THE CONTENTS AND SIGNIFICANCE OF THE SOOTHING SYSTEM IN
FIBROMYALGIA: A CONCEPT MAPPING STUDY

Master thesis Clinical Psychology

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Abstract

The biomedical understanding of fibromyalgia is a predominant paradigm that excludes relevant psychological and social factors. This thesis was based on 'the integrative model of fibromyalgia', adopting a psychosomatic perspective. One of the core components of this model are soothing influences experienced over fibromyalgia. The aim was to examine the contents of the soothing system, as well as their perceived importance and association with the severity of somatic symptoms. The procedure involved two phases, the first of which consisted of an online survey with open questions. In it, 724 participants from South America and Europe identified soothing influences over their somatic symptoms. The second phase comprised a card sorting task meant to structure these soothing influences, solved by 74 Dutch participants (72 women and 2 men, 22 to 65 years old). Additionally, participants rated the severity of their symptoms using the Patient Health Questionnaire-15 (PHQ-15). A hierarchical cluster analysis yielded four categories of soothers: (1) 'Social support', (2) 'Good condition', (3) 'Professional help' and (4) 'Self-care'; in which, 'good condition' was the most calming soother and 'self-care' the least calming one. A significant heterogeneity in what participants considered to be a soothing influence was observed. Furthermore, a higher perceived soothing influence of 'professional help' was significantly associated with somatic symptoms. Results reflect the individuality of soothing systems in fibromyalgia and contribute to an intersectional understanding of this condition that can be used in clinical practice (e.g., in the diagnostic phase) and in research (e.g., classifying subgroups of patients).

Key words: soothing system, soothers, fibromyalgia, somatic symptoms, integrative model.

Introduction

Fibromyalgia is a chronic widespread pain in muscles and skeleton for which the pathophysiological substrate is not yet fully understood but assumed to be an enhanced activation of the central nervous system (CNS) (Sluka & Clauw, 2016; Malin & Littlejohn, 2016). Within it, Pinto et al. (2020b) proposed that fibromyalgia is rooted in an overactive threat network system and a deficient soothing system in the brain.

There has been almost an exclusive focus on the biomedical interpretation of fibromyalgia (FM) which excludes its psychological and social dimensions in interaction with biological mechanisms. Thus, the need for a comprehensive and integrative model of FM as a complex CNS-related disorder becomes apparent. Gilbert's theory of affect regulation (2013) allows for this needed systematization of the current understanding of FM as a multifaceted condition (Pinto et al., 2020b).

Gilbert identifies three systems – threat, soothing and drive - that interact with each other and allow an individual to reach biosocial goals. The threat system detects and assesses potential or present threats in order to fabricate defensive mechanisms in an effective way. Threats can be social, sensorial, external and internal (Littlejohn & Guymer, 2018; Haviland et al., 2010). The drive system integrates the desire, motivation and action towards one's various goals and fulfilment. It is associated with stimulating feelings like pleasure and excitement (Gilbert, 2013). The soothing, contentment and safeness system regulates and restores balance after arousal derived from both the threat and drive systems. It is linked to affection and kindness, that when received, produce feelings of safeness. It links wellbeing to feeling loved, wanted, and safe with others (Gilbert, 2013) and becomes active after the obtainment of resources.

According to Gilbert's theory, an individual becomes stressed when the emotional regulation systems are out of balance. It has been observed that people with FM have increased negative emotions, decreased positive emotions, and increased emotional-avoidance strategies (van Middendorp et al., 2008) which is indicative of a proneness to disturbances in emotion regulation (Haviland et al., 2010). Specifically, Pinto et al., (2020b) hypothesize that FM could be the result of a hyperactive threat system and a hypoactive soothing system, in interaction with an imbalance of the drive system, were there are shifts from hyper and

hypoactivation. These disturbances can be heightened by early stressful experiences, biological and psychological predisposing factors and repeated negative life events. Such occurrences enhance a threat-focused processing that feeds and accentuates negative affective perceptions, reinforcing said imbalance. Various stimuli are then perceived as threatening, including pains associated with FM and leave little space for the regulatory functions of the soothing system (Pinto et al., 2020b).

While perhaps the threats of FM are well-known, soothing influences that could alleviate FM symptoms have received less attention in scientific literature. Possible soothers are acceptance, compassion, mindfulness, optimism, valued living and, particularly, social support and connectedness, all sensitive to improvement through psychosocial interventions (Pinto et al., 2020b). To design such interventions, directed to increase the soothing abilities of patients, it is important to identify all soothers involved in FM and how they present themselves in individuals. Specifically, it is relevant to identify if there is a priority structure were a set of soothers have a greater influence in FM symptoms, and if so, which ones.

Interventions in FM are not sufficiently effective (Palagini et al., 2016; Arnold & Claw, 2017) and they have usually been based on classical Cognitive Behavioural Therapy (CBT). In contrast, contextual cognitive behavioral interventions are potentially better equipped for the proposed transdiagnostic approach to FM. They include mindfulness and acceptance-based approaches, which are soothers and show promising improvements in FM treatment (Pinto et al., 2020a). For instance, mindfulness has been found to moderate the impact of fibromyalgia due to a possible alteration of how patients cope with this condition. It is also associated with less pain interference, better psychological health and increased quality of life in this population (Pleman et al., 2019; Cash et al., 2015). Similarly, a self-compassion therapeutic approach may protect against the development of stress related to fibromyalgia and subsequent risk for depression and suicidal behaviors (Hirsch et al., 2019; Gilbert, 2013). As explained in Pinto et al. (2020b), while mindfulness and acceptance focus on a better management of symptoms and experiences, compassion focuses on the self, incorporating non-judgement and kindness towards oneself. More specifically, it involves an affiliation-based affect regulation that relies not on evaluations or achievements, but on the cultivation of a wide contextual understanding of human experiences. This construct appears to be

relevant in chronic pain, where there is a constant challenge in maintaining a valued social role (Purdie & Morley, 2016). This affiliation-based affect regulation fundamentally refers to the soothing system, where affect is regulated by comforting influences, affection and kindness (Gilbert, 2013). Therefore, this study will feed appropriate interventions in this area.

The impact of fibromyalgia is significant in range and severity, including quality of sleep, pain, fatigue, depression, anxiety, cognitive impairment, social relationships and occupational function (Arnold et al., 2008). Additionally, there is evidence for the association between FM and negative self-image and body image perception, low self-esteem and low self-efficacy (Galvez-Sánchez et al., 2019). Thus, effective treatment is imperative. In order to increase the effectiveness of such interventions, getting insight into potential soothers influences and clarifying the association between them and physical symptoms becomes crucial.

For those purposes the following research questions are examined:

1. What kind of soothers do people with fibromyalgia have and how are these soothers structured in clusters and overarching categories?
2. What do people with fibromyalgia consider the least important and the most important soothers?
3. Which categories of soothers are correlated with the severity of the physical symptoms?

Hypotheses:

1. This study is explorative, designed to find any soother, but based on literature it is hypothesized that people with fibromyalgia have soothers that at least encompass the following clusters: acceptance, compassion, mindfulness, optimism, valued living and, particularly, social support and connectedness (Pinto et al., 2020b).
2. The most important soothers will have to do with social support and connectedness given the key role observed in ameliorating FM symptoms (Cooper & Gilbert, 2016), as well as their strong association with the severity of pain in FM and overall wellbeing (Pinto et al. 2020b; Gündüz et al., 2019; Pegado et al., 2017; Yim et al.,

2016). The least important will differ between individuals due to the noted heterogeneity in FM profiles (Palagini et al., 2016).

3. To the extent that all categories of soothers are assumed to be associated with the severity of somatic symptoms (Van Gordon, 2016), it is not expected to find soothers that are more clearly associated with somatic symptom severity.

Methods

Design and participants

This concept mapping study was granted two types of approval by the Ethics Committee of the Faculty of Social and Behavioural Sciences of Utrecht University, with respect to its different phases regarding a card sorting task (19-274) and an online survey (19-219). Informed consent concerning the procedure and purpose of the questionnaires and card sorting task was required before completing them.

This research had two phases, the first of which consisted of an online survey completed by 724 participants from South America and Europe with somatic diseases. For that purpose, recruitment letters and the survey were translated from English to Spanish, Dutch, Portuguese and Greek; and translated back to English by native speakers of each language to ensure a reliable translation (Wild et al., 2005). Participants with persistent physical symptoms were comprised by 655 women, 46 men and 23 preferred not to say. The average age was 45.4 years (min.18 – max. 80); and 88 spoke Greek, 3 English, 41 Spanish, 460 Dutch and 132 Portuguese. The survey consisted of open questions, were three possible influences over physical symptoms were identified: (1) threats, that bring a sense of danger or insecurity, (2) soothers, which bring calm, security and well-being, and (3) drives, motivating forces that stimulate an individual towards a goal. With the resulting data, the research group discussed and reached a consensus about initial categories in which 40 threats, soothers and drives were selected, striving for varied and encompassing sets of each one. The criteria for that purpose were as follows: (1) The content had to fit the definition of threat, soother or drive; or the participant had to explicitly mention that the answer was under either of these three influences. (2) The answer had to be applicable to the entire sample (e.g. outcomes that only concerned women were deleted). (3) Similar statements were combined, while statements that involved multiple threats, soothers or drives were split to reflect a single influence.

Selected statements were discussed within the research group and were put on a set of cards, resulting in three sets of 40 cards. Each card ended with the following statements: (1) '… is a threat that may create an experience of danger'; (2) '… is a comforting factor that may create an feelings of calmness, well-being, safety or social connectedness'; (3) '… is a drive, an urge, desire, ambition or motivation that stimulates to pursue a specific activity or reach a goal'. Several consensus meetings followed before reaching the final product (Overgaauw, 2020).

In the second phase, the card sorting test was sent by post and completed by 111 Dutch participants in The Netherlands with various diseases with somatic symptoms. Participants first sorted the cards of each group (threats, soothers and drives) in separate piles by content and gave them a label for the researches to interpret the sorting. The rules they were given were (1) all cards had to be placed in a pile, (2) each statement could be placed in one pile only, (3) each pile could include 2 to 25 items, and (4) 4 to 12 piles could be created. In case of missing or repeated items, researchers put them in a separate 1 item pile. In addition, participants classified each set of 40 threats, soothers and drives in piles from (1) 'least important' to (5) 'most important' according to their individual experience. To stimulate participants to think about the differences in importance, it was mandatory to allocate each item into the five categories provided. Finally, participants rated the severity of their somatic symptoms using the Patient Health Questionnaire-15 (PHQ-15). For the current thesis, the 74 individuals with fibromyalgia were selected.

Measures

The PHQ-15 is a somatic symptom subscale of the self-administered Patient Health Questionnaire (PHQ), used for the diagnosis of common mental disorders (Kroenke et al., 2002). It includes 15 somatic symptoms that represent a 90% of common physical complaints within somatic diseases, excluding upper respiratory tract symptoms (Kroenke et al., 2002). Each symptom is rated in a scale from 0 to 2 according to its severity, in which 0 ("not bothered at all"), 1 ("bothered a little"), or 2 ("bothered a lot"). This results in a total score range of 0 to 30. The categories chosen to reflect the severity of symptoms were score 0 to 4, minimal; score 5 to 9, low; score 10 to 14, medium; score 15 to 39 high (Kroenke et al., 2002). The internal reliability of the PHQ-15 is high, with a Cronbach's α of 0.80. Regarding

validity measures, its association with other scales is strong, showing a significant relationship between increasing PHQ-15 scores and worsening functional status, disability days and symptom-related difficulty. Moreover, the questionnaire differentiates the effects of somatic and depressive symptoms (Kroenke et al., 2002).

Data analysis

To classify and structure the content of each category, a hierarchical cluster analysis was performed using The IBM Statistical Software Package for the Social Sciences (SPSS) version 23 for Windows. Within it, the soothers that were sorted by the participants were analyzed according to their similarity in meaning and then structured in a hierarchy (according to their importance) through Ward's method (Schielke et al., 2008) for squared Euclidian distance (Klemm et al., 2018).

The reliability of the importance attached to soothers within a cluster was calculated through Cronbach's α, in which a value of .5 was considered the cutoff point. This low value was chosen because participants were forced to rank soothers in five categories, which reduces the internal consistency a lot. To reach said value, several items were deleted as shown in table 2. The next step comprised a calculation of the mean for each cluster, to then compare them and determine their importance. For that, a p – value of less than .05 was considered to indicate statistical significance.

Finally, a multiple regression analysis was performed to test whether the severity of somatic symptoms and soothers were associated. Pairwise comparisons were calculated, which involved a post hoc analysis with a Bonferroni correction. Demographic covariates would be included in regression analysis if needed.

Results

Demographics

After processing the data to eliminate incomplete or inadequate answers (e.g. instructions were not followed), there were a total resulting 111 participants, 74 of them with FM. The PHQ-15 results for individuals with fibromyalgia showed a minimum score of 5 (low severity) and a maximum of 24 (high severity). The mean was 13.52 which reflects a medium

severity of somatic symptoms and the standard deviation was 4.09. Table 1 shows the characteristics of the participants.

Table 1.

Demographics of participants

	Sample with fibromyalgia (n = 74)
Gender, n (%)	
Female	72 (97.3%)
Male	2 (2.7%)
Mean age in years (min-max)	47.8 (22-65)
	(SD) 10.9
Civil status	
Married or partnership	52
Single	14
Divorced	3
Other	2
Education	
Lower and middle education	36 (48.6%)
Higher education	38 (51.4%)
Mean years since diagnosis (min-max)	9,34 (1-40)
	(SD) 8.9

Hierarchical cluster analysis

The cluster analysis showed an initial soother dendrogram (see Appendix A) that included six categories named by the research team and comprised by the following items (see Appendix A): Social support S23 to S25; Sedentarism S09 to S30; Positive Feelings S24 to S27; Medical Help S11 to S03; Mindfulness S01 to S40; and Body care S14 to S10. The number of clusters was determined by the researchers, guided by the dendrogram which

showed what soothers were being combined. The main criterion to decide on the number of clusters was a qualitative one in which the clusters should reflect distinct components of soothers. This resulted in a name for each one.

After running reliability analyses, the solution of four clusters was chosen to reach an acceptable value for the Cronbach's α within each category. Table 2 shows an overview of the items deleted to improve the reliability, as well as the end result, the mean of each cluster, the standard deviation and the reliability measure (Cronbach's α). A supplementary schematic representation of the final dendrogram with the outcome of hierarchical cluster analyses, as well as the names of each category is shown in Figure 1.

Table 2.

Mean, Standard Deviation (SD) and items deleted in each cluster.

Clusters	Deleted items	Final items	Mean	SD	Cronbach's α
Social Support	S 25	S 23	3.2	0.5	.526
	S 12	S 26			
		S 06			
		S 17			
		S 04			
		S 20			
		S 28			
		S 37			
Good condition	S 09	S 22	3.7	0.8	.524
	S 16	S 30			
	S 34	S 15			
	S 36	S 33			
	S 24				
	S 31				
	S 08				
	S 35				
	S 27				
Professional help	-	S 11	2.8	0.8	.556
		S 29			
		S 02			
		S 03			
Self-care	S 38	S 01	2.3	0.6	.531
	S 13	S 21			
	S 39	S 19			
	S 07	S 40			
		S 14			
		S 18			
		S 05			
		S 32			
		S 10			

n = 74 participants. For full names of the items, see appendix A.

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                              ┌──────────┐
                              │ Soothers │
                              └──────────┘
        ┌─────────────────┬───────────────┬────────────────┐
  ┌──────────────┐ ┌───────────────┐ ┌──────────────────┐ ┌───────────┐
  │ Social Support│ │ Good Condition│ │ Professional Help│ │ Self Care │
  └──────────────┘ └───────────────┘ └──────────────────┘ └───────────┘
      S23              S22               S11                 S01
      S26              S30               S29                 S21
      S06              S15               S02                 S19
      S17              S33               S03                 S40
      S04                                                    S14
      S20                                                    S18
      S28                                                    S05
      S37                                                    S32
                                                             S10
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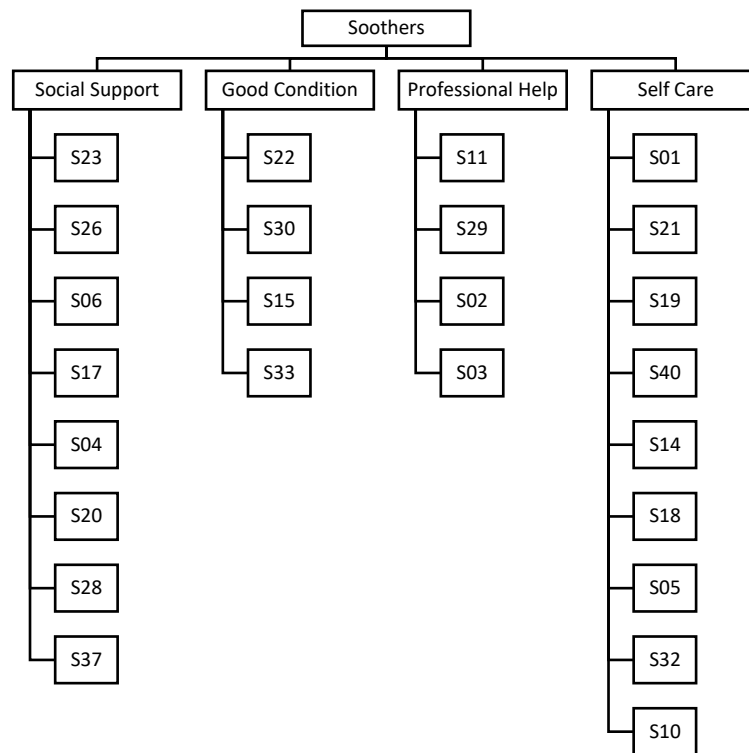
Figure 1. *Schematic representation of the final structure. For full names of the items, see appendix A.*

Importance of soothers

The perceived importance analysis showed a significant main effect for the difference in each soother category $F (3) = 47.51$; $p < .05$, with a Partial Eta Squared of $\eta^2_p = .67$ which represents a large effect size (Cohen, 1988 as cited in Ellis, 2010). As such, there were significant differences in what participants with fibromyalgia considered a good soother. As Fig. 3 shows, there is no overlap between the standard error of measurement bars of the designated clusters, which shows that the group, on average, clearly perceived some soothers as more important than others. The 'good condition' category (mean = 3.7; $SD = 0.8$), was considered as the most important; 'social support' (mean = 3.2; $SD = 0.6$) was second in importance; 'self-care' (mean = 2.4; $SD = 0.6$) was the third most important cluster, and 'professional help' (mean = 2.8; $SD = 0.8$) was the least important. The standard deviations

show that there were considerable individual differences in the perceived importance attached to the categories.
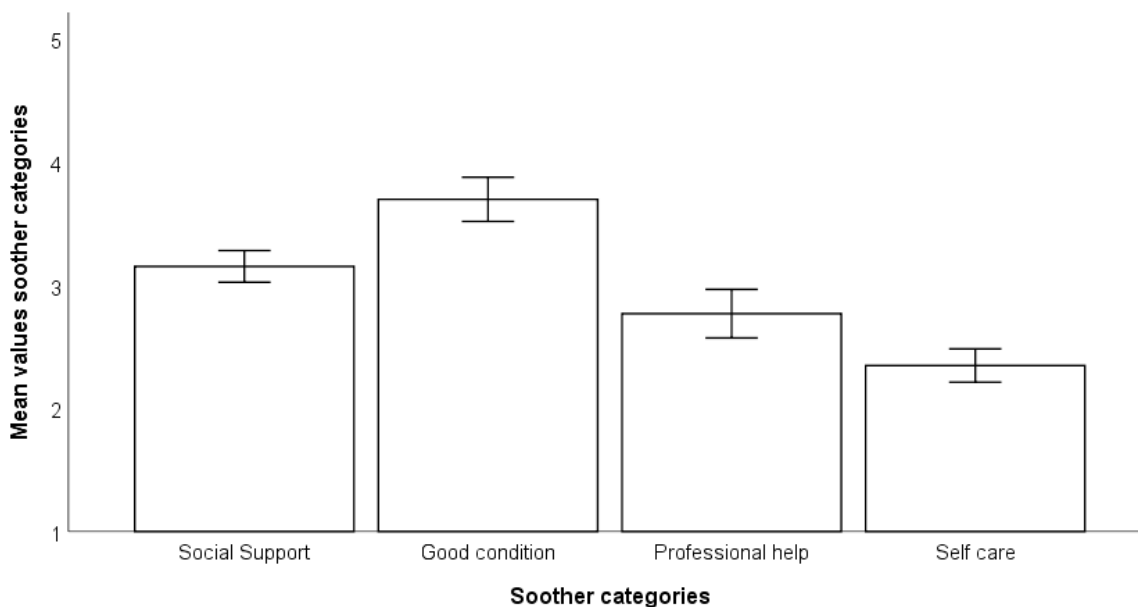

Figure 2. *Profile plot showing the importance of soothers as perceived by participants. The lowest possible score is 1 (least important) and the highest possible score is 5 (most important).*

Soothers and the severity of physical symptomss

Neither age nor gender nor education level had a significant association with PHQ-15 scores. Therefore, these variables were not included in the multiple regression analysis. Table 3 shows the association between soothers and the severity of somatic symptoms (PHQ-15). It can be seen there that the only significant association was found in 'professional help' ($t = 2.38$; $p = .02$), where a higher score was associated with more severe somatic symptoms.

Table 3.

Regression analyses showing an association between the severity of somatic symptoms and soothers.

Soothers	Severity of somatic symptoms (PHQ-15)				
	b	*Standard Error (s.e.)*	*β*	*t*	*Sig*
Social Support	-.508	.969	-.068	-.525	.602
Good Condition	.455	.699	.084	.651	.517
Professional Help	1.489	.625	.305	2.381	.020*
Self-Care	.391	.970	.055	.403	.688

Note.

PHQ-15 = Patient Health Questionnaire

* *p* < .05

Discussion

The elements comprising the "soothing system" according to people diagnosed with fibromyalgia were structured in four categories: (1) 'Social support', (2) 'Good condition', (3) 'Professional help' and (4) 'Self-care'. 'Social support' included the need for intimacy, physical affection, social interactions with meaningful people and emotional connection with others. 'Good condition' referred to a healthy day routine, caring and maintaining personal limits that allowed rest, as well as to emotional wellbeing and a safe environment. 'Professional help' encompassed both attention from health care professionals and medication; and 'self-care' consisted of meditation, relaxation and religious practices, healthy nutrition, physical and recreational activities and comfortable weather. Interestingly, each soother category was distinctly ranked, where the 'good condition' cluster was perceived as the most important and the 'self-care' category as the least important one. Nevertheless, there were clear individual differences in what participants with fibromyalgia considered to be a soothing influence. Furthermore, the only significant association between

the severity of somatic symptoms and soothers was found with the 'professional help' category.

It was hypothesized that soothers with influence over FM symptoms would gather in clusters of acceptance, compassion, mindfulness, optimism, valued living, social support and connectedness (Pinto et al., 2020b). Even though the findings of this study relate to the hypothesis, they differ in number and are clustered in a different manner. However, they are supported by the literature. In terms of the 'social support' and 'good condition' clusters, a significant association between low alexithymia and the use of effective coping strategies, as well as levels of perceived social support in FM patients has been found (Di Tella et al., 2017). This is indicative of the importance of social connectedness and emotional regulation as intertwined aspects to consider in the management and treatment of FM, which aligns with the contents of both 'social support' and 'good condition' categories. Regarding the 'self-care' cluster, there is evidence to support the association between mindfulness practice and reduced symptom severity in FM (Cash et al., 2015; Aman et al., 2018), as well as for the importance of nutrition over the alleviation of FM symptoms (Silva et al., 2019). Furthermore, it is argued that acceptance and compassion are contained on the concept of mindfulness (Kabat-Zinn, 2005) and thus, congruent with findings.

The 'professional help' cluster was not included in the hypothesis, given that the focus was on affect regulation systems, rather than pharmacological interventions. Nevertheless, especially the patients with more severe symptoms considered this an important soother. Psychotherapy for FM management is directed towards the development of all soother categories proposed; therefore, its underlying processes were already included in what was hypothesized. Nevertheless, the effectiveness of pharmacological treatment, as well as care from a range of health professionals (including mental and physical health providers) is well documented (Arnold & Clauw, 2017). In agreement to what is indicated in recommendations for the management of fibromyalgia (Macfarlane et al. 2017), in a study by Valentini et al. (2020), although participants were found to have a heavier reliance on pharmacological treatment, they had a lower, but more consistent reliance on non-pharmacological treatments. Specifically, individuals that had pharmacological treatments in the past were likely to have both pharmacological and non-pharmacological treatments in the present. Non-

pharmacological treatment, however, was more likely to be chosen again, and was unlikely to lead to a pharmacological one. Therefore, since FM guidelines include pharmacological treatment (Kia & Choy, 2017; Macfarlane et al., 2017), participants of this study are likely to have had a pharmacological history that could have led them to consider this intervention as a soother.

Findings regarding the perceived importance of soothers disconfirm the hypothesis that held that 'social support' and 'connectedness' would differentiate themselves from other categories, given that they have been observed to be fundamental factors in coping strategies for FM (Di Tella et al., 2017; Cooper & Gilbert, 2016). These soothers are contained in the 'social support' category, which was outranked by the 'good condition' one. This cluster referred to a general quality of life, sustained by an adequate routine and environment. It is clearly differentiated from 'professional help', which was ranked in third place and represents various kinds of treatments that can have a direct and immediate effect on FM symptoms. On the other hand, 'self-care' included two main components: meditation or spiritual practices, and care for the body; practices that bring results in the long term and may not bring the quick alleviation of pain that, for example, medication might. Perhaps this contributed to its lower perceived importance in comparison to other soothers. Moreover, the results show heterogeneity in what participants considered to be an effective and important soother; probably due to the complexity of FM. Adaptation profiles associated with FM severity have not only shown a significant heterogeneity, but also a continuum from maladaptive to adaptive in FM (Estévez-López et al., 2017). Similarly, Taylor et al. (2019) concluded that patient symptom profiles were significantly complex and different and thus, important in treatment design.

Finally, it was not expected to find soothers that were more clearly associated with somatic symptom severity in FM. However, findings showed 'professional help' to be the only one significantly correlated with the severity of somatic symptoms. This might reflect that, especially in the case of severe fibromyalgia, professional help may be the only means to calm somatic symptoms. The pharmacological domain of this cluster might play a key role in the significance observed given that it tends to have a short-term impact on pain relief (although effect sizes are small in fibromyalgia) (Macfarlane et al., 2017). Other domains of

soothers might not change the direct experience of pain but rather be directed towards management of the consequences of fibromyalgia, acceptance of pain and the support received from the environment. Interestingly, this also aligns with van Koulil et al.'s (2009) results, where, after participants received a standardized multidisciplinary treatment for FM, physical improvements in FM were significant, while psychological ones were not. Additionally, given that the PHQ-15 measures only physical symptomatology, all other symptoms associated with FM were not assessed. Therefore, soothers that might have a significant association with non-somatic symptoms of FM were not recognized. Furthermore, the forced sorting procedure in the card sorting task might have obstructed the identification of associations with symptom severity. However, it is worth noting that there is no biomarker identified as a criterion for FM diagnosis, which could be related to the moderate efficacy of pharmacological interventions (Taylor et al., 2018) and subsequently show non-pharmacological interventions to be more promising (Macfarlane et al., 2017).

The clinical consequences of the findings of this study point to a challenge in treatment development related to the different kind of influences over FM symptomatology. These encompass external (environment) and internal factors (individual characteristics such as personality, affective states and life experiences) that play a role in the perception of pain and its relievers. Furthermore, the limited efficacy of FM treatment that is often observed, is suggestive of its heterogeneity and complexity, regarding a wide range of comorbidities and a clear multidimensionality. As such, there is no agreement on one treatment approach for FM (Lawson, 2017; Kia & Choy, 2017).

As a response, this study informs about the key role of the perceived efficacy and personal experience in the treatment of FM, which is further emphasized by the fact that fibromyalgia's underlying processes are still unknown. Consequently, an effective measure independent from personal experience is absent, which points towards the need for an individualized treatment approach, based on symptom profiles and personal variables (Taylor et al., 2018). A biopsychosocial therapeutic perspective appears to be promising given that this model's primary focus is on the experience of pain rather than individual symptoms of FM. It also accounts for processes of appraisal (e.g. expectations and affective states), which are involved in both the meaning and experience of pain. These lead to subsequent

behaviours, that in turn, affect the environment and the severity of FM symptoms (Turk & Adams, 2016) and need to be included in interventions.

Pinto et al. (2020a, 2020b) suggest that a focus on soothers fit approaches like acceptance and compassion-based interventions, such as Compassion Therapy, Acceptance and Commitment Therapy (ACT) and Mindfulness-based Stress Reduction (MBSR). Particularly, self-compassion shows promising in the management of chronic pain given its focus on the development of a soothing internal dialogue, which leads towards a more contextualized view of FM and lessens catastrophic thoughts, resulting in a more stable affective state. This happens because thoughts, emotional responses and sensory processing are linked (and are part of neurophysiological responses that can lead to FM) (Littlejohn & Guymer, 2018). Thus, high levels of negative emotions are associated with higher pain and reduced adjustment. Moreover, negative affect can also trigger, worsen and maintain pain (Purdie & Morley, 2016; Lumley et al., 2011). Such cognitive restructuring is explained by Gilbert's model, in which FM is closely related to a failure in emotion regulation caused by a hypoactive soothing system and an imbalance of the drive system. In turn, this creates shifts from hyper to hypoactivation in the central nervous system (Pinto et al., 2020b). Thus, identifying soothing influences that hold for individual patients with fibromyalgia may aid in restoring and preventing emotional imbalances closely related to FM. Likewise, the identification and development of soothers allow for individuals to be less reliant on positive evaluation from others or amount of achievements. Considering that FM creates a significant challenge to maintain valued social identity, putting less attention and power towards external validation is relevant (Purdie & Morley, 2016).

The strengths of this study relate to its contribution towards a comprehensive understanding of FM as a multifaceted disease. Being a concept mapping study, it made possible to identify perceived soothing influences over somatic symptoms of FM in an exploratory way, allowing for flexibility in what participants chose to identify as soothers. This perspective integrates qualitative and quantitative methods, balancing the limitations of each. Moreover, it involved a multicultural background that helped capture the diversity of experiences that characterize FM. Its exploratory nature also contributed to the groundwork for future studies, in directing their focus towards a better understanding of different FM profiles. Furthermore, it would be

relevant for future research to focus the malleability of soothers given that, if significant, it could increase the already significant differences between patients at any given time of life. Regarding limitations, this study measured somatic symptoms which, as previously discussed, comprises one of many dimensions of this condition. Thus, previous personal and treatment history were not considered, even though they are important variables that may have had a significant association with the obtained results, and therefore, could have provided more comprehensive ones. For instance, knowing about past pharmacological treatments might have pointed towards their possible influence over what participants considered as a soother.

In conclusion, by exploring the perspective of participants, this study provided a clear outline of individual results, were heterogeneous profiles can be well accounted for. This contributes to a conceptualization of fibromyalgia based on the integrative model proposed by Pinto et al. (2020b), were FM can be comprehensively understood and treated, within a biopsychosocial frame. Furthermore, the overview of the identified soothers can be used to support diagnostic interviews were an intersectional understanding of FM may lead to future therapeutic precision and effectiveness. Research implications mainly rely on the classification of patient subgroups and in the examination of the impact and protective value of soothers.

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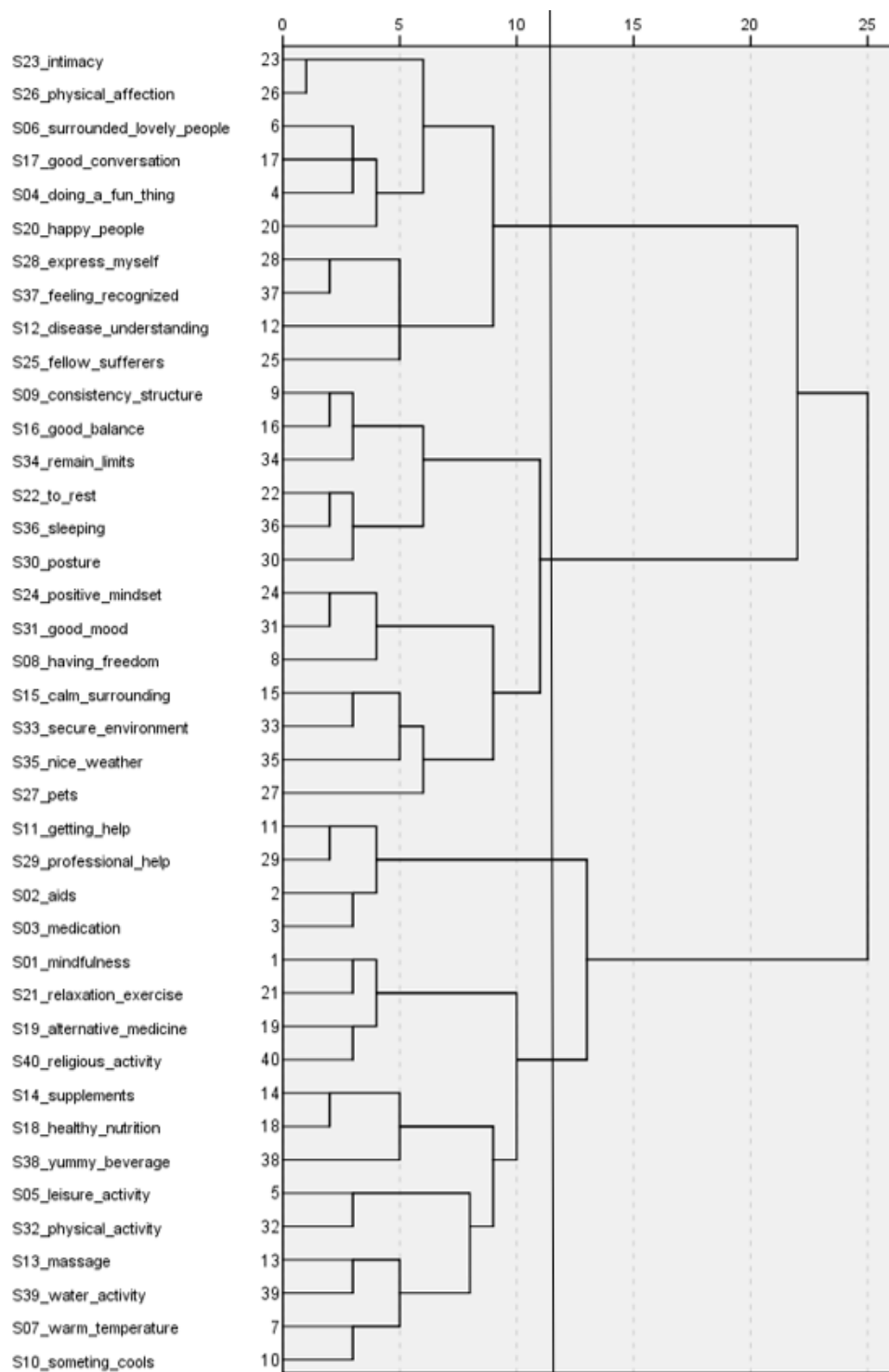
Appendix

Appendix A

Figure. Dendrogram showing the sorting of soother variables

The dendrogram shows the cluster solution. The X axis represents the stage of hierarchies, which help determine the number of clusters. The selected cutoff point is signaled by a vertical line over the figure. The Y axis shows the number and shortened name of each item. The distance between links shows dissimilarity, thus, the bigger the distance between two links, the bigger the difference between each item.

Appendix B

Table. Pairwise comparisons between soother categories

Soother categories		Mean difference between categories	Std. Error	Sig	95% Confidence Interval for Difference	
					Lower bound	Upper bound
1	2	-.544	.124	.000*	-.880	-.208
	3	.383	.127	.021*	.039	-.727
	4	.804	.100	.000*	.533	1.075
2	1	.544	.124	.000*	.208	.880
	3	.927	.130	.000*	.573	1.281
	4	1.348	.127	.000*	1.004	1.691
3	1	-.383	.127	.021*	-.727	-.039
	2	-.927	-.130	.000*	-1.281	-.573
	4	.421	.137	.018*	.049	.792
4	1	-.804	.100	.000*	-1.075	-.533
	2	-1.348	.127	.000*	-1.691	-1.004
	3	-.421	.237	.018*	-.792	-.049

Note. Social support = 1; Good condition = 2; Professional help = 3; Self-care = 4

* $p < .05$