SD) is a personality trait referring to self-determination, that is, the ability to regulate and adapt behavior to the demands of a situation in order to achieve personally chosen goals and values. Self-directedness (SD): Responsibility (SD1) ( $F = 7.507$ ;  $p = .007$ ). SMF patients show more responsibility and control than healthy subjects (Fig.1).

### **SASB Differences between FMS and Healthy Subjects**

In relation to the Anint A of SASB questionnaire, a significant difference was observed in the intrapsychic processes of the two groups described by the 8 clusters (Oneself): Cl 1 Autonomy- Assertive and separating ( $F = 4.398$ ,  $p = .037$ ), Cl 2 Autonomy and Love-Self-accepting and exploring ( $F = .145$ ,  $p < .005$ ), Cl 3 Love - Self- Supporting and appreciative ( $F = 7.880$ ,  $p < .005$ ), Cl 4 - Love and control - Self-care and development ( $F = 6.734$ ,  $p = .010$ ), Cl 5 Control - Self-regulating and controlling ( $F = 24.930$ ,  $p < .001$ ), Cl 6 Control and hate - Self-critical and oppressive ( $F = 26.310$ ,  $p < .001$ ), Cl 7 - Hate - Self-refusing and annulling. ( $F = 56.937$ ,  $p < .001$ ), Cl 8 - Hate and autonomy ( $F = 11.632$ ,  $p < 0.001$ ) (Fig.2). Participants affected by FMS showed lower levels of autonomy, autonomy and Love, Love and Love and control compared to the control group, with higher levels of Control, Control and hate, Hate and Hate and autonomy. In spite of the relatively small number of patients the results show many significant differences (Fig.2). The profile of the SASB Model showed the presence of depression. FMS patients presented low assertiveness and low ability to accept and support themselves (to treat, care for, console and consolidate). These patients have a tendency to be oppressive towards themselves (as the range reached shows) (SASB negative control) and can accuse themselves of inadequacy, evoking feelings of guilt and shame, and maintaining low self-esteem (SASB negative control). In extreme cases they can present self-punitive behavior. The main aspect of this profile is the tendency to exercise a negative control. In general, these patients exercise greater self control aimed to specific objectives, such as an attempt to achieve an ideal behavior and, in the extreme cases, by exhausting themselves trying to reach predetermined goals. The results in Anint A questionnaire of SASB Model showed that patients presented a tendency to depression without reaching a level of major depression, as shown by the distribution of the ranges of the different clusters.

### **Interpersonal Behaviors**

On the basis of these intrapsychic processes it is possible to describe the interpersonal processes as follows: lower level of appreciation, understanding and empathy towards others in Cl1 - Autonomy- Liberating and forgetting ( $F = 4.398$ ,  $p = .037$ ), Cl 2 - Autonomy and Love - Confirming and understanding ( $F = 8.145$ ,  $p < .005$ ) and Cl 3 Love- Caring and consoling ( $F = 7.880$ ,  $p < .005$ ), increased desire to be close to others without real intimacy in Cl 4 Love and control - Helping and protecting ( $F = 6.734$ ,  $p = .010$ ), 10 increased desire to control others, by reminding what they should think, do and say in Cl 5 Control - Looking after and managing. ( $F = 24.930$ ,  $p < .001$ ), tendency to blame others in Cl 6 Control and hate- Belittling and blaming ( $F = 26.310$ ,  $p < .001$ ), tendency to seriously threaten the other in Cl 7 Hate - Assaulting and refusing ( $F = 56.937$ ,  $p < .001$ ), and tendency to ignore and neglect the needs and interests of the other in Cl 8 Hate and autonomy - Ignoring and forgetting ( $F = 11.632$ ,  $p < .001$ ). FMS patients interpersonal profile. These patients don't fully promote independence in their relationship with others, by expressing trust and encouraging the independent identity of others; they are not always appreciative and empathic towards the other accepting difference of opinion and they do not always actively help or be close to the other person. However these behaviors may include elements of neglect and forgetfulness. They tend to control the others in a positive and negative way and may express behaviors of belittling, blaming or manipulating the other. In extreme cases these patients may ignore and neglect the needs and interests of the other.

### **Correlation between TCI, anxiety (ASQ) and depression (CDQ)**

Anxiety. A correlation was found for FS subjects between: Fear of uncertainty (HA2) and ASQ ( $r = 0.457$ ;  $p < .001$ ); Shyness (HA3) and ASQ ( $r = .279$ ;  $p = .039$ ); Fatigability (HA4) and ASQ ( $r = .416$ ;  $p = .002$ ); Harm avoidance (HA) and ASQ ( $r = .451$ ,  $p < .001$ ). Depression. A correlation was found for FS subjects between Fear of uncertainty (HA2) and CDQ ( $r = .272$ ;  $p = .056$ -tendency); Shyness (HA3) and CDQ ( $r = .357$ ;  $p = .011$ ); Fatigability (HA4) and CDQ ( $r = .367$ ;  $p < .009$ ); Harm avoidance (HA) and CDQ ( $r = .418$ ,  $p = .002$ ) More the patient shows Fear of uncertainty, Shyness, Fatigability (HA4) and, Harm avoidance (HA) and more she is anxious and depressed.

### **Correlation between SASB, anxiety and depression**

A negative correlation was found for FMS subjects between Cl 2 - Autonomy and Love ( $r = -.267$ ,  $p = .049$ , tendency), Cl 3 - Love ( $r = -.382$ ,  $p = .004$ ) and anxiety (ASQ). More anxiety tends to be correlated to less autonomy and love, and love. Instead a positive correlation was found for Cl 8 - Hate and autonomy ( $r = .375$ ,  $p < .005$ ) and anxiety (ASQ). More anxiety leads to more hate and autonomy. About depression (CDQ), was found a negative correlation with Cl 2 - Autonomy and Love ( $r = -.405$ ,  $p = .004$ ) and a positive correlation with Cl 5 - Control ( $r = .283$ ,  $p = .047$ , tendency). More depression tend to lead to less autonomy and love, and more depression leads to more control.

**Table 1. Descriptive Statistics of fibromyalgia and healthy subjects**

	Fibromyalgia subjects group (N = 57, 21.92%)	Healthy subjects group (N = 203, 78.08%)
Age		
Media	55.65	47.46
Mediana	55.00	49.00
Moda	55.00	52.00
Dev. Stand.	10.470	9.716
Civil Status		
Single	78.20%	20.40%
Married	10.90%	64.20%
Divorced	5.50%	5.50%
Widow	5.50%	10.40%
Educational Level		
Literate	32.70%	3.00%
Elementary	23.60%	18.20%
Middle School	30.90%	49.30%
High School	12.70%	29.10%
University	0.00%	0.50%

**Table 2. Correlations between TCI, SASB, ASQ and CDQ for fibromyalgia patients**

TCI	ASCI01		ASCI02		ASCI03		ASCI04		ASCI05		ASCI06		ASCI07		ASCI08		ASQ		CDQ	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
Exploratory excitability(NS1)	,017	,899	,003	,985	,067	,616	,287*	,029	,087	,515	-,045	,735	,065	,628	,080	,549	,021	,877	,035	,811
Impulsivness (NS2)	,334*	,010	,143	,283	,140	,295	-,058	,668	-,040	,768	-,060	,654	-,270*	,041	,026	,849	-,072	,602	-,114	,430
Extravagance (NS3)	,071	,598	,059	,660	,141	,292	-,047	,724	-,247	,062	-,107	,423	,050	,712	-,154	,249	-,170	,215	,015	,919
Disorderliness (NS4)	,266*	,044	-,027	,843	,158	,236	,016	,904	-,074	,581	,072	,593	-,141	,291	,073	,585	,046	,741	,010	,946
Novelty seeking (NS)	,296*	,024	,093	,489	,226	,088	,074	,581	-,141	,290	-,082	,540	-,122	,360	-,013	,926	-,099	,473	-,028	,846
Anticipatory worryHA1)	,096	,475	,169	,205	-,022	,868	,150	,261	,120	,369	,071	,597	,562**	,000	,199	,135	,167	,222	,182	,205
Fear of uncertain (HA2)	,164	,218	,052	,699	,004	,979	-,090	,502	-,076	,573	,092	,493	-,022	,873	,146	,275	,457**	,000	,272	,056
Shyness (HA3)	,187	,160	-,145	,278	-,236	,074	,032	,811	,074	,581	,224	,091	,139	,298	,430**	,001	,279*	,039	,357*	,011
Fatigability (HA4)	-,198	,137	-,361**	,005	-,334*	,010	-,216	,104	-,079	,557	,013	,925	-,186	,162	,110	,412	,416**	,002	,367**	,009
Harm avoidance (HA)	,078	,562	-,050	,711	-,193	,148	-,005	,969	,041	,759	,128	,337	,303*	,021	,307*	,019	,451**	,001	,418**	,002
Sentimentality (RD1)	-,237	,073	-,263*	,046	-,289*	,028	-,078	,560	,259*	,049	,216	,103	,130	,329	,092	,493	,234	,085	,086	,554
Openness to warm communication (RD2)	,213	,109	,045	,739	-,124	,352	-,184	,166	-,092	,494	,175	,188	-,052	,698	,177	,183	,072	,603	-,125	,389
Attachment (RD3)	,224	,091	,076	,571	,036	,790	,024	,861	-,046	,733	,057	,671	,142	,287	,127	,342	-,033	,809	-,095	,510
Dependence (RD4)	-,417**	,001	-,229	,083	-,332*	,011	-,191	,152	-,003	,983	,077	,568	-,007	,959	,002	,986	,005	,970	,019	,895
Reward dependence (RD)	-,088	,512	-,143	,283	-,271*	,039	-,160	,229	,044	,742	,198	,137	,092	,494	,153	,253	,099	,473	-,042	,771
Eagerness of effort(PS1)	-,151	,257	-,006	,965	-,033	,806	,168	,207	,315*	,016	,036	,787	,007	,959	-,066	,624	-,148	,279	-,113	,433
Work hardened (PS2)	-,087	,515	,125	,351	,005	,969	,208	,117	,438**	,001	,167	,210	,544**	,000	,108	,421	-,144	,295	-,054	,712
Ambitious (PS3)	,182	,171	,213	,108	,275*	,037	,367**	,005	,446**	,000	-,016	,904	,354**	,006	-,031	,820	,101	,464	,090	,536
Perfectionist(PS4)	-,067	,618	,046	,731	-,007	,958	,179	,178	,504**	,000	,102	,446	,239	,071	,068	,610	,210	,124	,193	,179



Persistence (PS)	-,037	,784	,128	,339	,085	,526	,312*	,017	,572**	,000	,094	,485	,379**	,003	,024	,857	,012	,933	,042	,772
Responsibility (SD1)	-,170	,203	,288*	,029	,161	,226	-,079	,557	-,350**	,007	-,490**	,000	-,396**	,002	-,452**	,000	-,373**	,005	-,406**	,003
Purposeful (SD2)	-,387**	,003	,156	,244	,098	,464	,210	,114	,090	,503	-,406**	,002	-,245	,064	-,497**	,000	-,308*	,022	-,467**	,001
Resourcefulness (SD3)	-,124	,356	,204	,125	,164	,220	,015	,913	-,181	,174	-,377**	,003	-,334*	,010	-,362**	,005	-,385**	,004	-,503**	,000
Self-acceptance (SD4)	-,173	,195	,013	,925	,033	,807	-,272*	,039	-,277*	,036	-,399**	,002	-,287*	,029	-,335*	,010	-,221	,105	-,033	,819
Enlightened second nature(SD5)	-,058	,668	,455**	,000	,406**	,002	-,022	,873	-,300*	,022	-,503**	,000	-,206	,121	-,483**	,000	-,343*	,010	-,366**	,009
Self-directedness (SD)	-,246	,063	,319*	,015	,244	,065	-,011	,937	-,257	,052	-,579**	,000	-,381**	,003	-,575**	,000	-,439**	,001	-,513**	,000
Social acceptance(C1)	-,174	,193	-,243	,066	-,189	,154	-,043	,750	-,034	,803	-,026	,844	-,140	,296	,142	,289	-,035	,799	,090	,535
Empathy(C2)	-,243	,066	-,104	,436	,024	,861	,276*	,036	,188	,157	-,011	,932	,071	,596	-,157	,238	-,087	,528	-,149	,300
Compassion (C4)	-,090	,503	-,107	,424	-,216	,104	-,132	,322	-,005	,973	-,150	,262	-,110	,410	-,090	,502	-,068	,623	-,058	,687
Helpfulness (C3)	-,104	,435	-,108	,420	-,132	,325	-,214	,106	-,244	,065	-,076	,572	-,205	,123	-,155	,244	-,238	,080	-,176	,220
Pure-hearted conscience (C5)	-,255	,053	-,207	,118	-,013	,924	-,045	,738	-,001	,996	-,056	,678	-,155	,247	-,068	,610	-,135	,326	,052	,719
Cooperativeness (C)	-,278*	,034	-,254	,054	-,185	,164	-,030	,824	,000	,999	-,104	,438	-,158	,235	-,080	,549	-,154	,262	-,059	,686
Self-forgetful (S)	,011	,932	-,165	,215	-,133	,320	,274*	,038	,329*	,012	,308*	,019	,176	,187	,291*	,027	,084	,541	,083	,565
Transpersonal identification (ST2)	,015	,910	-,090	,503	-,076	,570	,078	,558	,239	,070	,147	,271	,007	,961	,065	,626	-,101	,461	-,115	,425
Spiritual acceptance (ST3)	-,141	,291	-,036	,789	-,004	,974	,215	,106	,116	,387	-,158	,235	-,090	,502	-,033	,805	-,054	,697	-,174	,226
Self-transcendence (ST)	-,053	,694	-,125	,351	-,091	,498	,250	,058	,292*	,026	,123	,358	,041	,762	,141	,293	-,025	,857	-,084	,560

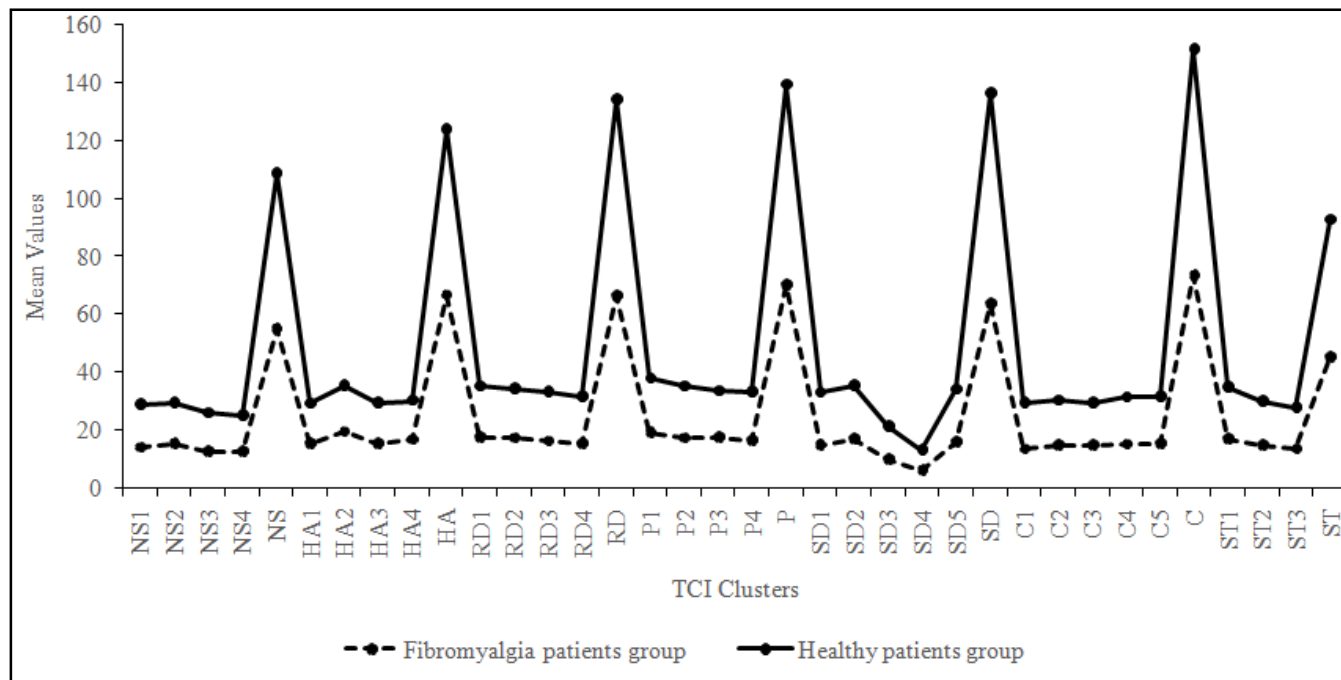


Fig. 1. TCI differences between fibromyalgia and healthy patients groups

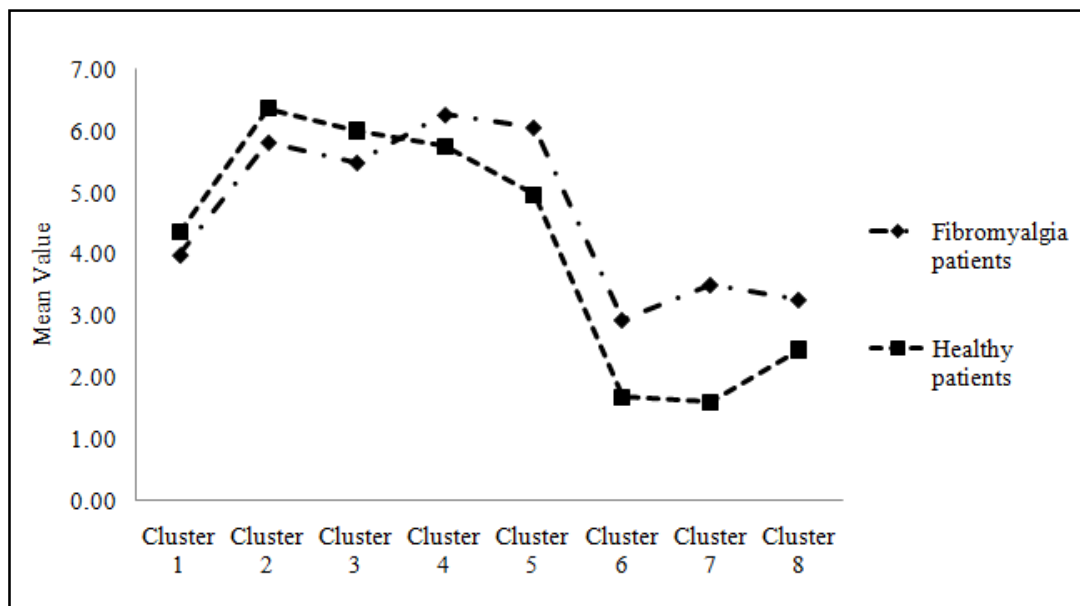


Fig. 2. Differences in intrapsychic modalities (SASB) between FMS patients and healthy subjects

### Correlations ASQ- CDQ – TCI

Fear of uncertainty (HA2) is correlated with anxiety(ASQ) ( $r = .457$ ;  $p < .001$ ); Shyness (HA3) is correlated with anxiety (ASQ) ( $r = .279$ ,  $p = .039$  and depression (CDQ) ( $r = .357$ ;  $p = .011$ ); Fatigability (HA4) is correlated with anxiety (ASQ) ( $r = .416$ ,  $p = .002$ ) and depression (CDQ) ( $r = .367$ ;  $p = .009$ ); Harm avoidance (HA) is correlated with anxiety(ASQ) ( $r = .451$ ,  $p < .001$ ) and depression (CDQ) ( $r = .418$ ;  $p = .002$ ); Responsibility (SD1) is correlated with anxiety(ASQ) ( $r = -.373$ ,  $p < .005$ ) and depression (CDQ) ( $r = -.406$ ;  $p = .003$ ); Purposeful (SD2) is correlated with anxiety (ASQ) ( $r = -.308$ ,  $p = .022$ ); and depression (CDQ) ( $r = -.467$ ;  $p < .001$ ); Resourcefulness (SD3) is correlated with anxiety(ASQ) ( $r = -.385$ ,  $p = .004$ ); and depression (CDQ) ( $r = -.503$ ;  $p < .001$ ); Enlightened second nature (SD5) anxiety(ASQ) ( $r = -.343$ ,  $p = .010$ ); and depression (CDQ) ( $r = -.366$ ;  $p = .009$ ); Self-directedness (SD) with anxiety(ASQ) ( $r = -.439$ ,  $p < .001$ ) and depression (CDQ) ( $r = -.513$ ;  $p < .001$ ) (Tab.2).

### Correlations TCI-SASB

The data obtained from the SASB model were then correlated with those obtained by the TCI test. The various correlations showed the following trends (Tab.2): High Impulsiveness (NS2) is correlated with: low level of autonomy – SASB-C11 Autonomy - Assertive and separating ( $r = .334$ ;  $p = .010$ ); and high level of Hate- SASB-C1 7 -Self-refusing and annulling ( $r = -.270$ ;  $p = .041$ ). More Impulsiveness is correlated with less autonomy and with behaviors of ignoring illnesses and wounds, incurring in self-exhaustion. Disorderliness (NS4) Vs Control is correlated with: low level of autonomy- SASB C11 Autonomy (Assertive and separating) ( $r = .266$ ;  $p = .044$ ). More stiffness (Disorderliness-NS4) is correlated with less autonomy. Low Novelty seeking (NS) is correlated with low level of autonomy- SASB C11 - Autonomy (Assertive and separating) ( $r = .296$ ;  $p = .024$ ). Fatigability (HA4) is correlated with low level of Autonomy and Love- SASB C1 2

(Self-accepting and exploring). ( $r = -.361$ ;  $p < .005$ ) and, Love-SASB C1 3 (Self-supporting and appreciative) ( $r = -.334$ ;  $p = .010$ ). Fatigability leads to low self acceptance and appreciation. Sentimentality (RD1) is correlated with low Autonomy and Love- SASB C1 2 (Self-accepting and exploring) ( $r = -.263$ ;  $p = .046$ ) and low Love- SASB C1 3 (Self-supporting and appreciative) ( $r = -.289$ ;  $p = .028$ ) and high Control - SASB -C1 5 (Self-regulating and controlling) ( $r = .259$ ;  $p = .049$ ). More Sentimentality is linked to low self acceptance, low self appreciation and high control. Harm avoidance (HA) is correlated with Hate SASB - C17 (Self-refusing and annulling) ( $r = .303$ ;  $p = .021$ ) and with Hate and autonomy -SASB C1 8 (Self-negligent and mentally absent). ( $r = .307$ ;  $p = .019$ ). The dimension of excessive worrying, pessimism, shyness, and being fearful, doubtful, and easily fatigued (Harm avoidance) is linked to high behaviors of self refusing, ignoring illnesses and wounds, and incurring in self-exhaustion. Shyness (HA3)-the insecurity for unknown things- is correlated with Hate and autonomy-SASB - C1 8 (Self-negligent and mentally absent). ( $r = .430$ ;  $p < .001$ ). More the patient shows the Shyness dimension the more behaviors of self-negligence are present. Anticipatory worry (HA1) is correlated with Hate-SASB -C1 7 (Self-refusing and annulling) ( $r = .562$ ;  $p = .001$ ) The patients with Anticipatory worry show behaviors of high self refusing, ignoring illnesses and wounds, and incurring in self-exhaustion and in self-negligence. Dependence (RD4) is correlated with SASB C11 - Autonomy (Assertive and separating) ( $r = -.417$ ,  $p < .001$ ) and SASB C1 3 Love (Self-supporting and appreciative) ( $r = -.332$ ,  $p = .011$ ) Low autonomy and low self-esteem. The more FMS patients present low assertiveness and low ability to be appreciative of themselves the more they are dependent (RD4). The low capacity for self-esteem is correlated with dependence dimension of temperament. Reward dependence (RD) is correlated with SASB C13-Love (Self-supporting and appreciative) ( $r = -.271$ ,  $p = .039$ ). Eagerness of effort (PS1) is correlated with SASB C1 5-Control (Self-regulating and controlling) ( $r = .315$ ,  $p = .016$ ). Work hardened (PS2) is

correlated with SASB C15-Control (Self-regulating and controlling) ( $r=.438$ ;  $p<.001$ ), SASB C17-Hate (Self-refusing and annulling) ( $r=.544$ ,  $p<.001$ ). Ambitious (PS3) is correlated with SASB C13- Love (Self-supporting and appreciative) ( $r=0.275$ ,  $p=0.037$ ) and SASB C1 4 - Love and control (Self-care and development) ( $r=.367$ ,  $p<.005$ ), SASB C15-Control (Self-regulating and controlling) ( $r=.446$ ,  $p<.001$ ), SASB C17-Hate (Self-refusing and annulling) ( $r=.354$ ,  $p=.006$ ). Perfectionist (PS4) is correlated with SASB C1 5-Control (Self-regulating and controlling) ( $r=.504$ ,  $p<.001$ ) Persistence (PS) is correlated with SASB C1 4-Love and control (Self-care and development) ( $r=.312$ ,  $p=.017$ ), SASB C15-Control (Self-regulating and controlling) ( $r=.572$ ,  $p<.001$ ), SASB C17-Hate (Self-refusing and annulling) ( $r=.379$ ,  $p=.003$ ). Responsibility (SD1) is correlated with SASB-C12-Autonomy and love (Self-accepting and exploring) ( $r=.288$ ,  $p=.029$ ), SASB C15-Control (Self-regulating and controlling) ( $r=-.350$ ,  $p=.007$ ), SASB-C16-Control and hate (Self-critical and oppressive) ( $r=-.490$ ,  $p<.001$ ), SASB C17-Hate (Self-refusing and annulling) ( $r=-.396$ ,  $p=.002$ ), SASB C18-Hate and autonomy (Self-negligent and mentally absent) ( $r=-.452$ ,  $p<.001$ ). Purposeful (SD2) is correlated with SASB- C16-Control and hate (Self-critical and oppressive) ( $r=-.406$ ,  $p=.002$ ), SASB C18-Hate and autonomy (Self-negligent and mentally absent) ( $r=-.497$ ,  $p<.001$ ).

Resourcefulness (SD3) is correlated with SASB C16-Control and hate (Self-critical and oppressive) ( $r=-.377$ ,  $p=.003$ ), SASB C17-Hate (Self-refusing and annulling) ( $r=-0.334$ ,  $p=.010$ ), SASB C18-Hate and autonomy (Self-negligent and mentally absent) ( $r=-.362$ ,  $p<.005$ ). Self-acceptance (SD4) is correlated with SASB C1 4-Love and control (Self-care and development) ( $r=-.272$ ,  $p=.039$ ), SASB C15-Control (Self-regulating and controlling) ( $r=-.277$ ,  $p=.036$ ), SASB C16-Control and hate (Self-critical and oppressive) ( $r=-.399$ ,  $p=.002$ ), SASB C17 - Love and control (Self-refusing and annulling) ( $r=-.287$ ,  $p=.029$ ), SASB C18 - Autonomy and love (Self-negligent and mentally absent) ( $r=-.335$ ,  $p=.010$ ). Enlightened second nature (SD5) is correlated with SASB C1 2- Autonomy and love (Self-accepting and exploring) ( $r=.455$ ,  $p<.001$ ), SASB C13- Love (Self-supporting and appreciative) ( $r=.406$ ,  $p=.002$ ), SASB C15-Control (Self-regulating and controlling) ( $r=-.300$ ,  $p=.022$ ), SASB C16-Control and hate (Self-critical and oppressive) ( $r=-.503$ ,  $p=.001$ ), SASB C18-Hate and autonomy (Self-negligent and mentally absent) ( $r=-.483$ ,  $p<.001$ ). Self-directedness (SD) is correlated with and SASB-C12- Autonomy and love (Self-accepting and exploring) ( $r=.319$ ,  $p=.015$ ), SASB- C16-Control and hate (Self-critical and oppressive) ( $r=-.579$ ,  $p=.001$ ), SASB C17-Hate (Self-refusing and annulling) ( $r=-.381$ ,  $p=.003$ ), SASB C18- Hate and autonomy (Self-negligent and mentally absent) ( $r=-.575$ ,  $p<.001$ ). Empathy (C2) is correlated with SASB C14- Love and control (Self-care and development) ( $r=-.276$ ,  $p=.036$ ). Cooperativeness (C) is correlated with SASB C11-- Autonomy (Assertive and separating) ( $r=-.278$ ,  $p=.034$ ). Self-forgetful (ST1) is correlated with SASB-C1 4-Love and control (Self-care and development) ( $r=.274$ ,  $p=.038$ ), SASB C15-Control (Self-regulating and controlling) ( $r=.329$ ,  $p=.012$ ), SASB- C16-Control and hate (Self-critical and oppressive) ( $r=.308$ ,  $p=.019$ ). Description of the dimensions resulting from the correlations between SASB and TCI Women with Fibromyalgia Syndrome do not feel completely spontaneous

and free to act as they see fit (C11- medium low range), and this is significantly correlated with the dimension of showing low impulsiveness (NS2) low disregulation (Stiffness) (NS4) with poor resistance to frustration (NS). Moreover they show high dependence and high social acceptance. They show medium low dimensions of accepting and reacting to their deepest feelings, feeling solid, integrated (C12) and this is correlated with the dimension of lack of energy (HA4), sentimentality (RD1), of blaming others ((SD1) and, with low lighting (SD5) and low self directness(SD).

Moreover the less appreciative they are of themselves (C13) and the more they show lack of energy (HA4) and sentimentality (RD1), the more they show high dependence (RD4) with excessive high social attachment and dependence from approval (RD) the less they are ambitious (PS3) and lighting TCI dimension (SD5) is present. The less patients protect and realistically examine the capacity of being positively self-constructive, actively developing their abilities (C14) the more they show stoic rigidity (NS1), and persistence correlated with dependence on the reward (PS). They are less ambitious (PS3). Moreover low level in CL4 is correlated with more struggle with self (and low self acceptance) (SD4), with low empathy or social indifference (C2) and with forgetfulness of self (low experience of self awareness) (ST1). The more patients express self control (C15) the more they express sentimentality (RD1) the more they show desire of commitment (PS1). Control is correlated with the dimension of: hardened by work (PS2); being perfectionist(PS4); expressing perseverance in dependence of the reward (PS); blaming others(SD1); expressing low self acceptance and conflict with self (SD4) ; low lighting (SD5) and forgetful of self (ST1). These patients show self-critical and oppressive behaviors towards themselves with feelings of inadequacy (C16) and this is correlated with the difficulty to be responsible (blame others -SD1) lack of goals (SD2); lack of resources (SD3); low acceptance of self (struggle with self SD4); and low lighting (SD5); low identification of herself as an autonomous individual (SD) and forgetful of self (ST1). FMS women may ignore illnesses and wounds, incurring in self-exhaustion (SASB-CL7) with self-refusal and self-deprivation behaviors as well as, and correlated with, impulsiveness (NS2), anticipated anxiety and pessimism (HA1), passive avoidance behaviors (HA), hardened by work (PS2), being ambitious(PS3) of expressing perseverance in dependence of the reward (PS), lack of resources (SD3), low acceptance of self (struggle with self SD4), low identification of herself as an autonomous individual(SD). Woman with FMS are anxious and insecure in front of unknown things(NS2) show passive avoidance behaviors (HA) including: blaming others(SD1); lack of goals (SD2); lack of resources (SD3); low acceptance of self (struggle with self ) (SD4); low lighting (SD5); low identification of herself as an autonomous individual (SD). These behaviors are correlated with the personality trait identifying someone who may daydream, subsequently not developing her abilities and potentials to their full extent (C18).

## DISCUSSION

Compared to healthy subjects, women affected by FMS presented a higher level of both depression and anxiety



(medium-high). In addition, there was a substantial difference in the number of TCI dimensions and intrapsychic and interpersonal attitudes. In general FMS women expressed higher levels in excessive worrying, pessimism, shyness, and being fearful, doubtful, and easily fatigued dimensions of Harm avoidance of personality of TCI than healthy subjects. Moreover they show a tendency to act on a whim, displaying behavior characterized by little or no forethought, reflection, or consideration of consequences. FMS women express an excessive concern about fear of uncertainty. They fell fear of unknown things and fatigability. Moreover sentimentality is present; persistence is low as Eagerness of effort and Ambitious. FMS patients showed more responsibility and control than healthy subjects. FMS patients presented in the SASB Model less autonomy in their choices and lower acceptance of their own feelings. These individuals are less spontaneous in their behaviors and show difficulties to get in touch with and accept their deeper feelings. Being unappreciative of themselves, they show low capacity to treat, console, care for and forgive themselves. If left untreated, these attitudes could hamper the patient's ability reach a good quality of life (pain, disabilities). The presence of dimension of negative control is the particular aspect of this profile. These behaviors are correlated with TCI dimension. Synthesizing, Self-control, Self-critical and oppressive behaviors, the feelings of inadequacy (CI6) to ignore illnesses and wounds incurring in self-exhaustion (CI7), the low identification of herself as an autonomous individual (SD) and forgetful of self (ST1), the low acceptance of self (struggle with self SD4), to be anxious and insecure in front of unknown things (NS2), the presence of lack of resources (SD3), low acceptance of self (SD5) low identification of herself as an autonomous individual (SD) are all behaviors that may be linked to stress and to pain.

In fact negative control (SASB) and intrapsychic behaviors are probably related to physical control and then tightening of muscles (Thieme *et al.*, 2004; White *et al.*, 2009; Börsbo *et al.*, 2010). This consideration is based on the assumption that the vicious circle of pain includes muscle stiffening. The other important TCI dimension correlated with different SASB clusters is the low identification of herself as an autonomous individual (SD). These patients' intrapsychic disadaptive modalities linked to temperament and character dimensions can be traced to the patients' condition and pain. Many studies have shown that chronic pain creates a decline in mood to a real state of depression (Thieme *et al.*, 2006). Another question that arises is whether repeated pain can affect intrapsychic processes and temperament and character dimensions creating a bending of the personality or if it is the personality to influence these characteristics. Probably both are true in a vicious circle of mutual influence (Carbonell-Baeza *et al.*, 2011). These results are in agreement with different studies in particular the following: some authors (Hassett *et al.*, 2000; Gormsen *et al.*, 2010) affirm that patients with FMS tended to have an increased risk for depressive symptoms and tended to have more unhappy and discontented feelings. Moreover no association was found between depression, history of psychiatric symptoms and increased of Fibromyalgia (Okifuji *et al.*, 2000; Fietta *et al.*, 2007). However, personality disorders are rarely diagnosed in Fibromyalgia Syndrome

(Thieme *et al.*, 2004; Arnold *et al.*, 2006; Malin, 2007). Thus, premorbid personality patterns do not seem to be directly associated with Fibromyalgia Syndrome per se (Fietta *et al.*, 2007). While depression and anxiety have been considered consequences rather than a cause of FMS, the intrapsychic and interpersonal characteristics described in this study could demonstrate that these individuals may be more prone to depression and anxiety as the description of the intrapsychic factors indicated. These considerations may be important for different reasons in particular the following: depression (and the intrapsychic processes linked to it) may hamper adaptation to the disease condition and to the medical treatment.

Therefore further studies are necessary in this field. On the basis of our results it is possible to hypothesize that a targeted psychotherapeutic intervention could help overcome the maladaptive intrapsychic modalities related to negative control. Psychotherapeutic intervention (Scheidt *et al.*, 2013; van Eijk-Hustings *et al.*, 2013) that allows the patient to overcome this control could also affect pain, favoring its decrease. Furthermore, the patient would learn pain management (Fors *et al.*, 2002; Köllner *et al.*, 2012). Based on the intrapsychic profile (SASB) which emerged specific psychotherapeutic intervention (Scheidt, 2013; Vázquez-Rivera, 2009, van Eijk-Hustings, 2013) could be necessary (Benjamin, 2006) for facilitating the contact, elaboration and integration of emotional experiences (passive adaptation, low self-affirmation, self-criticism), in order to change the style of life and to encourage resources necessary for a successful adaptation to the disease condition and to medical treatment (with its side effects). The project envisioned here is multidisciplinary (Carbonell-Baeza *et al.*, 2011) and involves the integration of the intervention of psychotherapy in psychosomatic medicine with focused physical training exercise. Despite of the limitation of the small sample studied many significant differences in intrapsychic and temperament and character dimensions in FMS patients emerged. The results of this study may help proper further researches.

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