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Disclosing fibromyalgia psychological profile: the connection between body and mind

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1. Abstract

Fibromyalgia is a clinical condition still understudied that presents a clear connection with certain psychological features, in terms of personality traits, behaviors, and clinical symptoms. By analyzing a survey that was conducted by the Center of Psychology and Functional Psychotherapy (i.e., Centro di Psicologia e Psicoterapia Funzionale) with 76 female patients in 2021, the aim of the present study was to disclose the psychological profile of fibromyalgia and to better understand the psychological features of a typical sufferer of this syndrome. In detail, 8 different psychological aspects were assessed: anxiety, depression, psychosis, touch avoidance, positive affect, quality of life, self-criticism, and pain acceptance, through 8 specific scales translated and validated to Italian. We compared our sample means with normative data means and examined possible correlations between the features. The results point out that the fibromyalgia psychological profile is composed by high anxiety trait levels, mild to moderate levels of depression, a risk of developing psychotic disorders, medium levels of touch avoidance, elevated feelings of compassion towards others, a medium to high negative impact on quality of life, inflated self-hate criticism, and a lack of pain acceptance characterized mainly by pain unwillingness. The practical use of the fibromyalgia psychological profile and its relevance are reported and discussed, as well as the correlations between the psychological features.

2. Introduction

2.1. Fibromyalgia: the chronic pain syndrome

Fibromyalgia is a chronic pain syndrome that is primarily defined by broad, persistent, and long-lasting musculoskeletal discomfort that lasts for more than three months (D'Agnelli et al., 2018). Fatigue, sleep issues, and other cognitive, psychological and physical symptoms are linked to this syndrome (Clauw, 2014), which presents a 2-4% prevalence in the general population (Jones, Atzeni, Beasley, Flüß, Sarzi-Puttini & Macfarlane, 2015). Interestingly, the prevalence is similar among different countries, cultures and ethnicities (McBeth & Jones, 2007), and women are significantly more affected than men, having three times higher likelihood of receiving a diagnosis (Arnold et al., 2019). The etiology of fibromyalgia is still unknown (Wolfe, Ross, Anderson, Russell & Hebert, 1995).

Despite the uncertainty regarding the causal mechanisms of fibromyalgia, evidence suggests that genes may be significantly involved in the syndrome (Kato, Sullivan, Evengård & Pedersen, 2009; Kerr & Burri, 2017; Markkula, Järvinen, Leino-Arjas, Koskenvuo, Kalso & Kaprio, 2009), as family members of fibromyalgia individuals can also have a history of persisting pain (Arnold et al., 2004). Moreover, environmental factors like infections (e.g., Epstein-Barr virus; see Buskila, Atzeni & Sarzi-Puttini, 2008), trauma (McLean et al., 2011) and psychological stressors (e.g. childhood trauma, abuse and mental disorders; see Clauw, 2014; Häuser, Kosseva, Üceyler, Klose & Sommer, 2011) may be associated with the rise of this clinical condition.

Functional magnetic resonance imaging (fMRI) investigations are also revealing that fibromyalgia sufferers have enhanced neuronal activity in areas of the brain that process pain and that their pain responses to experimental stimuli (sensitization) is exaggerated. Therefore, it could be inferred that these individuals' have the tendency to intensify their

pain experience due to an abnormality in their pain processing regulation system (O'Brien, Deitos, Pego, Fregni & Carrillo-de-la-Peña, 2018). Studies point out that this abnormality can also affect the way other sensory data is processed, which may explain how some bothersome symptoms like fatigue, disturbed sleep, cognitive issues, and depression are present in this syndrome (Clauw, 2014). In addition, the risk factors for the development of this clinical condition are: being a female (Arnold et al., 2019), the presence of other painful (e.g., rheumatoid arthritis; see Fitzcharles, Perrot & Häuser, 2018) or mental health conditions (Løge-Hage, Sæle, Juhl, Bech, Stenager, Mellentin, 2019), sleep disturbances, physical inactivity (Skarpsno, Nilsen, Sand, Hagen, Mork, 2019), being overweight (Mork, Vasseljen & Nilsen, 2010) and middle age (Galek et al., 2013).

As was already noted, fibromyalgia can include physical, cognitive, and psychological symptoms. Headaches, bloating, nausea, diarrhea, jaw discomfort, vertigo, and paresthesia are examples of physical symptoms. Moreover, memory, attention, and concentration may be affected. In fact, the term *"fibro fog"* has been used to describe this particular set of cognitive issues in fibromyalgia cases (Bair & Krebs, 2020). Regarding the psychological manifestations, research reveals that individuals with fibromyalgia are more likely to be diagnosed with mental disorders such as depression, anxiety, obsessive-compulsive disorder, and posttraumatic stress disorder (Clauw, 2014).

When discussing about the fibromyalgia treatment, it is important to specify that it should be multimodal and multidisciplinary, especially because no single treatment improves function and minimizes all symptoms (Bair & Krebs, 2020). However, due to practice patterns that prioritize pharmacological therapy over nonpharmacological treatments, drugs are frequently administered for fibromyalgia sufferers and can cause negative side effects (Bair & Krebs, 2020). In addition, clinical studies have only found

minor improvements in individual outcomes that undertook pharmacological treatment (Fitzcharles et al., 2013; Macfarlane et al., 2017). Hence, nonpharmacological treatments cannot be left aside during fibromyalgia therapy as they are the mainstay of treatment and can help to reduce symptoms and improve functionality (Macfarlane et al., 2017).

One of the most famous nonpharmacological treatments is exercising. Aerobic exercise, in particular, is an essential component of fibromyalgia treatment because it can enhance sleep (Häuser et al., 2010), function (Kaleth, Slaven & Ang, 2014), and lessen depressive and anxiety symptoms if present (McDowell, Cook & Herring, 2017). Furthermore, strength and resistance training (Busch et al., 2013), and mind-body exercises like tai chi or yoga are additional exercise types that could be beneficial for this clinical group (Lauche et al., 2015). Besides, massage sessions of different types (e.g., myofascial release and shiatsu) can improve pain, fatigue, and quality of life (Yuan, Matsutani & Marques, 2015). The same results were found for spa therapy (Maindet et al., 2021).

Psychotherapy is another form of care that is frequently utilized for fibromyalgia cases. Numerous psychotherapy approaches, including Cognitive Behavioral Therapy (CBT), Psychoanalysis, and Acceptance and Commitment Therapy (ACT) have been shown to improve the suffering of individuals that have this medical condition. The focus of CBT, for instance, is on identifying maladaptive thoughts and beliefs that are responsible for the creation of emotional discomfort and dysfunctional behaviors (Chand, Kuckel & Huecker, 2023). According to a scientific study (Bennett & Nelson, 2006), this type of psychotherapy offers significant benefits in pain-related behavior, self-efficacy, coping mechanisms and general physical function.

Psychoanalytic treatment's central point, on the other hand, is on how the unconscious mind influences conscious functions in ways that obstruct normal psychological functioning. In a case study conducted by Griffies (2010), for example, the analyst helped

the client to better understand his feelings and to acknowledge symbolic representations of his body pain. Moreover, the third wave of the cognitive and behavioral approach gave rise to ACT, a type of psychotherapy that focuses on assisting the individual in accepting his or her own thoughts and feelings and committing to personal values. ACT has been shown to benefit fibromyalgia sufferers in increasing levels of pain acceptance and decreasing levels of depression and kinesiophobia (i.e., excessive, and illogical fear of physical movement because it makes one feel vulnerable to suffering an unpleasant injury or re-injury; see Simister, Tkachuk, Shay, Vincent, Pear & Skrabek, 2018).

Despites the treatments mentioned above, as soon as the person is diagnosed, he or she should be educated on the pathophysiology, available treatments, and any potential coexisting conditions. Education is a crucial part of fibromyalgia treatment because it validates the illness experience, lessens anxiety caused by symptoms and provides a justification for self-management and suggested therapies (Bair & Krebs, 2020). As was previously emphasized, every fibromyalgia case should be assisted with a variety of approaches because no single treatment improves function alone. Hence, focusing on combining medication, physical, behavior, education, and alternative treatments for this clinical condition seems like a wise option for enhancing fibromyalgia individuals' quality of life.

Fibromyalgia's prognosis is dependent on several demographic, behavioral, and psychological variables. When it comes to demographic characteristics, being a woman, having a low socioeconomic level, and being unemployed are linked to worse outcomes (Reisine, Fifield, Walsh & Forrest, 2008). The same occurs for psychological and behavioral variables like depression, catastrophizing, a history of abuse, obesity, and an excessive somatic concern (Mundal, Gråwe, Bjørngaard, Linaker & Fors, 2014). It is crucial to point out that fibromyalgia sufferers have a higher risk of committing suicide

(Dreyer, Kendall, Danneskiold-Samsøe, Bartels & Bliddal, 2010), so this danger should be constantly monitored as well.

 To conclude, fibromyalgia is a chronic pain syndrome that is characterized by both physical, psychological and cognitive symptoms (Clauw, 2014). Its etiology is still unknown (Wolfe et al., 1997) but related to several risk factors and environmental characteristics like psychological stressors (Häuser et al., 2011) and trauma (McLean et al., 2011). Treatment for this condition is unusual and should include both pharmacological and nonpharmacological options (Bair & Krebs, 2020), such as aerobic exercise and psychotherapy. Moreover, education is a central part of the treatment, as it can help the person to validate the illness experience and manage his/her condition (Bair & Krebs, 2020). Interestingly, individuals with fibromyalgia are more likely to have mental health conditions identified alongside (Clauw, 2014), and some of them (such as major depression disorder) may be present in 25-65% of cases (Løge-Hagen et al., 2019). Indeed, to point readers in the direction of our research question and hypotheses, we shall describe how psychology and fibromyalgia are strictly related in the following section, before deepening into the research.

2.2. Do fibromyalgia individuals have a psychological profile?

Numerous studies have been pointing out the strict link that fibromyalgia shares with psychopathologies. Among these, a research carried out in Japan by Miki and colleagues (2018) revealed that, when using a DSM-IV classification for diagnosis, 96,9% of fibromyalgia individuals involved in the study presented one or more mental health disorders. Findings also suggest that this clinical group has a higher risk of suicide than the overall population, with one study reporting that fibromyalgia sufferers are 16.7% more likely to attempt it (Kurth & Scher, 2015). The above facts lead us to the conclusion that it is fundamental to adequately monitor the co-occurrence of psychopathologies within fibromyalgia in order to implement the proper preventive and treatment measures. Furthermore, despite a clear correlation between this clinical condition and certain psychological features, the psychological profile of the fibromyalgia group is still understudied.

Consequently, the current study aims to better comprehend fibromyalgia sufferers through the psychology lens, by disclosing the typical psychological profile of this group. The chosen features to assess the profile were: touch avoidance, anxiety, depression, positive/negative affect, self-criticism and perfectionism, quality of life and functionality, psychosis, and pain acceptance/catastrophizing. Moreover, because one can assume many different definitions to the term "psychological profile" we've decided to define it in terms of traits, behaviors, and clinical symptoms that usually compose a fibromyalgia person. Traits are intended to be typical characteristics that an individual presents; behaviors, the factors that could be predisposing or enhancing the traits; and clinical symptoms the consequences that the traits could introduce into the person's life.

Every trait, behavior and clinical symptom included in this study was measured by a different scale inside of a questionnaire. After analyzing the scales involved in the

research to better comprehend which psychological feature enters in which category, we concluded that: anxiety, negative/positive affect, and touch avoidance are traits; self-criticism and perfectionism and pain acceptance/catastrophizing are behaviors; and depression, psychosis, and poor quality of life and functionality are clinical symptoms. However, the fact that these three categories overlap with each other and cannot be completely distinguished was not ignored, and the division created was made only to give a specific meaning to the term "psychological profile". In the following pages, we will evaluate each psychological feature theoretical underpinning in order to create the hypotheses for the research.

Amid the possible psychopathological comorbidities of fibromyalgia, anxiety disorders are constantly present in this group (Aparicio, Ortega, Carbonell-Baeza, Cuevas-Toro, Delgado-Fernández & Ruiz 2013; Fietta, Fietta & Manganelli, 2007; Henao-Pérez, López-Medina, Arboleda, Monsalve & Zea, 2022). In fact, studies (Fietta et al., 2007) show that between 20-80% of individuals with fibromyalgia also present an anxiety disorder, and generalized anxiety disorder, phobias, panic attack (Kleykamp et al., 2021) and post-traumatic stress disorder (Coppens et al., 2017) are the most common ones. Research also points out that anxiety in fibromyalgia could lead to an increased pain perception and pain severity (Aparicio et al., 2013). Post-traumatic stress disorder (PTSD), for instance, tends to be very common in this syndrome, as traumas (McLean et al., 2011) and a history of abuse (Mundal et al., 2014) could be risk factors. In a study conducted in Israel, for example, the prevalence of fibromyalgia in individuals with PTSD was 21% (Amir, Kaplan, Neumann, Sharabani, Shani & Buskila, 1997).

Another important trait of fibromyalgia that we aim to explore in this study is the tendency of this group to reach closer to positive affect (i.e., the extent to which a person experiences subjectively positive feelings like love, happiness, and compassion) or to

negative affect (i.e., how much someone feels subjectively negative emotions like sadness, anger, and fear). According to research, negative and positive affects as states and traits influence the way people perceive their health goals and health life. Compared to people with high positive affect (PA), those with high negative affect (NA) believe their health goals are less manageable, realistic, and consistent with their self-identity. Therefore, adopting and achieving health objectives and living a healthy lifestyle may be aided by positive affect while being hindered by negative affect (Plys & Desrichard, 2020).

As stated by scientific publications, fibromyalgia individuals tend to express more negative affect than positive affect (Arrayás-Grajera et al., 2021; Hassett, Simonelli, Radvanski, Buyske, Savage & Sigal, 2008; van Middendorp, Lumley, Jacobs, van Doornen, Bijlsma & Geenen, 2008; Zautra et al. 2005). The results of a study by Arrayás-Grajera et al. (2021), which compared the levels of positive affect, negative affect, satisfaction with life, optimism, and emotional repair in women with and without fibromyalgia, revealed that the members of the clinical group presented lower scores for positive affect, satisfaction with life, optimism and emotional repair and higher levels of negative affect than controls. These findings are also confirmed by another study (van Middendorp et al., 2008), which divulged that fibromyalgia sufferers have higher levels of negative affect, lower levels of positive affect, and make more use of emotional-avoidance strategies.

Interestingly, a phenomenon known as *affective balance* has been studied to better understand positive and negative affects levels in fibromyalgia cases. Affective balance refers to the relative levels of negative and positive affect present in each individual and can express itself in four different formats: healthy (high PA/low NA), low (low PA/low NA), reactive (high PA/high NA), and depressive (low PA, high NA). In a study

conducted by Hassett and colleagues (2008), results indicate that people with fibromyalgia are more likely to present depressive and reactive affective balances, and that those individuals report higher levels of negative affect, lower functioning, and more clinical disorders than controls. Additionally, it has been postulated that individuals with fibromyalgia display a defective positive affect regulation, or, in other words, a loss of ability to retain positive affect during times of heightened pain and stress (Zautra et al., 2005).

Positive and negative affect were also found to be significant mediators of the changes in depression and quality of life, with positive affect being responsible for higher scores of quality of life and lower scores of depression (Molinari, Miragall, Enrique, Botella, Baños & García-Palacios, 2020). Therefore, interventions designed to increase positive affect in fibromyalgia individuals may be helpful in reducing the signs and symptoms of depression as well as in enhancing quality of life. Attachment-based compassion therapy, for instance, aims to establish a secure attachment style in an individual through improving compassion for both oneself and others (García-Campayo, Navarro-Gil & Demarzo, 2016). Compassion is one of positive affect characteristics, and research has shown that it can help people with fibromyalgia to feel less anxious and depressed (Santos, Crespo, Pérez-Aranda, Beltrán-Ruiz, Puebla-Guedea & García-Campayo, 2022). To resume, fibromyalgia sufferers frequently display more negative than positive affect, but interventions focused on improving positive affect may be beneficial for lowering unpleasant emotions and for enhancing quality of life.

The last topic that we wanted to address as a trait in our research is if and how frequently fibromyalgia individuals avoid touch. Contact avoidance can encompass romantic partners, parents, siblings, friends, work colleagues, or even complete strangers, and given that fibromyalgia is a syndrome characterized primarily by physical pain in various

parts of the body, it should be reasonable to assume that these individuals avoid touch as a coping mechanism to prevent physical discomfort on some level. In order to provide a theoretical framework for this section of the study, however, it was unfortunate and oddly difficult to locate scholarly publications about touch avoidance in fibromyalgia. As a result, we chose to examine attachment styles, a phenomenon that has been linked to fibromyalgia in scientific research before.

Although it is clear that touch avoidance and attachment styles are two completely separate phenomena, there are nevertheless some parallels between them. Later, we will return to such topics, but before let's define attachment and introduce its styles. Attachment is denoted by the need to form intimacy in the interaction that develops between the baby and the caregiver in the early years of life. This concept was first introduced by the American psychologist John Bowlby, who formulated the Attachment Theory based on his scientific research. There are four different attachment styles and according to Bartholomew and Horowitz (1991), they are established using combinations of a person's self-image and image of others (being those positive or negative).

The four different types of attachment are: secure, fearful, avoidant, and anxious. People with the secure attachment style tend to be more independent and quickly establish intimacy with others. Individuals with the anxious attachment type experience anxiety in their close relationships and require frequent reassurance and consolation. On the other side, those with an avoidant attachment style steer clear of intimate connections with others in order to preserve their independence. Finally, the fearful attachment style is characterized by the high level of worry about potential desertion, a sense of loss in close connections, and a desire to avoid being wounded. As a result, people with this style avoid close relationships (Bartholomew & Horowitz, 1991).

According to research, fibromyalgia individuals tend to present more anxious and avoidant attachment styles than the general population (Ege & Ege, 2022; Peñacoba, Perez-Calvo, Blanco & Sanroman, 2018). In fact, higher levels of perceived physical pain (MacDonald & Kingsbury, 2006) and the tendency to catastrophize about it (Kratz, Davis & Zautra, 2012) were found in fibromyalgia adults with anxious attachment style. Moreover, secure attachment was found to be two times more prevalent in healthy controls (44.2%) than in people with fibromyalgia (21.5%; see Ege & Ege, 2022). This could be disadvantageous as secure attachment and high self-esteem can be protective factors for the quality of life of women with fibromyalgia, while insecure attachments and low self-esteem produce the opposite effect (Sechi, Vismara, Brennstuhl, Tarquinio & Lucarelli, 2020). Hence, secure attachment can be beneficial for fibromyalgia sufferers, while insecure ones can hinder physical pain and decrease quality of life.

Returning to the parallels that touch avoidance and attachment styles may share, we can speculate that a child's early relationships and levels of intimacy with its primary caregivers may have an impact on how it will want to receive and give affection in the future. And as it is known, touch is one of the most common forms of affection. Besides, it is interesting to point out that people with avoidant or fearful attachment styles usually avoid close relationships, and these two types of attachment are frequently associated with fibromyalgia. In fact, a study found out that the most common attachment style in fibromyalgia sufferers is the fearful one (Ege & Ege, 2022). Clearly, once again, attachment styles and touch avoidance are two very different phenomena, but due to the lack of study regarding the latter in fibromyalgia individuals, we connected both to the purpose of creating hypotheses for the research.

Aside from traits, a remarkable behavior of this clinical group is the presence of self-criticism and a tendance for perfectionism (Ecija, Catala, Sanroman, Lopez-Roig, Pastor-

Mira & Peñacoba, 2021; Gonzalez, Baptista & Branco, 2015; Gutierrez, Velasco, Blanco, Catala, Pastor-Mira & Peñacoba, 2022; Molnar, Flett, Sadava & Colautti, 2012; Sirois & Molnar, 2014). In fact, both self-oriented perfectionism (i.e., beliefs that pursuing perfection and being perfect are important) and socially prescribed perfectionism (i.e., felt societal pressure and expectations to be perfect) have been found in people suffering from fibromyalgia, and they can be associated with lower health functioning (Molnar et al., 2012).

Other studies confirm that excessive perfectionism in fibromyalgia can lead to maladaptive coping such as behavioral disengagement (i.e., the tendency to reduce one's efforts in difficult circumstances), denial, self-blame (Sirois & Molnar, 2014) and pain avoidance (Ecija et al., 2021). In an interview carried out with 10 Portuguese women with fibromyalgia, for example, perfectionism was one of the emergent themes (Gonzalez et al., 2015). Nearly all participants proudly acknowledged that perfectionism is a significant aspect of their personalities, but that it may also have negative consequences because it can manifest as a strong feeling of responsibility, self-exigency, and intolerance towards failure. One of them shares: *"Today I try to be different, but at that time I was very, very exigent with myself, maybe too much. I had to have everything perfect, in order, perfect in my job and perfect in my home, and of course I expected the same from everyone else, I hated clumsy people. Nowadays, I accept a little better that I am not responsible for everything ... and people may have different standards"* (Gonzalez et al., 2015).

Although self-criticism and being too hard on oneself could lead to a dark path, perfectionism can also present a bright side. According to research, a moderate level of perfectionism in fibromyalgia instead of low levels could contribute positively to a healthier functioning, as it can be more adaptive to daily life (Molnar et al., 2012). Additionally, perfectionism could be helpful in enhancing task persistence (i.e.,

persistence of finishing tasks or activities despite pain; see Ecija et al., 2021) since it has been linked with increased physical functioning and more positive affective states (Esteve, Ramírez-Maestre, Peters, Serrano-Ibáñez, Ruíz-Párraga & López-Martínez, 2016; Segura-Jiménez et al., 2017). To conclude, many fibromyalgia individuals have a strong tendency towards perfectionism, which may have its benefits. Nonetheless, if the strive for perfection is driven excessively, it could result in lower health functioning and maladaptive coping.

Pain acceptance is another behavior that could be depicted in the construction of a fibromyalgia's psychological profile. Pain is a remarkable characteristic of this chronic syndrome, but how exactly can pain acceptance assist in lessening symptoms and in minimizing negative feelings is still understudied. The term pain acceptance could be defined as the capacity to shelter suffering without making any attempts to diminish, prevent, or otherwise alter it (McCracken, 1999) and research claims that it can be beneficial in increasing functioning and reducing symptoms in chronic pain syndromes (Thompson & McCracken, 2011). Pain catastrophizing (i.e., a maladaptive coping strategy in which the individual exaggerates pain and gives extreme attention to it), on the other hand, is inversely associated with physical function, general health perception, vitality, mental health, and quality of life (Galvez-Sánchez, Montoro, Duschek & Reyes del Paso, 2020).

A study conducted in Norway (Tangen, Helvik, Eide & Fors, 2020) with the objective of examining the relationship between pain acceptance and its impact on function and symptoms in fibromyalgia, for example, found out that pain acceptance is associated with better daily functional level and less pain. The research used both cross-sectional and longitudinal designs and the benefits were observed in the short and long terms. Moreover, another research conducted in Italy (Varallo et al., 2022) with the purpose of

understanding how pain acceptance and pain catastrophizing influence physical functioning in fibromyalgia individuals with obesity revealed that both self-report and performance-based measures of physical functioning were negatively correlated with pain catastrophizing and positively correlated pain acceptance. Hence, individuals who spend too much time catastrophizing about their suffering could be facing less daily functionality and a worsening of their symptoms. As a consequence, interventions on pain acceptance could be beneficial for this clinical population.

Depression was the most difficult psychological feature to be assigned into a category because it is one of the clearest clinical symptoms of fibromyalgia and on the same time, it could be also thought as a relevant trait, because a large amount of individuals with this clinical syndrome are diagnosed with major depression disorder (Løge-Hagen, Sæle, Juhl, Bech, Stenager & Mellentin, 2019), or other disorders from the mood cluster. Moreover, the development of the correlation between depression and fibromyalgia is still little understood, and a study (Yepez et al., 2022) revealed that it could exist a bidirectional link between these two variables, as both can influence in the emergence of the other and that depression can adversely affect the prognosis of these individuals. With that being said, depression is expressed as a clinical symptom of fibromyalgia in innumerous studies (Cetingok, Seker & Cetingok, 2022; Segura-Jiménez et al., 2015).

Besides depression, a connection between fibromyalgia and psychosis is emerging as recent literature research reveals the existence of signs and symptoms of this clinical condition in individuals with schizophrenia spectrum disorders or other psychotic psychopathologies (Almulla, Al-Hakeim, Abed, Carvalho & Maes, 2020; Mousa, Al-Hakeim, Alhaideri & Maes, 2020). In a specific type of schizophrenia named deficit schizophrenia, for instance, there has been found a robust association between *fibro fatigue* and typical characteristics of this disorder, such as: negative symptoms, psychosis,

excitation, hostility, mannerism, formal thought disorders and psychomotor retardation (Almulla et al., 2020). In addition, all the items of the scale measuring the fibro fatigue in the latest study mentioned were higher in individuals with deficit schizophrenia compared to healthy controls.

In another research conducted in Iraq (Mousa et al., 2020), 115 schizophrenia patients and 43 healthy controls undertook the fibro-fatigue scale (FF) and the results reveal that this collection of fibromyalgia signs and symptoms are an integral part of schizophrenia. As a matter of fact, individuals with an increased FF score presented increased ratings of many important schizophrenia characteristics, such as: psychosis, hostility, and negative symptoms. Unfortunately, no scientific study found aimed to comprehend if psychotic signs and symptoms are a part of fibromyalgia. However, based on the previously mentioned findings, we hope to create a link between these two conditions by analyzing the other side of the coin. In other words, we aspire to understand if psychosis is also a clinical symptom of fibromyalgia.

Understanding if fibromyalgia individuals have a poor quality of life and functionality is also crucial for investigating the psychological profile of the condition and for better acknowledging how these two variables can be a consequence of certain traits and behaviors presented by this group. Overall quality of life and functionality are uneasy concepts since they encompass numerous interpretations and facets. According to the World Health Organization (WHO), for instance, a person's view of their position in life within the context of the culture and value systems in which they live, as well as their goals, expectations, standards, and worries, are what constitute their quality of life. Moreover, quality of life comprises many different life domains, such as the emotional wellbeing, interpersonal relations, material wellbeing, personal development, physical wellbeing, self-determination, social inclusion, and rights (Schalock et al., 2005). Hence,

when speaking about an overall quality of life we should aim for a holistic and comprehensive view.

Functional status, on the other hand, refers to the extent to which a person can carry out specific duties in different areas, like the physical, social, and psychological ones (Gerber & Price, 2018). With these concepts in mind, it is simple to see how important quality of life and functionality are to everyone's lives, including the ones who suffer from fibromyalgia. Conversely, it is also conceivable that fibromyalgia itself may have an effect on these two life variables. In fact, recent studies have been revealing that this syndrome's impact can negatively influence a person's functional capacity and can make it very difficult for them to pursue activities of daily living (Ubago Linares, Ruiz-Pérez, Pérez, Labry-Lima, Hernández-Torres & Plazaola-Castaño, 2008).

It seems that even inside the cluster of chronic pain syndromes, fibromyalgia's individuals show bigger struggles in daily function (Branco et al., 2016) and in reaching higher levels of quality of life (Andréll, Schultz, Mannerkorpi, Nordeman, Börjesson & Mannheimer, 2014; Branco et al., 2016). Branco and colleagues (2016), for example, found out that individuals who suffer from rheumatic and musculoskeletal diseases (RMDs) have significantly lower quality of life, mental health, and physical function scores than individuals from the general population, but fibromyalgia was among the RMDs with the worst impact on function and quality of life. Individuals with fibromyalgia were also found to report lower quality of life scores than refractory angina pectoris' patients, despite the fact that the latter have a condition that may be fatal (Andréll et al., 2014). Finally, studies indicate that the higher is the influence of fibromyalgia on physical function, overall impact, and disease severity the more the physical and mental components of peoples' general quality of life are negatively affected

(Lee et al., 2017). Therefore, fibromyalgia's impact should be assessed constantly for daily living improvement.

To resume, we investigated some psychological traits (i.e., 1) Anxiety, 2) Positive/Negative affect, 3) Touch Avoidance), behaviors (i.e., 4) Self-criticism and Perfectionism, 5) Pain Acceptance/Catastrophizing), and clinical symptoms (i.e., 6) Depression, 7) Psychosis, 8) Poor quality of life and functionality) of the fibromyalgia psychological profile (see Table 1) in order to generate hypotheses for the study and to integrate our research with theoretical framework and scientific background. According to the findings of the diverse number of studies that were presented and analyzed, we've created 8 different hypotheses (that concern the 8 different psychological features) for the research that the Center of Psychology and Functional Psychotherapy (i.e., Centro di Psicologia e Psicoterapia Funzionale) carried out with 76 fibromyalgia individuals in 2021. The psychological features will be later compared to different scales of the study and the hypotheses and aim of the study will be presented more deeply in the first section of the next chapter.

Table 1 – Psychological features of fibromyalgia investigated in the study

Table 1 shows a quick summary of the Introduction section by displaying all the psychological features that were investigated, their respective category (trait/behavior or clinical symptom) and the main scientific results that connect them to fibromyalgia.

Psychological Feature	Trait/Behavior/Clinical Symptom	Main Results
Anxiety	Trait	Studies show that between 20-80% of fibromyalgia individuals also present an anxiety disorder (e.g., Fietta et al., 2007).
Positive/Negative affect	Trait	According to scientific research, fibromyalgia sufferers tend to express more negative affect than positive affect (e.g., Arrayás-Grajera et al., 2021).
Touch avoidance	Trait	No scientific literature found aims to understand touch avoidance in fibromyalgia cases.
Self-Criticism and Perfectionism	Behavior	Fibromyalgia individuals tend to be perfectionists (e.g., Gonzalez et al., 2015).
Pain acceptance/catastrophizing	Behavior	Pain catastrophizing is associated with worse daily functioning and more pain in fibromyalgia cases (e.g., Tangen et al., 2020).
Depression	Clinical symptom	Depression is expressed as a clinical symptom of fibromyalgia in innumerous studies (e.g., Cetingok et al., 2022).
Psychosis	Clinical symptom	Fibromyalgia symptoms are found in many psychotic disorders (e.g., Almulla et al., 2020), but no scientific article found reveals if psychotic symptoms are also present in fibromyalgia cases.
Quality of life and functionality	Clinical symptom	Fibromyalgia individuals show major struggles in daily function and in reaching a high quality of life (e.g., Branco et al., 2016).

3. Research

The current research was carried out in Padova between the months of April and June of 2021. The initial goal was to collect and compare data of fibromyalgia individuals before and after receiving Acceptance and Commitment Therapy (ACT) and Compassion-focused Therapy (CFT) online interventions. Therefore, the first aim of recruitment and data gathering was to investigate the importance and utility of the aforementioned psychotherapies in enhancing peoples' psycho-physical wellbeing and in reducing symptoms associated with fibromyalgia. On the other hand, the present study's objective is only to examine pre-intervention data (i.e., pre-intervention questionnaire) in order to draw conclusions on the fibromyalgia psychological profile.

3.1. Study's aim and hypotheses

The present study aim was to disclosure the psychological profile of fibromyalgia, especially by paying attention to 8 different psychological aspects of this clinical condition: 1) anxiety, 2) positive and negative affect, 3) touch avoidance, 4) self-criticism and perfectionism, 5) pain acceptance and pain catastrophizing, 6) depression, 7) psychosis and 8) quality of life and functionality. Each one of these features was reported deeply in the introduction by analyzing scientific literature. Based on the empirical findings, we will now present 8 different hypotheses that are expected to be found in the results of the research. Each hypothesis addresses one of the psychological features referred above.

Starting by the traits, it has been speculated that the fibromyalgia participants that conducted the present research would show high levels of the anxiety trait, as it was found to be very common in individuals with fibromyalgia (Fietta et al., 2007), expressing itself in different types of formats like generalized anxiety disorder, panic attacks (Kleykamp et al., 2021) and post-traumatic stress disorder (Coppens et al., 2017). Therefore, our first

hypothesis formulated was that: **H1) the observed individuals would present high anxiety scores.** In addition, results made abundantly clear that negative affect is more present in fibromyalgia individuals than positive affect (Arrayás-Grajera et al., 2021; Hassett et al., 2008; van Middendorp et al., 2008; Zautra et al. 2005). Consequently, we hypothesized that: **H2) high levels of negative affect and low levels of positive affect would be present in the results of our study.**

Moreover, there is no research available of our knowledge that studies the relationship between fibromyalgia and touch avoidance, but we've decided to create a hypothesis based on our findings regarding attachment styles. According to results, anxious and avoidant attachment styles are more present in fibromyalgia sufferers than in the general population (Peñacoba et al., 2018) and the most common among this clinical group is the fearful one (Ege & Ege, 2022). Hence, we postulated that: **H3) people with fibromyalgia would have the propensity to avoid touch in both intimate relationships and with complete strangers.**

Regarding behaviors, because scientific research found that self-oriented perfectionism and socially prescribed perfectionism are commonly present in fibromyalgia sufferers (Molnar et al., 2012), and that they could sometimes lead to maladaptive coping (Ecija et al., 2021; Sirois & Molnar, 2014) we hypothesized that: **H4) self-criticism and perfectionism levels would be high in fibromyalgia sufferers.** Furthermore, contrary to pain catastrophizing, research has shown that accepting one's pain can enhance symptoms and daily functioning (Tangen et al., 2020; Varallo et al., 2021). On top of that, since fibromyalgia sufferers frequently have pain symptoms and impaired functioning, we expected that: **H5) the observed individuals would exhibit high scores of pain catastrophizing and low scores of pain acceptance.**

Moving our focus to clinical symptoms, it was found in past studies that depression is a very common symptom of fibromyalgia (Cetingok et al., 2022; Segura-Jiménez et al., 2015) and that a large number of individuals with this condition are also diagnosed with major depression disorder (Løge-Hagen et al., 2019). Hence, it has been hypothesized that: **H6) the analyzed fibromyalgia sufferers would express high levels of depression.** Regarding psychoticism, our study is a pioneer in trying to analyze psychosis signs in fibromyalgia individuals, as current research has focused on the opposite (i.e., the search for fibromyalgia symptoms in people suffering from a psychotic condition). However, as evidence shows that there is a link between these two phenomena (Almulla et al., 2020; Kanchanatawam et al., 2018; Mousa et al., 2020), we hypothesized that: **H7) the studied individuals would present psychotic symptoms at some level.**

Finally, with respect to functionality and quality of life, literature results showed us that the higher is the fibromyalgia's impact, the lower is the individuals' functional capacity and quality of life (Andréll et al., 2014 Branco et al., 2016; Lee et al., 2017; Ubago Linares et al., 2008). Accordingly, it has been postulated that: **H8) participants would express poor functionality and deficient quality of life.** Succeeding, our research will be deeply presented and revealed, considering the recruitment, inclusion and exclusion criteria, the participants, the materials and methods, the procedures, and the data analyses and results. Following the disclosure of the findings, we will connect them to the hypotheses, and in case some of them are not matched, alternative explanations will be handed out in the discussion. The work will be finalized by the presentation of the conclusion and the practical implications.

3.2. Recruitment

The participants were recruited to conduct the research in February 2021 through a fibromyalgia seminar held by the institute that conducted it, which had the goal of

presenting the syndromic picture of the disease; the potential relevance of trauma and/or the presence of personality disorders in individuals with fibromyalgia; the stress variable captured in a theoretical framework of psycho-neuro-endocrine-immunology; the meaning and potential of emotional processing; the endocrine and gender variable; and, finally, an overview of the treatments, to date, recognized as effective in the management of fibromyalgia pain (e.g., psychotherapy, physical exercise, and mindfulness). Moreover, candidates were recruited via digital communication channels such as Instagram, Facebook, and the institute's website.

Following the participants' subscriptions (see Table 2) to the research, each one of them received a welcome text email (see Table 3) and later was contacted by a phone call to be explained about the organizational procedures of the research and to understand their clinical situation better. Questions were asked about the person's current or past engagement in psychotherapeutic interventions; the present use of psychopharmacological medicines; and whether he/she would be able to follow the online interventions during a consecutive hour each, despite their fibromyalgia's pain and symptoms. Succeeding the telephone interview, the institute's staff sent an email to the 88 selected individuals in April 2021 requesting them to complete 8 different scales (total duration of 40-45 minutes). The scales were divided in two different questionnaires (each lasting 20-25 minutes) so that the compilation would not be too taxing on the group, potentially influencing the results.

3.3. Inclusion and exclusion criteria

The inclusion criteria included that all participants should speak Italian fluently for the purposes of the research, as all the questionnaires and intervention meetings were conducted in this language. All candidates involved in the study had to have been diagnosed with fibromyalgia at any time in the past. Moreover, the individuals that did

Table 2 – Research's invitation for subscription

Table 2 depictures the English version of the research presentation and invitation text that each participant received by email.

English version of the research presentation and invitation text:

If you suffer from fibromyalgia, we offer you the opportunity to participate in a study we are carrying out on the effectiveness of some interventions based on mindfulness and relaxation. This research is in collaboration with CFU ITALIA (Comitato Fibromialgici Uniti) and with the University of Padua.

By participating in our research, you will be able to work on yourself to alleviate your suffering and **contribute**, with your experience, to developing increasingly effective interventions for those who, like you, suffer from this syndrome. You can do something about it!

Participation is **FREE** and consists of an exchange between our time and your time. Specifically, we will ask you to:

• compile a series of tests on wellbeing and symptoms related to fibromyalgia, before, during and at the end of the intervention, to gather information on what changes during the intervention.
• participate in **8 weekly one-hour group evening meetings** conducted by trainers qualified in the proposed treatments.

The meetings will take place on **zoom** platform and will be completely **free**.

Each proposed intervention will be based on **scientifically approved exercises in the treatment of chronic pain disorders** for the benefits they entail in the **management of physical pain** and all those symptoms that occur in those suffering from fibromyalgia syndrome such as the **sense of fatigue**, **sleep disturbances**, **depressive states**, and a **sense of anxiety**.

<u>FILL OUT THIS FORM to participate in the study</u>

Course objectives:

Numerous studies and **scientific publications**, such as the one conducted by the University of Turin in 2016, confirm that **mindfulness training** is an excellent strategy for **dealing with fibromyalgia disorders**, useful for:

• Managing *pain, fatigue, anxiety, depression, and other unpleasant symptoms of fibromyalgia.*
• Experimenting new *listening and body perception techniques.*
• *Improving negative emotional states* (such as anger).
• *Mitigating anxiety states.*
• Developing unprecedented *abilities to adapt and cope with adverse situations.*
• Distinguishing *"clean pain" from "dirty pain".*
• Understanding the power of *acceptance.*
• *"Flush out" the habitual avoidance strategies,* rediscover and align with one's own *values to live one full and meaningful life.*

These objectives are achieved through a **personal path of knowledge and exercise** of 8 weekly meetings of an hour, in which mindfulness, breathing and psycho-body relaxation techniques will be proposed.

Table 3 – Research's welcome text email

Table 3 exhibits the English version of the research welcome text that explains in detail what the project consists of and how it will be conducted.

English version of the research project welcome text:
We WELCOME you to the new research project aimed at managing fibromyalgia. Thank you for having given your support to collaborate in our research which aims to better understand the **beneficial effects of some simple practices** and thus **promote wellbeing** and the **management of negative emotions** associated with fibromyalgia. More and more studies underline the need for further research that focuses on the impact that the psychological side can have both as a contributing cause in the onset of fibromyalgia syndrome and as an effective and indispensable treatment. **You will be contacted by telephone in the next few days** by one of our collaborators, who will ask you some general questions about fibromyalgia and who will be able to solve some doubts about this research. As the number of people participating in the study is high and places are limited, you may be asked to join a waiting list. Participation in the study involves: **Completing a series of questionnaires** before, during and after the intervention, which will allow researchers to monitor the effects of the intervention on psychological well-being over time. The questions will concern: - Your personal history with fibromyalgia. - Habits and lifestyle. - Relationship with pain. - Levels of anxiety and depression. **Active presence at 8 evening meetings,** on the **zoom** platform. The meeting will last one hour each and will be organized as follows: - **Introduction** of about 15 minutes. - **Practical exercise** of about 20 minutes (it could be an exercise with your eyes closed, in which you are guided by the conductor to explore your pain with a different attitude or to imagine useful scenarios for managing suffering; or a pencil and paper exercise, to reflect through writing on specific topics). - **Sharing and closing** the meeting (25 minutes). By participating in the research, <u>you will not run any risk, inconvenience, or damage.</u> The data will be kept for a maximum of 5 years, in compliance with the law on personal data and the GDPR. Only project researchers will have access to them, which will remain confidential and anonymous. Your answers will help us to have **more information on the health state of people affected by fibromyalgia,** but above all, with your contribution we will have the possibility to **add a brick** to the

complex and delicate **scaffolding of an effective therapeutic treatment** to manage fibromyalgia symptoms, allowing fibromyalgia individuals **to live a life worth living even in the presence of pain.**

<u>Your collaboration is precious.</u>

If you would like to terminate your participation in the study, you can do so at any time. In this case, all information you have provided will be deleted.

The staff and members of the Ethics Commission will have to respect the law on data protection and anonymity. <u>In the case of publication of the study results, the anonymity of the participants will be ensured,</u> since <u>no personal information will be disclosed</u>. The consent document and the data in electronic form will be destroyed 5 years after the completion of the research, in accordance with the provisions of Article 5 (1) and 39 of the General Data Protection Regulation (GDPR). The duration of five years is considered sufficient to carry out the data analysis and publish a scientific article.

Happy to work together!

not complete and/or finalized properly the first and second parts of the pre-intervention questionnaire were excluded from the research. In fact, the number of participants dropped from 88 to 81 due to this last-mentioned criterion. Finally, due to the small number of male candidates (only 5 out of 81), it has been decided to exclude them, as they could present confounding factors for the study. The final number, then, was constituted of 76 female participants.

3.4. Participants

All 76 individuals involved in the present study are female and Italian. The age range comprises people from 23 to 78 years old, with the total mean being approximately 50,17 years old and the standard deviation (SD) of 10,42. Regarding location, only 11 participants lived in Veneto region (the same one where the research was carried out), 57 resided in different Italian regions and 8 did not give an answer. Furthermore, 46 individuals were married, 12 were in a serious relationship, 9 were divorced, 7 were single, 1 was a widow, and 1 person selected "other".

With respect to education and profession, out of 76 people, 17 possessed a master's degree, 6 a bachelor's degree, 28 finished high school but did not go to college, 21 did

not complete high school and 4 had further educational certifications than a master's degree (e.g., a PhD). Moreover, 42 individuals were workers, 12 did not have a job, 5 were housewives, 5 were retired, 2 were students and 10 selected "other". Concerning the experience with psychotherapy and the undertaking of psychopharmacological drugs, 30 participants were presently taking this kind of medicine, 38 were not and 8 gave no answer. Moreover, 19 candidates were undergoing psychotherapy and 38 had undergone some sort of psychotherapeutic treatment in the past.

Data regarding specifically fibromyalgia showed that, 13 participants went to a professional doctor because of their clinical condition once in the last year, 34 between 2 to 5 times, 10 between 6 to 10 times, 4 more than 10 times, and 10 did not go at all. 5 individuals did not select either of the above options. Furthermore, 13 individuals were diagnosed 1 year or less than 1 year ago, 24 were diagnosed 2 to 5 years ago, 21 6 to 10 years ago, and 18 more than 10 years ago. Finally, 54 participants undertook some kind of medical drug for the management of fibromyalgia symptoms, while 22 did not. All participants signed a formal consent agreeing to participate in the research (see Table 4).

Hence, we can affirm that, based on the sample of the present research, all participants were Italian females around 50 years old, living in Italian regions other than Veneto (75%), and married (60,5%). Moreover, the greatest number of individuals finished high school but did not go to college (36,8%) and were currently employed (55,3%). Almost 40% of the sample (39,47%) was undertaking psychopharmacological drugs and more than half (71%) medicines to minimize fibromyalgia symptoms. Besides, most candidates were diagnosed between 2 to 5 years ago (31,6%) and are frequent users of the health care system (mean of 2 to 5 times a year). Finally, half of individuals had already underwent some sort of psychotherapeutic treatment in the past and 25% were undergoing concurrently to the time when the research was conducted.

Table 4 – Consent form

Table 4 shows the English version of the research project information and consent form and data processing method.

English version of the information and consent form for participation and data processing

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The undersigned _____ (SURNAME AND NAME IN CAPITAL LETTERS) freely agrees to participate in the study entitled "The effect of different psychological treatments on Fibromyalgia".

The undersigned declares:

- To be aware that the study is in line with the current laws Legislative Decree 196/2003 and EU GDPR 679/2016 on data protection and to consent the processing and communication of personal data for the purposes and for the duration specified by the laws in force (Legislative Decree 196/2003 and EU GDPR 679/2016). The research manager undertakes to fulfill the obligations established by current legislation in terms of collection, processing, and storage of sensitive data.

- To be aware of the possibility to withdraw from the study at any time, without providing explanations, without any penalty and obtaining the non-use of the data.

- To be aware that the data will be collected in confidential form (name/code).

- To be aware that your data will be used exclusively for scientific and statistical purposes and with the maintenance of the rules relating to confidentiality.

- To be aware that, should he/she so wish, he/she can obtain the return of the raw data together with the relative reference normative data. Since this study has no clinical purposes, I am aware that I will have to consult a specialist for any interpretation of the data.

- To know that a copy of this form will be given to me by the researcher.

- To consent to video recording.

- To know that the protection of your data is designated by the Decree of the Director General 4451 of 19 December 2017, in which the data protection manager was appointed, privacy@unipd.it.

- (Only for participants who have come into contact with researchers through the "Comitato Fibromialgici Uniti" association) To be aware that participation in the research is completely free and separate from any cures/treatments/courses administered by the Associazione Sudtirolese Malati Reumatici and to know that the "Comitato Fibromialgici Uniti" will not have access to research data and sensitive data of the participant.

The undersigned _____ (SURNAME AND NAME IN CAPITAL LETTERS) having read this form, expresses his/her consent to the participation and the processing of his/her personal date.

Date_____

Legible signature_____

3.5. Materials and Methods

As was mentioned before, the questionnaire was divided in two different parts (each of 20-25 minutes) to avoid the loosening of concentration of the participants. The first and second parts of the questionnaire consisted of 4 scales each. The scales of the first part were: the Touch Avoidance Questionnaire (TAQ; Ozolins & Sandberg, 2009), the State-Trait Anxiety Inventory Y-2 (STAI Y-2; Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983), the Beck Depression Inventory-II (BDI-II; Beck, Steer & Brown, 1996), and the 16-item Prodromal Questionnaire (iPQ-16; Ising et al., 2012). As for the second part, the scales: Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS; Gilbert, Clark, Hempel, Miles & Irons, 2004), Chronic Pain Acceptance Questionnaire (CPAQ; McCraken, Spertus, Janeck, Sinclair & Wetzel, 1999), Fibromyalgia Impact Questionnaire (FIQ; Burckhardt, Clark & Bennett, 1991), Dispositional Positive Emotion Scales (DPES; Shiota, Keltner & John, 2006) were the selected ones. Moreover, the first part of the questionnaire also included an introduction, the instructions and privacy information, demographic questions, and "my story with fibromyalgia" questions (e.g., "how many years ago you have been diagnosticated with fibromyalgia?") that were already explained in depth in the last section. Next, each scale will be presented, as the psychological feature they are measuring.

1. The Touch Avoidance Questionnaire (TAQ) was developed by Ozolins & Sandberg in 2009 to assess the level of touch avoidance in different contexts, such as situations involving partners, parents, siblings, friends, professional contact and contact with complete strangers. Some questions concern the attitude towards touching friends of the same sex and some concern touching friends of the opposite sex. Among these categories, there are different questions about touching and being touched. An example of an item is "I often find it unbearable to be touched by my partner." The TAQ consists of 37 items

to which subjects must respond on a Likert scale from 1 (I completely disagree) to 5 (I completely agree). The test was validated in Italian by Casetta, Rizzi, Passarelli, Arcara & Perrella in 2020.

2. The State-Trait Anxiety Inventory Y-2 (STAI Y-2) by Spielberger et al. (1983) measures anxiety as a trait through items that ask subjects to describe the way in which he/she usually feels. The questionnaire consists of 20 items answered on a Likert scale from 1 (almost never) to 4 (almost always) and higher scores indicate higher levels of anxiety. Examples of items are: "I feel inadequate" and "I wish I could be as happy as others seem to be". The STAI Y-2 was translated and validated in Italian by Pedrabissi & Santinello in 1989.

3. The Beck Depression Inventory – II (BDI-II) by Beck et al. from 1996 is a 21-item self-report questionnaire that assesses symptoms of depression. Each item is scored on a scale of 0 to 3, with higher scores reflecting more severe symptoms. An example of an item is "Pessimism: 0 - I am not discouraged about my future. 1 - I feel more discouraged about my future than I used to. 2 - I do not expect things to work out for me. 3 - I feel my future is hopeless and will only get worse." The BDI-II was translated and validated in Italian by Sica & Ghisi in 2007.

4. The 16-item Prodromal Questionnaire (iPQ-16) by Ising et al. (2012) is a screening measure that allows to identify the presence of a "mental state at risk" (i.e., a clinical condition associated with a high risk (around 30%) of developing a psychotic disorder within six months to three years). The test consists of 16 items, to which the person must answer to true or false and, if true, specify the level of discomfort felt on a scale from 0 (none) to 3 (severe). An example of an item is "I have sometimes been undecided whether some things I have experienced were real or imaginary". The test was translated and validated in Italian by Pelizza et al. in 2018.

5. The Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS) by Gilbert, Clack, Hempel, Miles & Irons (2004) is a 22-item questionnaire that measures self-criticism and the ability to comfort oneself when things go wrong. Participants are asked to respond on a Likert scale from 0 (Not at all true for me) to 4 (Totally true for me). This measure has 3 subscales: Hated-Self (e.g., "I feel a sense of disgust with myself"), Inadequate-Self (e.g., "I feel disappointed with myself easily"), Reassured-Self (e.g., "I can remind myself of my qualities"). The scale used is the version translated by Petrocchi & Couyoumdijan in 2015.

6. The Chronic Pain Acceptance Questionnaire (CPAQ) by McCracken and colleagues (1999) is a questionnaire that measures the level of pain acceptance through two components that compose it: the ability to engage in activities even in the presence of pain and the willingness to experience pain. The questionnaire consists of 20 items which the person must answer on a scale from 0 (never true) to 6 (always true). The maximum score achievable is 120. Higher scores indicate a greater ability to accept pain. The Italian version of the questionnaire was validated by Bernini, Pennato, Cosci & Berrocal in 2010.

7. The Fibromyalgia Impact Questionnaire (FIQ) is a test developed to gather information on a fibromyalgia person's health status. It includes 10 items that measure various aspects such as physical health, psychological distress, pain, sleep, fatigue, and well-being (Burckhardt et al., 1991). The test in Italian was translated by Sarzi-Puttini et al. in 2003. The first item has 10 sub-items to which the person must respond on a Likert scale from 0 (always) to 3 (never). This item concerns the person's ability to carry out habitual activities such as cooking, walking, or meeting friends. An example of a sub-item is: "Over the past week have you been able to prepare meals?". The second and third items concern the number of days in the last week (from 1 to 7) that the person was well and that he/she was unable to work or do housework. From the third to the tenth item, the

person is asked to answer on a Likert scale from 1 to 10 how they felt in a particular situation. An example of a question from these items is: "How did you feel when you woke up?". In this case, the answer possibility ranged from 1 (Extremely rested) to 10 (Extremely tired).

8. The Dispositional Positive Emotion Scales (DPES) by Shiota et al. (2006) is a self-report tool for assessing the predisposition of people to experience positive emotional states. The questionnaire validated in Italian by Chirico, Shiota & Gaggioli (2020) is composed of 37 items to which people respond on a Likert scale from 1 (strongly disagree) to 7 (strongly agree) and has 6 subscales: "Happiness" made up of 11 items represents a positive attitude towards life in general (e.g., "I am an intensely cheerful person"); "Compassion" made up of 5 items represents the desire to take care of the wellbeing of others, especially those who are vulnerable or needy (e.g., "Taking care of others gives me a warm feeling inside"); "Amusement" consisting of 5 items, refers to the ability to experiment with humor (e.g., "The people around me make a lot of jokes"); "Love" consists of 6 items that address how people conceive closeness and authenticity (e.g., "I love many people"); "Pride" consists of 5 items on the social image of oneself (e.g., "Many people respect me"); and 5-item "Awe" is about the ability to connect with something great (e.g., "I see beauty all around me"). In the original version, there's a 7th scale called "Contentment" with 5 items that was englobed by the Joy scale in the Italian form, and together, they were named the "Happiness" scale.

All the scales mentioned above serve for the purpose of revealing the psychological profile of a typical fibromyalgia patient, which is the main aim of this study. Every scale of the questionnaire administered concerns a psychological feature that was explored in the theoretical introductory part of this work to create hypotheses for the study. The

hypotheses then, are once again presented to connect each to the respective belonging scale and psychological feature (see Table 5).

Table 5 – Psychological features' scales and hypotheses

Table 5 displays a small summary of the hypotheses for each psychological feature and the scale used to measure it.

Psychological feature	Hypothesis	Scale
Touch Avoidance	People with fibromyalgia would have the propensity to avoid touch in both intimate relationships and with complete strangers.	Touch Avoidance Questionnaire (TAQ; Ozolins & Sandberg, 2009).
Anxiety	The observed individuals would present high anxiety scores.	State-Trait Anxiety Inventory Y-2 (STAI Y-2; Spielberger et al., 1983).
Depression	The analyzed fibromyalgia sufferers would express high levels of depression.	Beck Depression Inventory-II (BDI-II; Beck et al., 1996).
Psychosis	The studied individuals would present psychotic symptoms at some level.	The 16-item Prodromal Questionnaire (iPQ-16; Ising et al., 2012).
Self-Criticism and Perfectionism	Self-criticism and perfectionism levels would be high in fibromyalgia sufferers.	The Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS; Gilbert et al., 2004).
Pain acceptance/catastrophizing	The observed individuals would exhibit high scores of pain catastrophizing and low scores of pain acceptance.	The Chronic Pain Acceptance Questionnaire (CPAQ; McCracken et al., 1999).
Quality of life and functionality	Participants would express poor functionality and deficient quality of life.	The Fibromyalgia Impact Questionnaire (FIQ; Burckhardt et al., 1991).
Positive/Negative affect	High levels of negative affect and low levels of positive affect would be present in the results of our study.	The Dispositional Positive Emotion Scales (DPES; Shiota et al., 2006).

3.6. Procedure

The 76 participants were recruited to conduct the research in February 2021, and in April, they compiled both parts of the questionnaire. The demographic factors of participants (e.g., residence, age, civil status, educational level, and occupation) were analyzed with descriptive statistics, a method used to summarize and organize characteristics of a data set. Moreover, features regarding the mental health (i.e., use of psychopharmacological drugs and present or past involvement with psychotherapy) and physical health (i.e., fibromyalgia diagnosis, frequency of medical visits per year and the use of medical drugs for the purpose of releasing symptoms) of the individuals involved in the research were interpreted using this type of statistics as well. Concerning the interpretation of the scales, the means, medians, standard deviations, and minimum and maximum scores, they were once again analyzed using descriptive statistics. Next, our sample mean of each scale was compared to the ones found on the papers which translated and validated the same scales to Italian. Hence, our sample means were compared to the normative means found in other studies, so we could have a comparison between the fibromyalgia and healthy groups. The means were compared using the inferential statistical method "one sample T-test". Finally, possible correlations between the psychological features were analyzed using principal component analysis method.

3.7. Data analyses and results

In the table below (see Table 6), there is a visual representation of the questionnaire scales descriptive, that was made using the statistical software Jamovi (see references). In the following pages, the results will be deeply examined, and our sample means will be compared to the normative means. Each scale will be analyzed individually, and comparison tables and graphs will be presented.

Table 6 – Descriptive of the Questionnaire Scales

Table 6 exhibits a summary of the descriptive statistics of every scale and subscale involved in the study's questionnaire. Moreover, one column is dedicated to the means found on the control groups, so comparison between the means of both groups could be more clearly depicted.

Scale/Subscale	Mean fibromyalgia group	Mean control group	Median fibromyalgia group	Standard deviation fibromyalgia group	Minimum fibromyalgia group	Maximum fibromyalgia group
Touch Avoidance Questionnaire – Partner	3.542	2.329	3.500	0.711	1.800	5.00
Touch Avoidance Questionnaire – Family	3.022	2.975	3.000	0.973	1.167	5.00
Touch Avoidance Questionnaire – Same Sex	4.024	2.826	4.083	0.703	2.167	5.00
Touch Avoidance Questionnaire - Opposite Sex	3.621	2.906	3.500	0.844	1.000	5.00
Touch Avoidance Questionnaire - Stranger	3.158	2.626	3.000	0.884	1.000	5.00
State-Trait Anxiety Inventory Y-2	56.500	41.27	58.500	10.788	32.000	78.00
Beck Depression Inventory-II	0.926	0.32	0.857	0.354	0.286	1.76
The 16-Item Prodromal Questionnaire	6.947	5.6	7.000	3.614	0	14
The Forms of Self-Criticizing/Attacking and Self-Reassuring Scale – Hated-Self	1.828	1.6	1.600	0.717	1.000	4.40
The Forms of Self-Criticizing/Attacking and Self-Reassuring Scale – Inadequate-Self	2.865	2.7	2.778	0.760	1.111	4.78
The Forms of Self-Criticizing/Attacking and Self-Reassuring Scale – Reassured-Self	3.008	3.5	2.875	0.686	1.375	4.75
Chronic Pain Acceptance Questionnaire - Pain Willingness	19.395	22	18.000	8.977	2.000	45.00
Chronic Pain Acceptance Questionnaire – Activity Engagement	30.395	28.7	31.000	11.169	6.000	51.00

Chronic Pain Acceptance Questionnaire – Total Score	49.789	50.7	47.000	17.158	12.000	95.00
Fibromyalgia Impact Questionnaire – Poor Functioning	4.151	4.2	4.330	2.122	0.000	8.67
Fibromyalgia Impact Questionnaire – Total Score	66.287	57.2	66.549	12.638	21.858	90.90
The Dispositional Positive Emotion Scales – Happiness	3.590	-	3.500	1.184	1.545	6.00
The Dispositional Positive Emotion Scales – Pride	4.547	-	4.700	1.256	1.600	7.00
The Dispositional Positive Emotion Scales – Love	4.164	-	4.250	1.172	1.500	6.17
The Dispositional Positive Emotion Scales – Compassion	6.242	5.75	6.300	0.697	4.400	7.00
The Dispositional Positive Emotion Scales – Amusement	4.434	4.928	4.400	1.405	1.000	6.80
The Dispositional Positive Emotion Scales – Awe	4.534	-	4.600	1.320	1.000	6.80

Touch avoidance

The Touch Avoidance Questionnaire (TAQ) was used to measure the level of touch avoidance of the fibromyalgia participants involved in the study. The mentioned scale quantifies this psychological trait by analyzing questions that regard touch avoidance with partners, family, people from the same or opposite sex and strangers. According to the authors of the referred scale (Ozolins & Sandberg, 2009), higher scores indicate a higher level of touch avoidance, since positively worded items were reversed before computations. The same procedure was done in the present study. Moreover, items 6, 10, 12, 13, 15 and 36 were excluded from the original version of the questionnaire and the one translated and validated in Italian due to several issues (i.e., low validity, low Cronbach's alpha, unacceptable low loadings, and low construct validity), so they were excluded from our scale as well. Therefore, from the results expressed in Table 6, it can

be inferred that touch avoidance with members of the same sex *(M = 4.024; SD = 0.703)* was the highest for the participants, followed by touch avoidance with members of the opposite sex *(M = 3.621; SD = 0.844)*, partners *(M = 3.542; SD = 0.711)*, strangers *(M = 3.158; SD = 0.884)* and family *(M = 3.022; SD = 0.973)*. Furthermore, compared with the means of the normative Italian sample, the means of our participants in each category were significantly higher *(p-value < .001)*, excluding only the Family category, which was higher but not significantly *(p-value = 0.676)*. The results are expressed in Table 7 and Figure 1.

Table 7 – One Sample T-Test of the Touch Avoidance Questionnaire (TAQ)

Table 7 displays the comparison of the means of the fibromyalgia group and healthy group in every subscale of the TAQ using one-sample T-test.

Subscale	Mean fibromyalgia group	Mean healthy group	Student's t	Degrees of freedom	P-value
TAQ_Partner	3.542	2.329	14.9	75.0	< .001
TAQ_Family	3.022	2.975	0.420	75.0	0.676
TAQ_SameSex	4.024	2.826	14.9	75.0	< .001
TAQ_OppositeSex	3.621	2.906	7.39	75.0	< .001
TAQ_Stranger	3.158	2.626	5.25	75.0	< .001

Figure 1 – Visual display of the Touch Avoidance Questionnaire (TAQ) results

Figure 1 displays a visual graph that compares the means found on our sample with the ones reported in the paper that translated and validated the TAQ to Italian.
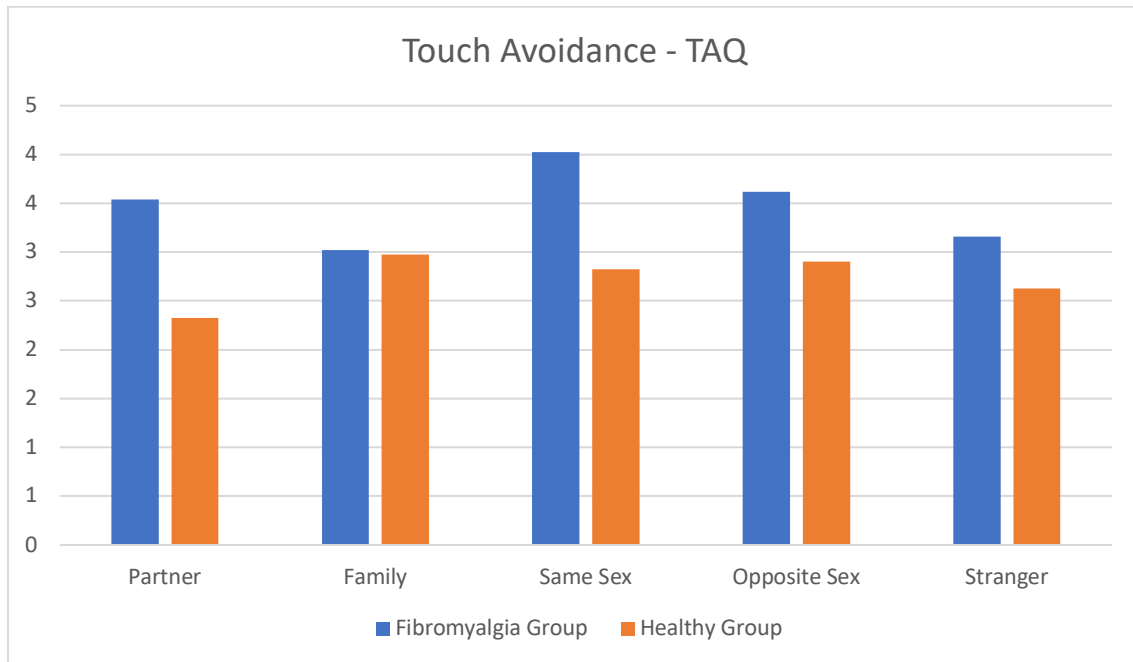
Anxiety

Anxiety was measured using the State-Trait Anxiety Inventory Y-2 (STAI Y-2). The referred questionnaire analyzes anxiety as a trait with 20 affirmations to which test-takers need to answer on a scale from 1 (almost never) to 4 (almost always) how much that sentence is usually true for them. Positively worded items are inverted, and therefore, higher scores indicate a higher level of anxiety. The total score can range from 20 to 80. Our sample presented a mean of 56.5 *(SD = 10.788),* which according to the authors of the questionnaire (Spielberger et al., 1983), is considered a high level of anxiety. Moreover, the mean of the fibromyalgia group was significantly higher than the one of the healthy group *(M = 41.27. SD = 9.68),* which reported moderate anxiety levels. The results are expressed in Table 8 and Figure 2.

Table 8 – One-Sample T-Test of the State-Trait Anxiety Inventory Y-2 (STAI Y-2)

Table 8 shows the comparison of the STAI Y-2 means of the fibromyalgia group and healthy group using one-sample T-test.

Scale	Mean fibromyalgia group	Mean healthy group	Student's t	Degrees of freedom	P-value
STAI Y-2	56.50	41.27	12.3	75.0	$< .001$

Figure 2 – Visual display of the State-Trait Anxiety Inventory (STAI Y-2) results

Figure 2 displays a visual graph that compares the mean found on our sample with the one reported in the paper that translated and validated the STAI Y-2 to Italian.
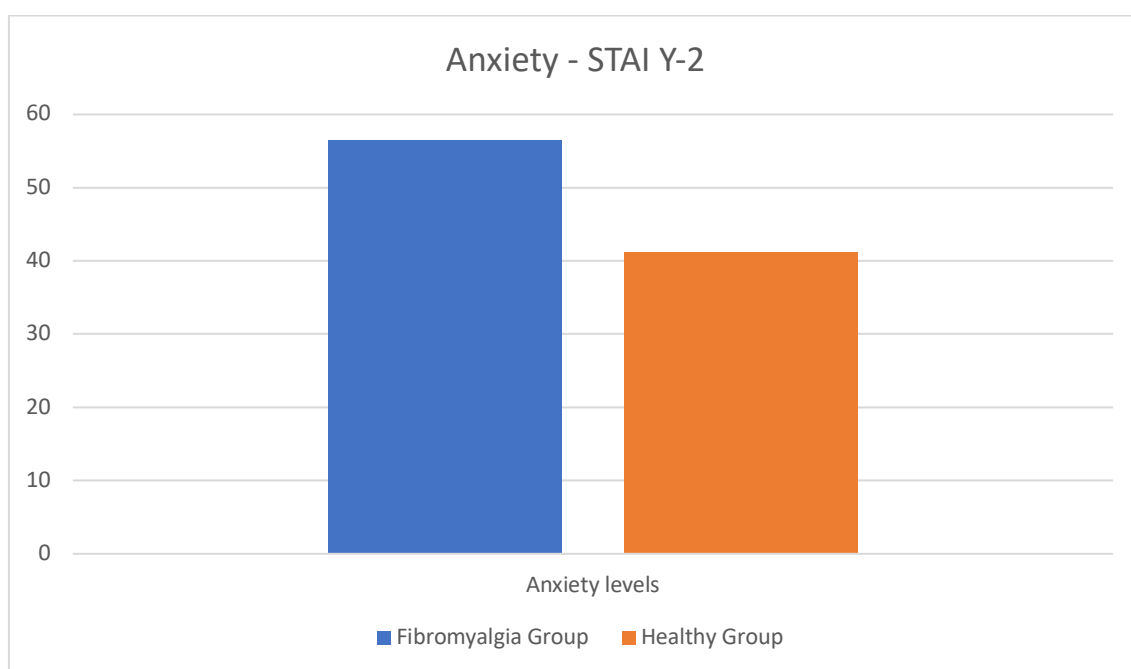
Depression symptoms

The Beck Depression Inventory-II (BDI-II) was used to measure the symptoms of depression reported by the fibromyalgia sufferers. Higher scores on this scale indicate higher levels of depression (scores range from 0 to 3), which comprises 21 items that represent the widest range of depressive symptoms. The fibromyalgia group reported a

total mean of 0.926 *(SD = 0.354)* and the items with the highest scores were items 16 *(M = 1.473, SD = 0.774;* which measures changes in the sleeping pattern), 17 *(M = 1.71, SD = 0.763*; which measures irritability) and 21 *(M = 1.71, SD = 1.055*; which measures loss of interest in sex). The fibromyalgia group reported significantly higher scores than the healthy group *(M = 0.32),* and the items that elevated the most for this last group were items 15 *(M = 0.54, SD = 0.59;* which measures loss of energy), 16 *(M = 0.69, SD = 0.79*) and 18 *(M = 0.56, SD = 0.76*; which measures changes in appetite). Moreover, when summing up the mean of each item of the questionnaire, the fibromyalgia group reached a total score of 19,447 out of 63, which represents a mild (almost moderate) level of depression. The total score of the healthy group, on the other hand, was 6.8, which indicates minimal or no depression. The results are reported in Table 9 and Figure 3.

Table 9 – One-Sample T-Test of the Beck Depression Inventory-II (BDI-II)

Table 9 displays the comparison of the BDI-II means of the fibromyalgia group and healthy group using one-sample T-test.

Scale	Mean fibromyalgia group	Mean healthy group	Student's t	Degrees of freedom	P-value
BDI-II	0.926	0.32	14.9	75.0	$< .001$

Figure 3 – Visual display of the Beck Depression Inventory-II (BDI-II) results

Figure 3 displays a visual graph that compares the mean found on our sample with the one reported in the paper that translated and validated the BDI-II to Italian.
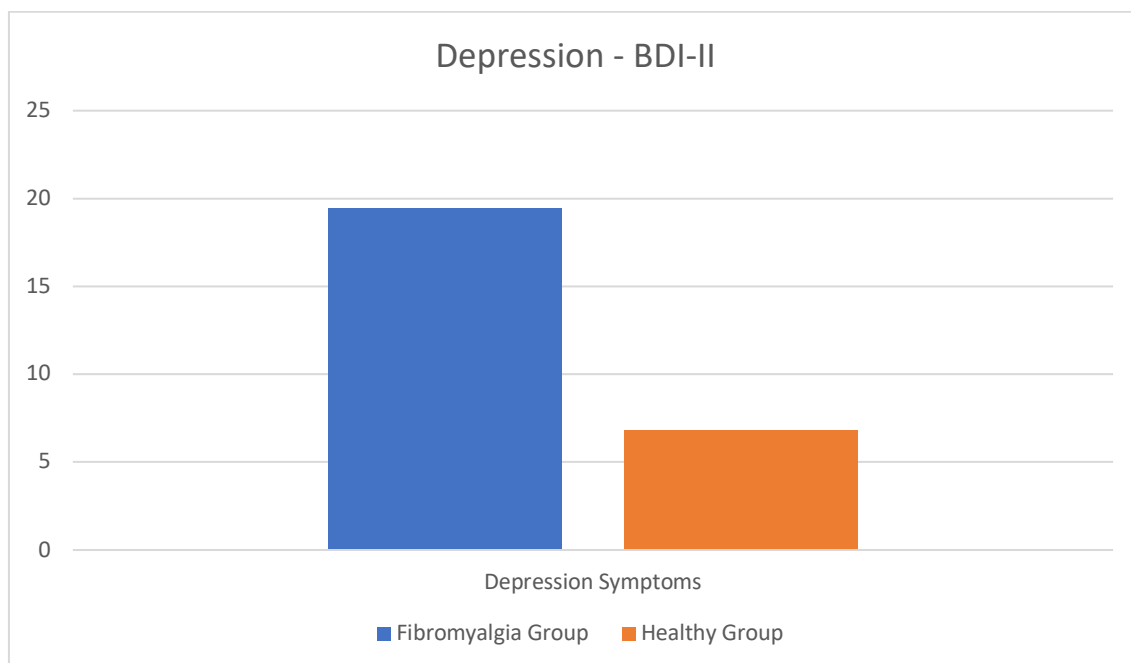
Psychotic symptoms

Fibromyalgia individuals' psychotic symptoms were measured using the 16-item Prodromal Questionnaire (iPQ-16). The iPQ-16 is a dichotomous scale that presents questions to which test takers can only answer to "true" or "false", and if the answer was "true", then the level of severity of the symptoms should be indicated on a scale from 0 (none) to 3 (severe). The symptom total score can range from 0 to 16, and the participants involved in the current study presented a mean of almost 7 symptoms *(M = 6.947; SD = 3.614),* which is significantly higher than the mean of the healthy group *(M = 5.6; SD = 3.72*; see Table 10 and Figure 4). The 3 items to which participants answered mostly "true" to were items 3 (i.e., "I Sometimes smell or taste things that other people can't smell or taste"), 11 (i.e., "Sometimes I have felt that I'm not in control of my own ideas or thoughts") and 16 (i.e., "I feel that parts of my body have changed in some way, or that

parts of my body are working differently than before"). 43 individuals answered "yes" to item 3, but a great number of them expressed that the gravity of the symptom was none *(N = 18)*. Moreover, 12 defined it as moderate, 10 as little and 3 as severe. Regarding item 11, 48 participants answered "yes" to it, and the big majority classified it as moderate *(N = 21)*. However, 15 saw it as severe, 9 as of little gravity and 3 of no gravity at all. Finally, 66 individuals answered affirmatively to item 16, with the greatest number classifying it as moderate *(N = 36)*. The others perceived it as very severe *(N = 24)* or little severe *(N = 6)*.

Table 10 – One Sample T-Test of the 16-Item Prodromal Questionnaire (iPQ-16)

Table 10 presents the comparison of the iPQ-16 means of the fibromyalgia group and healthy group using one-sample T-test.

Scale	Mean fibromyalgia group	Mean healthy group	Student's t	Degrees of freedom	P-value
iPQ-16	6.947	5.6	3.25	75.0	0.002

Figure 4 – Visual display of the 16-Item Prodromal Questionnaire (iPQ-16) results

Figure 4 displays a visual graph that compares the mean found on our sample with the one reported in the paper that translated and validated the iPQ-16 to Italian.
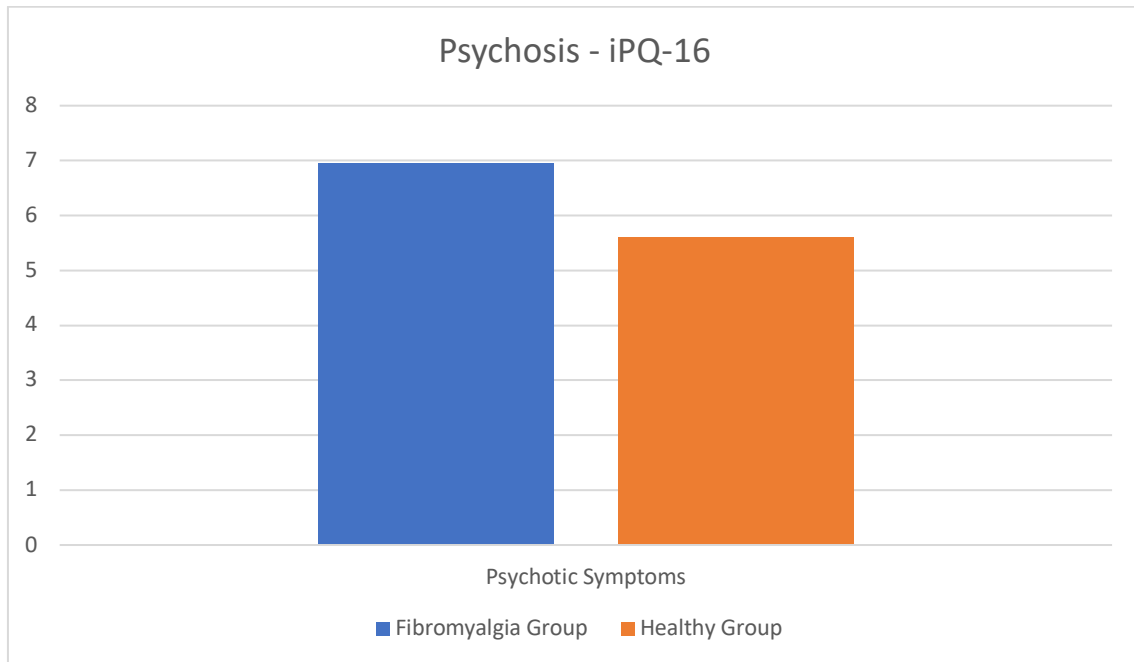
Self-criticism and perfectionism

The presence of self-criticism behavior in fibromyalgia patients was measured using the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS). Inside this scale, there are affirmations that regard 3 subscales: Hated-Self, Inadequate-Self, and Reassured-Self. Test takers should answer to all affirmations on a Likert Scale of 0 (this is not true at all) to 4 (this is completely true). Higher scores mean higher levels of self-hate, self-inadequacy, and self-reassurance respectively. As we can observe in Table 6, the mean for each one of the subscales was: Hated-Self *(M = 1.828; SD = 0.717),* Inadequate-Self *(M = 2.865; SD = 0.760),* and Reassured-Self *(M = 3.008; SD = 0.686).* As expected, the Hated-Self subscale mean was found to be significantly higher in the fibromyalgia group *(M = 1.6; SD = 0.7)* and the Reassured-Self scale presented significantly higher scores in the healthy group *(M = 3.5; SD = 0.7).* However, the mean

of the Inadequate-Self scale was higher, but not crucially, in the fibromyalgia group compared with the healthy group *(M = 2.7, SD = 0.9;* see Table 11 and Figure 5).

Table 11 – One Sample T-Test of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS)

Table 11 displays the comparison of the means of the fibromyalgia group and healthy group in every subscale of the FSCRS using one-sample T-test.

Subscale	Mean fibromyalgia group	Mean healthy group	Student's t	Degrees of freedom	P-value
FSCRS - Hated-Self	1.828	1.6	2.77	75.0	0.007
FSCRS – Inadequate-Self	2.865	2.7	1.89	75.0	0.063
FSCRS – Reassured-Self	3.008	3.5	-6.25	75.0	< .001

Figure 5 – Visual display of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS) results

Figure 5 displays a visual graph that compares the means found on our sample with the ones reported in the paper that translated and validated the FSCRS to Italian.
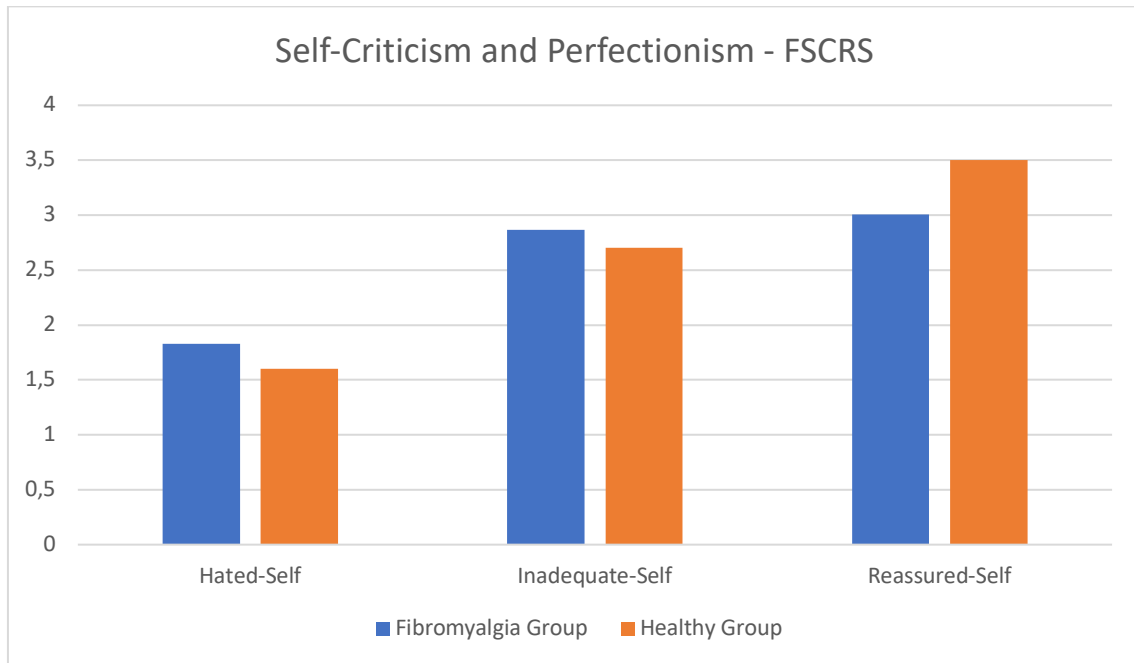
Pain acceptance

The willingness to move towards pain acceptance behavior was measured by the Chronic Pain Acceptance Questionnaire (CPAQ). This questionnaire is constituted of 20 affirmations, to which test takers need to answer on a Likert scale that goes from 0 (never true) to 6 (always true). The maximum score achievable is 120 and higher scores indicate a greater ability to accept pain. Moreover, this scale is divided into two subscales: activity engagement (AE) and pain willingness (PW). Research participants showed a mean of 30.395 *(SD = 11.169)* out of 66 maximum points for activity engagement and of 19.395 *(SD = 8.977)* out of 54 maximum points for pain willingness. The total mean score was 49.789 *(SD = 17.158)*. Pain willingness was found to be significantly higher in the chronic pain group *(M = 22; SD = 9.8; p-value < .05)* and the total mean score was higher

but not significantly also in this group *(M = 50.7; SD = 18.5)*. Finally, activity engagement mean was higher (but not significantly) in the fibromyalgia group compared to the chronic pain group *(M = 28.7; SD = 13;* see Table 12 and Figure 6).

Table 12 – One sample T-Test of the Chronic Pain Acceptance Questionnaire (CPAQ)

Table 12 shows the comparison of the means of the fibromyalgia group and chronic pain group in every subscale of the CPAQ and in the total score using one-sample T-test.

Subscale	Mean fibromyalgia group	Mean chronic pain group	Student's t	Degrees of freedom	P-value
CPAQ_AE	30.395	28.7	1.32	75.0	0.190
CPAQ_PW	19.395	22	-2.53	75.0	0.014
CPAQ_TOT	49.789	50.7	-0.463	75.0	0.645

Figure 6 – Visual display of the Chronic Pain Acceptance Questionnaire (CPAQ) results

Figure 6 displays a visual graph that compares the means found on our sample with the ones reported in the paper that translated and validated the CPAQ to Italian.
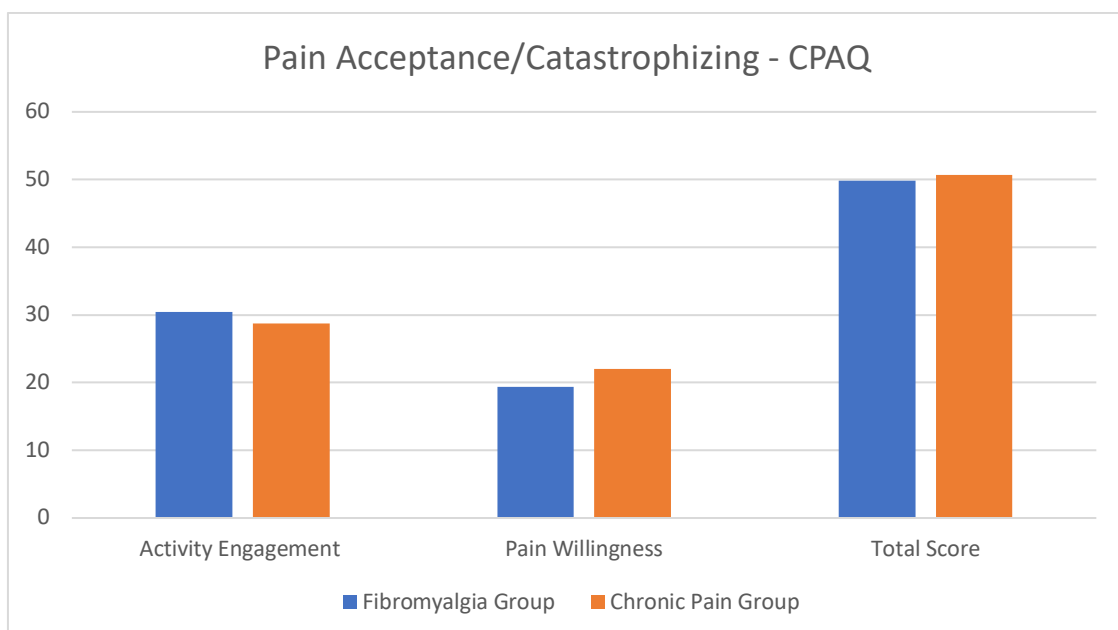
Quality of life and functionality

Quality of life and functionality of the fibromyalgia individuals were measured using the Fibromyalgia Impact Questionnaire (FIQ), the only questionnaire involved in the study designed especially for the ones who suffer from this clinical condition. The first 10 sub-items of this questionnaire measure poor physical functioning on a scale from 0 to 3, with 3 indicating a very precarious functionality. Then, the 2 following items measure "for how many days you were fine last week?" and "how many days in the last week were you unable to go to work or do housework because of fibromyalgia?" with a Likert scale that ranges from 0 to 7 days. Finally, the last 7 items measure how the person feels in a particular situation with a Likert scale that goes from 0 to 10, with 10 meaning greater impairment. The first 3 items (i.e., poor physical functioning, number of days felt good and number of days of missed work) were converted to a 1 to 10 scale (like in the Italian translated and validated scientific article; Sarzi-Puttini et al., 2003), so a total score could be calculated to define the level of fibromyalgia impact. The total score ranges from 0 to 100, with 100 indicating more fibromyalgia impact. In our sample, the poor physical functioning mean was of 4.151 *(SD = 2.122),* and the total score mean was equal to 66.287 *(SD = 12.638).* The poor physical functioning score was found to be non-significantly higher in the fibromyalgia control group *(M = 4.2, SD = 2.1)*, and the total score was significantly higher in the fibromyalgia group compared to the fibromyalgia control group *(M = 57.2, SD = 12.8*; see Table 13 and Figure 7).

Table 13 – One-Sample T-Test of the Fibromyalgia Impact Questionnaire (FIQ)

Table 13 shows the comparison of the means of the fibromyalgia group and fibromyalgia control group in the poor functioning subscale and in the total score of the FIQ using one-sample T-test.

Subscale	Mean fibromyalgia group	Mean fibromyalgia control group	Student's t	Degrees of freedom	P-value
FIQ_Poor_Functioning	4.151	4.2	-0.199	75.0	0.842
FIQ_TOT	66.287	57.2	6.27	75.0	< .001

Figure 7 – Visual display of the Fibromyalgia Impact Questionnaire (FIQ) results

Figures 7 displays a visual graph that compare the means found on our sample with the ones reported in the paper that translated and validated the FIQ to Italian.
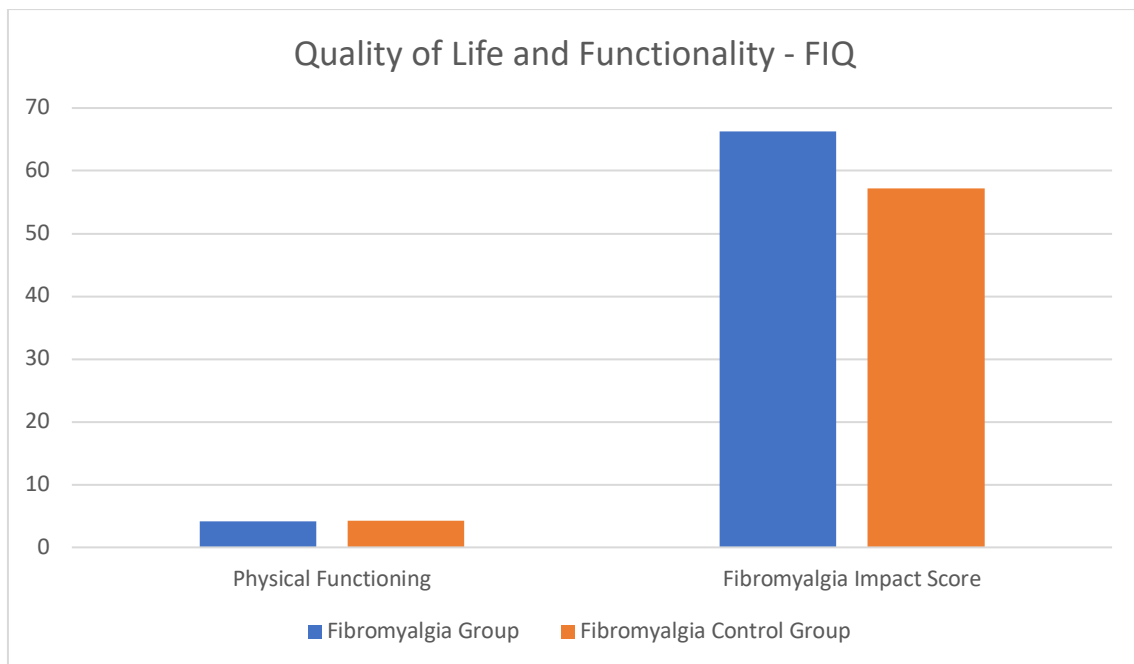
Positive Affect/Negative Affect

Positive affect and Negative affect were measured using the Dispositional Positive Emotion Scales (DPES), a scale composed of 37 items and 6 subscales (i.e., Happiness

50

Pride, Love, Compassion, Amusement and Awe). Test-takers can respond to each item on a Likert scale that ranges from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate a higher disposition for positive affect. Our sample expressed the following scores for each subscale: Happiness *(M = 3.590, SD = 1.184),* Pride *(M = 4.547, SD = 1.256),* Love *(M = 4.164, SD = 1.172),* Compassion *(M = 6.242, SD = 0.697),* Amusement *(M = 4.434, SD = 1.405)* and Awe *(M = 4.534, SD = 1.320).* Unfortunately, the study (Chirico et al., 2020) responsible for the translation and validation of the questionnaire to Italian only shared the means of two subscales: Compassion *(M = 5.75, SD = 0.791)* and Amusement *(M = 4.928, SD = 0.996).* Therefore, because no other Italian samples of the DPES were found, we decided to analyze only these two subscales. Compassion was found to be significantly higher in the fibromyalgia group, and amusement in the healthy group (see Table 14 and Figure 8).

Table 14 – One-Sample T-Test of the Dispositional Positive Emotion Scales (DPES)

Table 14 presents the comparison of the means of the fibromyalgia group and healthy group in the compassion and amusement subscales of the DPES using one-sample T-test.

Subscale	Mean fibromyalgia group	Mean healthy group	Student's t	Degrees of freedom	P-value
DPES_Compassion	6.242	5.75	6.16	75.0	< .001
DPES_Amusement	4.434	4.928	-3.06	75.0	0.003

Figure 8 – Visual display of the Dispositional Positive Emotion Scales (DPES) results

Figure 8 displays a visual graph that compares the means found on our sample with the ones reported in the paper that translated and validated the DPES to Italian.
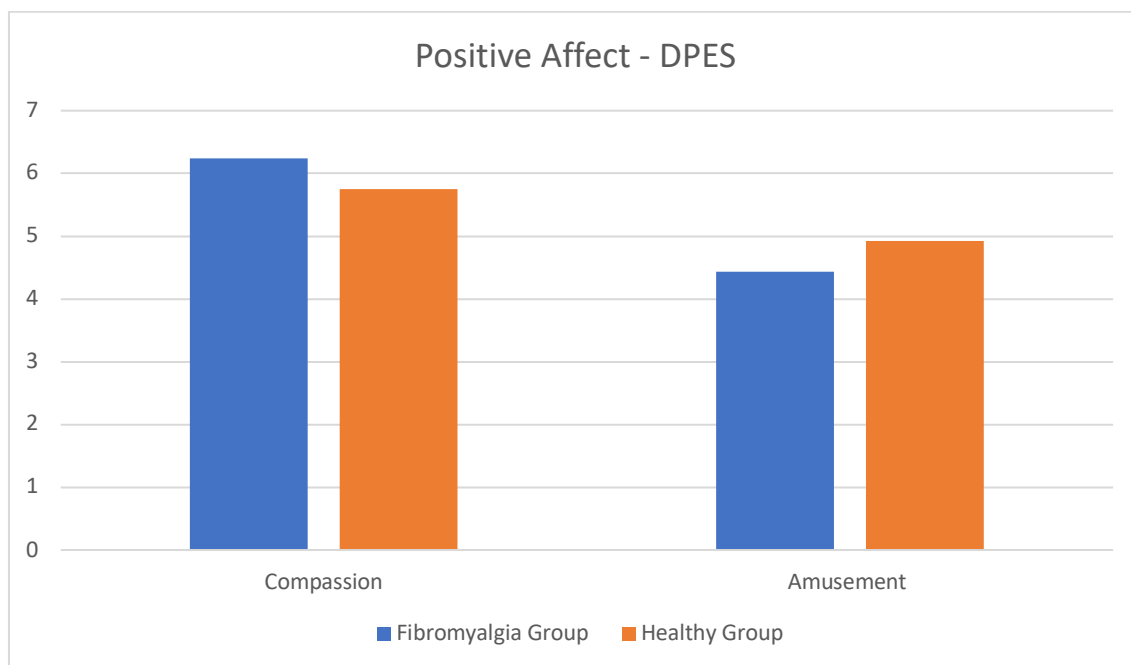
Principal Component Analysis

Principal component analysis is a method for reducing the number of dimensions in a large data set by condensing a massive number of variables into a smaller set that still contains the majority of the large set's data. This method enables a more in-depth examination of the most important variables of a data set, and in this study, we will employ it to comprehend how the psychological features involved correlate with one another. According to computations, the results of our study are divided into four different principal components (see Figure 9), which will be carefully analyzed next.

The first principal component of this research is correlated with 10 of the original variables. It increases with the increase of anxiety, depression, psychosis, self-criticism (self-hate and self-inadequacy), and fibromyalgia impact levels, which means that when one of these variables expands, the remaining ones grow as well. Moreover, it increases

Figure 9 – Principal Component Analysis of the results

Figure 9 displays the Principal Component Analysis of the results, a data reduction method used to interpret correlations in a synthetic way.

Principal Component Analysis

Component Loadings

	Component 1	Component 2	Component 3	Component 4	Uniqueness
TAQ_Partner			0.452		0.8073
TAQ_Family			0.333	0.363	0.7412
TAQ_SameSex			0.760		0.4200
TAQ_OppSex			0.718		0.4841
TAQ_Stranger			0.785		0.2774
STAI Y-2	0.829				0.2227
BDI	0.661	−0.323			0.2389
IPQ	0.369			0.338	0.6215
FSCRS_Hated-Self	0.831				0.2863
FSCRS_Inadequate-Self	0.916				0.2327
FSCRS_Reassured-Self	−0.850				0.2649
CPAQ_PW		0.851			0.3413
CPAQ_AE		0.753			0.3247
CPAQ_TOT		0.935			0.0971
FIQ_Poor_Functioning		−0.729	−0.403		0.3226
FIQ_TOT	0.350	−0.522			0.3943
DPES_Happiness	−0.537			0.514	0.2323
DPES_Pride	−0.741			0.383	0.2868
DPES_Love	−0.325		0.393	0.371	0.4461
DPES_Compassion				0.484	0.6079
DPES_Amusement				0.721	0.4750
DPES_Awe				0.689	0.4094

Note. 'promax' rotation was used

with the decreasing of happiness, pride, love, and self-reassurance. Therefore, anxiety, depression symptoms, psychotic symptoms, self-criticism, and fibromyalgia impact are positively correlated with one another, and these variables were negatively correlated with many dimensions of positive affect (i.e., happiness, pride, and love) and with self-reassurance, which in turn, were positively correlated with each other. Furthermore, the first principal component correlates most strongly with the "Inadequate-Self", a measure

of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS) that represents a sense of inferiority linked to social comparison and with the desire to belong to a certain social standard (Gilbert et al., 2004). Hence, probably this principal component is primarily a measure of self-inadequacy and its consequences.

The second principal component is correlated with 6 variables. It increases with the increasing of all the variables of chronic pain acceptance (i.e., activity engagement, pain willingness, and total score) and increases with the decreasing of depression levels, poor physical functioning, and fibromyalgia impact. Accordingly, all the measures of pain acceptance were negatively correlated with depression symptoms, poor physical functioning, and fibromyalgia impact. In addition, because the second principal component correlates more strongly with the variables of pain acceptance, it is likely a crucial measure of this behavior.

The third principal component is correlated with 7 original variables. It grows with the growth of all the types of touch avoidance (i.e., partner, family, same sex, opposite sex, and strangers) and with love and it increases with the reduction of poor physical functioning. Hence, touch avoidance and love are negatively correlated with poor physical functioning. Additionally, because this principal component correlates more strongly with touch avoidance (especially touch avoidance with members of the same sex, opposite sex, and strangers) it is probably and mainly a measure of this trait.

The fourth principal component analysis correlates with 8 variables and increases when all of them (the six variables of positive affect, psychotic symptoms, and touch avoidance with family members) increase. Hence, all the 8 variables mentioned are positively correlated with each other and because this last principal component correlates more strongly with happiness, amusement, and awe, likely it is primarily a measure of positive affect.

To resume, when the principal component analysis method was applied in our study to better comprehend which psychological features were more strongly correlated, we found four main principal components. The first one was principally a measure of self-inadequacy and its consequences, the second one was a primary indicator of pain acceptance and its positive and negative correlations, the third one of touch avoidance and its associations and the fourth one a measure of positive affect and its correlations.

4. Discussion

The current study investigated 8 different psychological features with the aim of understanding what composes the psychological profile of a typical fibromyalgia individual. After analyzing the data of our sample and comparing it with normative data of healthy controls or controls with chronic pain and/or fibromyalgia, we came upon fascinating findings. To start with, our first hypothesis **"H1) the observed individuals would present high anxiety scores"** was confirmed. Indeed, the fibromyalgia group explored in this study presented a total mean score on the STAI Y-2 scale that is considered very high and indicates an elevated trait anxiety level. Moreover, the mean score of our sample was significantly higher than the one of the healthy group. The same results were also found in other scientific articles (Cetingok et al., 2022; Pagano, Matsutani, Ferreira, Marques & Pereira, 2004).

The second hypothesis of our research **"H2) high levels of negative affect and low levels of positive affect would be present in the results of our study"** unfortunately was not assessed properly since the study (Chirico et al., 2020) that translated and validated the Dispositional Positive Emotion Scales (DPES) to Italian only shared the means of the sample for two subscales (compassion and amusement) of 6 in total. Hence, we only had the chance to compare the results of the fibromyalgia and healthy groups for these two variables of positive affect. Compassion was found to be significantly higher in the fibromyalgia group and amusement in the healthy group. The results for compassion are quite unexpected as it is a measure of positive affect and as the findings do not confirm the predefined hypothesis. However, it is important to mention that DPES measures compassion towards others and not compassion towards oneself. Therefore, one could theorize that since fibromyalgia sufferers are used to emotional and physical pain, these individuals would have a greater tendency towards empathy and helping others. In

fact, a study conducted by Leyton-Hernández & Vales-Motta (2021) found that women with fibromyalgia have a high empathic capacity.

Regarding the other 4 subscales of positive affect (happiness, pride, love, and awe), even though we did not have a control group for comparing the results, it still can be claimed that our sample obtained considerably higher scores than we've imagined (see Table 6). These findings contradict those originated in the studies presented in the introduction section (Arrayás-Grajera et al., 2021; van Middendorp et al., 2008; Zautra et al. 2005), which exhibited that fibromyalgia individuals were more prone to negative affect than positive affect. Nonetheless, Hassett and colleagues (2008) shared that both depressive (low positive affect/high negative affect) and reactive (high positive affect/high negative affect) affective balances are common in fibromyalgia individuals. Hence it could be possible that our sample presents a reactive affective balance instead of a depressive one, but since DPES is only a measure of positive affect, it is not possible to prove this fact.

Indeed, the biggest difference between our study and the studies mentioned in the introduction section is the chosen measure to quantify positive and negative affect. All of them utilized the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988), which measures explicitly and in a balanced way positive affect and negative affect. Moreover, the variables and question style of the DPES and PANAS are very different. The PANAS, for example, contains measures of concepts that most theories would not consider to be emotional constructs (e.g., alert). Accordingly, a clear explanation for our results could not be reached, and in the future, choosing a questionnaire that measures explicitly negative affect would be wise in order to establish definite results.

Our third hypothesis **"H3) people with fibromyalgia would have the propensity to avoid touch in both intimate relationships and with complete strangers"** was confirmed. According to the translated and validated version of the Touch Avoidance Questionnaire (TAQ) to Italian (Casetta et al., 2020), on a scale from 1 to 5, responses represent from 1 to 2 low touch avoidance, 3 medium touch avoidance and from 4 to 5 high touch avoidance. Respectively, our sample presented medium touch avoidance levels in almost all subscales (partner, family, opposite sex, and strangers) and high touch avoidance score for members of the same sex. Hence, based on our results we can confirm that fibromyalgia individuals tend to mediumly to highly avoid touching people, depending on who they are. They are less comfortable with touching people from the same sex, opposite sex, and their partners and more comfortable with touching strangers and family members.

These findings are difficult to interpret especially since, to our knowledge, no scholarly article has looked into the relationship between touch avoidance and fibromyalgia. However, given that the affirmations of the same sex, opposite sex, and partner subscales bring up touch in a deeper way than the others, it could be concluded that the question style of the Touch Avoidance Questionnaire (TAQ) may be partially responsible for the findings. For instance, affirmations like "I like to hug and caress my partner for hours" and "I like to hug a friend of my own sex/opposite sex" are found on the partner and same sex/opposite sex subscales, respectively. On the other hand, there are affirmations like "I hug/has always hugged my mother when I see her" on the family subscale. The difference seems subtle, but the word "like" brings up a huge difference in this context. Intentional specific touch like hugging and kissing is not brought up in the stranger subscale as well. Therefore, it's possible that the results might not accurately reflect how much touch a person with fibromyalgia avoids in various contexts. Given that physical discomfort is a

primary symptom of fibromyalgia, it is understandable that these individuals avoid straight touch, like the ones that normally a person shares with close friends or with a partner. Nonetheless, more research in this area must be done before definitive conclusions can be drawn. Our research supports at a least a medium touch avoidance level in fibromyalgia individuals for all types of interpersonal relationships.

The fourth hypothesis of our study **"H4) self-criticism and perfectionism levels would be high in fibromyalgia sufferers"** was partially confirmed by results. The Forms of Self-Criticizing/Attacking and Self-Reassuring scale, used to measure self-criticism and perfectionism in our study is divided in 3 subscales: hated-self, inadequate-self, and reassured-self. The mean score for the hated-self subscale was significantly higher for the fibromyalgia group, and the one for the reassured-self subscale was significantly higher for the healthy group as we predicted. However, the inadequate-self mean score was not significantly higher in the fibromyalgia group compared to the healthy group. Therefore, it could be inferred that self-criticism in the form of feelings of disgust and self-hate may be more common in fibromyalgia than inadequacy, which is a lighter form of self-criticism that could be also expressed in the form of perfectionism.

Our fifth hypothesis **"H5) the observed individuals would exhibit high scores of pain catastrophizing and low scores of pain acceptance"** was partially confirmed by results since the total score of the fibromyalgia group on the Chronic Pain Acceptance Questionnaire (CPAQ) was of 49.789 out of 120, which could be considered as a medium to low level of pain acceptance and a medium to high level of pain catastrophizing. Furthermore, our sample, once again, obtained medium to low ratings in the activity engagement subscale and a low score on the pain willingness subscale, which proves a tendency for pain catastrophizing in this group. Indeed, low pain willingness has been associated with catastrophizing, low self-efficacy, pain-related beliefs, and fear of

movement (Bernini et al., 2010). Aside from pain willingness, the scores of the fibromyalgia group did not diverge significantly from those of the chronic pain group, which consisted of 120 individuals (40.8% were fibromyalgia sufferers and 83% were females). This cohort expressed higher scores of pain willingness than the fibromyalgia group, indicating that sufferers of this syndrome may find it harder to regulate or avoid pain than members of other chronic pain conditions.

The sixth hypothesis of our research **"H6) the analyzed fibromyalgia sufferers would express high levels of depression"** was partially confirmed. The mean score of our sample was significantly higher and almost three times larger than the one of the healthy group. However, based on the criteria used to interpret the scores of the Beck Depression Inventory-II (BDI-II), the fibromyalgia group expressed a mild level of depression, on the borderline of a moderate level, but not a severe level. These findings are in line with other studies (Cetingok et al., 2022; Segura-Jiménez et al., 2015; Pernambuco, Silva, Fonseca & Reis, 2017), which also found higher scores of depression in the fibromyalgia group compared with controls and a moderate level of this clinical symptom in the fibromyalgia individuals.

The seventh hypothesis of our study **"H7) the studied individuals would present psychotic symptoms at some level"** was confirmed by the findings, since the fibromyalgia group expressed a mean of 7 symptoms (out of 16), which was significantly higher than the one found in the healthy group. Moreover, according to the authors of the 16-item version of the Prodromal Questionnaire (iPQ-16; Ising et al., 2012), a cutoff of ≥ 6 agreed items predicted a diagnosis of Ultra-High Risk state or psychotic disorder using CAARMS (The Comprehensive Assessment of At Risk Mental States) with high sensitivity and specificity (87%). Unfortunately, no studies of our knowledge have analyzed the link between the fibromyalgia syndrome and psychotic symptoms, as was

already mentioned in the introduction section. Nonetheless, it has been found that many fibromyalgia symptoms are present in sufferers of psychotic disorders (Almulla et al., 2020; Mousa et al., 2020), so possibly there is a bidirectional connection between both conditions. Further studies need to analyze this topic in depth to infer conclusive results.

Our last hypothesis **"H8) participants would express poor functionality and deficient quality of life"** was partially confirmed by results. The physical functioning level was moderate and not poor, and the fibromyalgia impact on quality of life was of 66.287, which can be considered a medium-high level. Therefore, fibromyalgia presented negative moderate impacts in the functionality of the participants involved in our research and moderate to severe impacts on the general quality of life of those individuals. The physical functioning scores did not differ significantly from the fibromyalgia control group (notice that the Fibromyalgia Impact Questionnaire is a survey designated only for the sufferers of this condition, so instead of having a healthy group, we had to compare the results with another fibromyalgia group instead) but the total fibromyalgia impact score did (it was significantly higher in our sample). The groups did not diverge a lot considering the demographic factors, however, the fibromyalgia group from the research that translated and validated the Fibromyalgia Impact Questionnaire is from 2003, which means that there is almost a 20-year difference between the studies. Nowadays, fibromyalgia is still an understudied phenomenon, but it is undeniable to affirm that its research and recognition faced progress in the last two decades. Hence, it may be that the sufferers of this condition are currently more aware of what is fibromyalgia and what are its main impacts.

Regarding data correlation, the principal component analysis method pointed out that there were four main components in our study. The first component indicated that anxiety, depressive and psychotic symptoms, self-criticism, and fibromyalgia impact were

positively correlated with each other and negatively correlated with happiness, pride, love, and self-reassurance. The results are coherent, especially by taking in consideration that this first component is a main measure of self-criticism and feelings of inadequacy. Therefore, when this variable arises, there is a greater fibromyalgia impact, and higher anxiety, depression, and psychotic symptoms. On the other hand, self-criticism and self-inadequacy decrease self-reassurance and positive feelings like happiness, pride, and love.

The second component indicated that chronic pain acceptance and its measures (activity engagement and pain willingness) were negatively correlated with depression, poor physical functioning, and fibromyalgia impact. The negative correlation between chronic pain acceptance and these three variables was also found in other studies (Tangen et al., 2020; Varallo et al., 2022). Therefore, we can affirm that pain acceptance is a beneficial coping mechanism for increasing physical functioning and for decreasing depression symptoms and fibromyalgia negative impact on sufferers of this condition. On the other hand, pain catastrophizing is positively correlated with higher depression scores, poor physical functionality, and fibromyalgia impact.

The third component was mainly a measure of touch avoidance, and specifically, it was correlated strongly with same sex, opposite sex, and strangers touch avoidance. All types of physical touch avoidance were positively correlated with each other, which means that touch avoidance in a specific domain (e.g., with family) can be generalized. Interestingly, touch avoidance was negatively correlated with poor physical functioning. Hence, results point out that touch avoidance may be used as a coping mechanism by fibromyalgia individuals to avoid the worsening of physical symptoms. Finally, all types of touch avoidance were positively (but not strongly) correlated with love, which is a strange finding. After all, physical touching is many times an expression of love. However, it is

important to comment that many fibromyalgia individuals experienced trauma in the past, with sexual or physical abuse being unfortunately a common part of these individuals' history. A study (Alexander et al., 1998) conducted with fibromyalgia women showed, for example, that 57% of the sample reported a history of sexual and/or physical abuse. As a result, it could be reasonable to claim that some fibromyalgia sufferers have misguided beliefs about what love and affective contact are, which could account for our findings.

The fourth component indicated that the measures of positive affect correlated positively between each other and with psychotic symptoms and touch avoidance with family members. The positive correlation shared by positive affect and psychosis was not observed in another study (Martins, Marques, Carvalho, Macedo, Pereira & Castilho, 2018), which found that positive and negative psychotic symptoms were negatively correlated with the safe and relaxed types of positive affect. Moreover, the active type of positive affect was not associated with either. Nonetheless, according to another research (Damme, Gupta, Haase & Mittal, 2022), people who are at clinically high risk for psychosis exhibit greater dampening in their self-reported response to positive affect than healthy controls. Higher levels of damping were also linked to positive psychotic symptoms but not negative ones. As a result, it's possible that positive affect is linked to positive psychotic symptoms, but more research is required since our study did not distinguish between the two clusters of psychotic symptoms. Additionally, the positive correlation between positive affect and touch avoidance with family members could have a connection with trauma involving sexual and/or physical abuse, as it was already mentioned in the previous paragraph.

The fibromyalgia psychological profile of the subjects involved in this study included high anxiety trait levels, medium levels of touch avoidance (both with intimate

relationships and with complete strangers), elevated feelings of compassion towards others, high self-criticism expressed as feelings of disgust and hate for oneself, a lack of pain acceptance, particularly characterized by pain unwillingness, mild to moderate levels of depression, a high risk of developing psychotic disorders, moderate physical functioning, and a medium to high fibromyalgia negative impact on quality of life. Furthermore, according to the principal component analysis, 1) anxiety, depression, psychosis, self-criticism and fibromyalgia impact were negatively correlated with positive affect and self-reassurance, 2) pain acceptance was negatively correlated with poor functioning, fibromyalgia impact and depression, 3) touch avoidance was negatively correlated with poor physical functioning and positively associated with love and 4) positive affect was positively correlated with touch avoidance with family members and psychoticism.

Other studies that aimed to comprehend better the fibromyalgia psychological profile (Terol-Cantero, Buunk, Cabrera, Bernabé & Martin-Aragón Gelabert, 2020; Jamison, 1999; Shuster, McCormack, Riddell & Toplak, 2009) found interesting results regarding many different psychological features. The research conducted by Shuster et al. (2009), for instance, discovered that, in comparison with healthy controls, women with fibromyalgia report stronger external locus of control, less perceived family support, lower levels of adaptive cognitive bias, and poorer mood. Furthermore, a study administered in Spain (Terol-Cantero et al., 2020) found similar results to ours, as the great majority of individuals presented higher levels of pain perception, anxiety, and depression.

5. Conclusion

The current study acknowledges that the understanding of what characterizes the fibromyalgia psychological profile is still in its early stages. Unfortunately, there is a lot of discrimination against individuals with this clinical condition, with many people arguing that the ailment is not even a legitimate syndrome. Moreover, due to the difficulty surrounding the diagnosis criteria and methods, fibromyalgia sufferers are regular users of health care services, often before but even after acquiring a diagnosis. For those people, just receiving a proper diagnosis can be quite consoling (White, Nielson, Harth, Ostbye & Speechley, 2002), mainly because it allows them to put a name to their feelings and educate themselves on what to do next. Nonetheless, fibromyalgia sufferers live with pain for the rest of their lives, and pain is clearly a physical as well as a psychological issue. In fact, psychological features can manifest as risk factors, clinical symptoms, traits, behaviors, and even potential causes of fibromyalgia. It is therefore undeniable to claim that there is a tight link between this condition and certain psychological aspects, and that deepening our studies in them can assist fibromyalgia individuals to enhance their functionality, as well as their quality of life.

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