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Explanations for functional somatic symptoms across European treatment settings: A mixed methods study

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ABSTRACT

Objective: Engaging patients in treatment for functional somatic symptoms (FSS) relies on a shared understanding of the mechanisms underlying the complaints. Despite this, little is known about the explanatory models used in daily clinical practice. We aim to examine the approaches healthcare professionals use to explain FSS across European healthcare settings.

Methods: This is an exploratory mixed methods study, combining sequential qualitative and quantitative analyses. 3 types of data were collected: a survey of Health-Care Professionals (HCPs) with special interest in FSS from 16 European countries (n = 186), Patient Education Material collected systematically from survey respondents (n = 72) and semi-structured Interviews with HCPs (n = 14). Survey results are summarized descriptively. Qualitative data was thematically coded following template analysis methods. Findings were integrated through mixed-methods triangulation.

Results: Five main explanatory models for FSS that are used across treatment settings and diagnostic constructs were represented in the data. The 'Multisystem Stress' Approach explains FSS through physiological stress responses within a bio-psycho-social paradigm. 'Sensitized Alarm' and 'Malfunctioning software' are both approaches derived from the neurosciences. Explanations related to 'Embodied Experience' are often used within integrated psychosomatic therapies. In the person-centred 'Symptoms' approach, HCPs aim for co-constructed, individualized explanations. These approaches, which rely on different models of mind-body-environment are complementary and are used flexibly by skilled HCPs.

Conclusion: Taken together the explanatory models described might form the basis of a curriculum of medical explanation with the potential to equip clinicians to form more collaborative relationships with patients across healthcare.

1. Introduction

Various health conditions are characterized by persistent bodily symptoms that can be described as Functional Somatic Symptoms (FSS). FSS are a common reason that patients present across all healthcare settings [1], and may fall under a number of diagnostic paradigms. Clusters of symptoms may be described by a functional somatic syndrome, such as Fibromyalgia or Irritable Bowel Syndrome (IBS). Diagnostic constructs included in mental health classification systems, like Somatic Symptom or Bodily Distress Disorder, describe typical psychological and behavioural features. Still, patients often struggle to get a well-fitting diagnosis or are told their symptoms are Medically Unexplained. As FSS seen in different treatment settings overlap epidemiologically and are attributable to similar mechanisms involving the interplay of environment, physiology and experience, it has been proposed that it is useful to consider disorders characterized by FSS under one umbrella [2].

Explanatory models in medicine usually include notions of cause,

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course, appropriate proper treatment, and likely outcome [3], and should be able to empower the patient to make appropriate recovery orientated changes. Patient education which integrates biological, psychological and social factors has been recommended as a cornerstone for engaging patients in treatment for FSS [4] and various explanations for FSS are described in the literature [5]. However in most European countries, provision of specialist care for FSS remains patchy [6] and patients frequently report receiving inadequate explanations to understand their symptoms [7]. Coherent explanatory models for FSS are rarely available when patients search their symptoms online and generally health-care professionals (HCPs) receive little to no formal training on FSS [8] and so tend to develop their own explanatory models which are often influenced by cultural attitudes and local practices [9]. This can lead to confusion, anxiety, and lack of trust, which can act as a barrier to engaging the patient in effective treatment. It has been suggested that development of a curriculum of medical explanation is necessary to better prepare HCPs in providing effective and authoritative explanations for symptoms that are not well explained by structural disease [10].

Although previous work has studied the explanations used by HCPs within single treatment settings [11], it remains unclear whether explanations for FSS described in the literature are relevant across different treatment and cultural contexts [12]. This study aims to summarize current approaches to patient education used by HCPs with special interest in treating FSS across a range of European healthcare settings. By describing widely applicable, clinically relevant models, we present the foundations of an overdue curriculum of integrative medical explanation.

2. Methods

2.1. Study design and rationale

A mixed methods approach was chosen to capture different aspects of explanation in the clinical setting. Three types of data were collected. A survey of HCPs was collected to provide a ‘wide-angled lens’ on practice across treatment settings. Patient Education Material (PEM) addressing FSS, including online, written, e-health, and group education resources, provided a direct perspective on information that patients receive. Finally, semi-structured interviews with HCPs were carried out. The three data types were analysed sequentially. PEM was analysed first. Through this a hierarchical codebook was developed which provided rich information on how explanatory components are typically drawn together into explanatory models. The survey results were then analysed in the light of the PEM with the aim to describe how use of explanations was distributed by geographical area and professional background. Interview topics were developed to expand on major themes in the Survey and PEM data, with the aim of clarifying points of uncertainty and to understand the relational context of engaging with patients around explanations. Findings from each type of data were integrated using a triangulation convergence matrix [13], which allows direct comparison of the multiple data types.

2.2. Survey of healthcare professionals (HCPs)

The survey instrument was developed to capture a broad range of clinical experience. The following description of FSS, based on previous work on a common classification system [2], was provided to survey respondents:

Functional somatic symptoms is used as an umbrella term to mean any persistent or recurrent somatic (bodily) symptom(s) lasting above 3 months in duration where appropriate medical investigation has ruled out alternative biomedical disease as an adequate explanation for the symptom(s).

We include general symptoms such as fatigue or dizziness or specific symptoms such as dyspepsia or limb weakness. In addition, we include single symptoms (such as Dissociative Seizures) and symptom syndromes (such as Irritable Bowel Syndrome or Fibromyalgia).

Apart from where the diagnosis is somatoform disorders (or equivalent), our definition excludes psychiatric diagnoses (such as health anxiety or depression) where these are severe enough to require a primary treatment focus and/or where they exist in the absence of persistent or recurrent somatic complaints.

A list of 17 explanatory components (appendix A) relevant to FSS was developed after reviewing the literature [14,5,15]. Explanations included in the list were heterogenous including causal (predisposing and triggering) as well as perpetuating mechanisms across biological, psychological, and social levels of explanation [11,16]. Survey respondents were presented with this list alongside short descriptions and were asked to indicate on a Likert scale how often they used each item within patient education. (0 = Never heard of item, 1 = Never Use, 2 = Rarely Use, 3 = Sometimes Use, 4 = Often Use, 5 = Always or Nearly Always Use). They were given the option to describe other approaches not captured. The survey also included questions about terminology used and reasons HCPs might vary their approach.

Participants were HCPs with experience treating FSS in a European healthcare setting. To reach participants in a broad range of treatment settings, snowball sampling was carried out via the EURONET-SOMA network formed around research interest in functional disorders [17]. Members of this network were asked to distribute the survey invitation amongst local clinically active contacts. Survey items about professional experience were used to assess inclusion criteria. Survey data was collected in January 2022 using REDCap, a secure, web-based data-capture platform (https://redcap.au.dk/). STATA (https://www.stata.com/) was used to organize and summarize quantitative data. Statistical analysis is limited to an exploratory descriptive approach. Survey responses were looked at in all responders and in groups by Country or Profession. Survey responses are presented by proportion (binary variables) or median and interquartile range (continuous variables).

2.3. Patient educational material (PEM)

Survey respondents were asked to submit PEM via an upload function integrated in the survey instrument. Additional material was provided directly by email. PEM that was originally in other languages was translated into English prior to analysis, using DeepL (https://www.deepl.com/), followed by human checking for accuracy. Audio data was transcribed and imported in textual form to Nvivo12Pro (https://www.qsrinternational.com/). Data was analysed in keeping with King's template analysis method [18]. An a-priori codebook was based on the explanatory components listed in the survey. Data was coded inductively to precise conceptual themes; themes were organized hierarchically, and the codebook was developed flexibly during the coding process. Coding of qualitative material was carried out independently by two of the authors (CS and HT), which allowed disagreements in how material should be coded to be discussed and the codebook was adapted and clarified where indicated. Where consensus was not reached decisions were discussed with the wider research group.

2.4. Semi-structured interviews

Questions that arose following analysis of PEM and survey data (both quantitative and qualitative) informed the semi-structured interview guides. A purposive sub-sample of survey respondents were invited for an interview, selected to represent a variety of countries and professional backgrounds. Interviews were conducted in English between February to April 2022 via Zoom Videoconferencing (https://zoom.us/). The interviews were transcribed and transcripts were coded according to template analysis using the codebook developed during PEM analysis as a template [18]. During this process extensive codes were added to describe themes related to relational and embodied aspects of explanation, which were common topics of the interviews.

2.5. Integration of data

Findings from the three data-sets were integrated using a mixed methods triangulation protocol [19]. In the first step, main themes or findings following the analysis of each dataset were summarized within a convergence matrix. In the second stage, the main findings from each dataset were examined in the other datasets. The convergence matrix allowed easy visualisation of where there was agreement, partial agreement, silence, or dissonance between datatypes. Results are presented as a narrative summary of the convergence matrix, with a focus on explanatory models.

2.6. Researchers characteristics, context, and reflexivity

Building on concepts of medical systems as cultural systems [3] our starting point was that the content of patient educational material is already highly constructed, sitting within the context of HCPs own heuristic models, developed within specific cultural and training contexts. The authors have backgrounds in the General Practice, Psychology, Nursing and Psychiatry, from Denmark, Estonia, and the UK. As HCPs we bring certain assumptions about explanatory models: they should be acceptable and relatable to patients, simple enough to communicate within a clinical encounter, and able to set the foundation for engagement in effective treatment. As researchers, we bring assumptions that explanatory models should be examined and improved in terms of both clinical usefulness and goodness of fit with up-to-date research.

2.7. Trustworthiness and ethical issues

This study was pre-registered (DOI: 10.17605/OSF.IO/CMKF9) and has been carried out in accordance with open science principles. Participant written consent was integrated within the survey instrument, and recorded verbal consent was collected from interviewees. The study was conducted according to the guidelines of the Danish Research Ethics Committee (ref: 271 / 2021 (1–10–72-274-21)) and approved by the Data Protection Agency (ref:760005).

3. Results

3.1. Respondents and data

186 Healthcare Professionals (HCPs) completed the survey after 'false start' records containing missing data were excluded (n = 77). Survey respondents represented healthcare systems in 16 countries, mostly from North-West Europe. 30 HCPs were approached to carry out 14 interviews. Most common reasons for declining to take part were work pressures, or self-perceived inadequacy of spoken English. 84 survey respondents also submitted PEM which yielded 72 unique sources from 12 countries. Appendix B represents the professional groups and country of work of the survey respondents, interviewees, and PEM.

3.2. Terminology

The most common terms used in patient education by survey respondents were Functional (71% of respondents), followed by specific syndrome names (Fibromyalgia 68%, Irritable Bowel Syndrome 64%, Chronic Fatigue Syndrome 56%). Terms that implied a particular aetiology such as Dissociative (38%), Stress Related (48%), Somatoform Disorder (19%) and Myalgic Encephalitis (19%) were used less frequently. 41% of HCPs spoke with patients about Persistent Physical Symptoms. 24% used 'Medically Unexplained Symptoms (MUS)' or local equivalents such as 'Somatisch Onvoldoende verklaarde Lichamelijke Klachten' (SOLK). Some terms had localized acceptability: 'Psychosomatic' was used widely in countries where there is a tradition of psychosomatic medicine (e.g. Germany and Latvia) but was uncommon outside of these areas. 'Bodily Distress' was regularly used in Denmark but infrequently elsewhere. The most common terms used in the PEM resources were 'Functional', 'Chronic' (e.g. chronic pain) or the name of a specific syndrome. Fewer PEM referred to MUS/SOLK or used the term 'Persistent Physical Symptoms'. Psychiatric diagnostic terms are not commonly used, and this was corroborated across data types. Overall, 19% of survey respondents reported using either 'Somatoform disorder' or 'Somatic Symptom Disorder' in patient education and a further 30% in communication with other professionals. Only 1 PEM mentioned either of these terms. Interviewees confirmed that they did not find these terms helpful in patient education but reserve them for administrative purposes, usually when a referral to psychological therapy is indicated.

The HCPs interviewed all conceptualized the variously termed conditions asked about in the survey as closely related.

> "I understand it as the same kind of problem, and I work with them as the same problem."
>
> Physiotherapist, France

> "These chronic conditions are part of same family; we use the same approach."
>
> Family Doctor, Spain

> "I might say 'you have a lot of functional somatic syndromes, that's really hard for you. We know that these share some similarities, they go along with each other often'…."
>
> Psychologist, Sweden

Many HCPs interviewed stated they tend to use their patient's preferred term, as long as this was not felt to hinder therapeutic potential by implying either non-recoverability or an unrealistic single factor cure. Despite feeling personally comfortable working with a heterogeneity in terminology, it was recognized that multiple terms are confusing and prevent patients feeling reassured and confident in their diagnosis. Variable terminology also affects access to social support and helpful information online.

> "I like to ask (patients) 'What would you tell your family or your boss if they ask you what is your problem?'. And they are very, very uncomfortable with that. They say 'I don't know, I wouldn't know.' And that makes the social acceptability very hard."
>
> Physiotherapist, France

3.3. Familiarity and use of explanations presented in the survey

Overall, survey respondents were familiar with the list of explanations presented (Appendix A). 53% of survey respondents reported having heard of all 17 of the explanations in the list and 94% had heard of at least 10. Respondents reported using a wide selection of explanatory components. The median number used at least 'Sometimes' was 8 (IQR 6). This did not vary with healthcare setting: primary-care based healthcare workers reported using as broad a range of explanations as those in tertiary-care. Fig. 1 shows the proportion of HCPs reporting they use each of the explanations presented in the survey 'often' or 'always'. Although 79% of HCPs reported speaking with patients about the biopsychosocial model, explanations on the social level such as 'Iatrogenicity' or 'Interpersonal and Systemic Models of Role Formation' were not widely used. In addition, the use of biological explanations varied considerably. 47% of HCPs responded they often use explanations based on the autonomic nervous system, whereas only 16% often talk about the immune system in their explanations. This may reflect the relatively high numbers of psychologists who work clinically in this field. Under-expressed emotion (Alexithymia), formerly a leading way to understand functional symptoms, was used 'often' by only 26% of respondents.

93% of respondents reported varying which explanations they used depending on factors in the patient's presentation. The most common reasons given for varying an explanation were the patient's existing

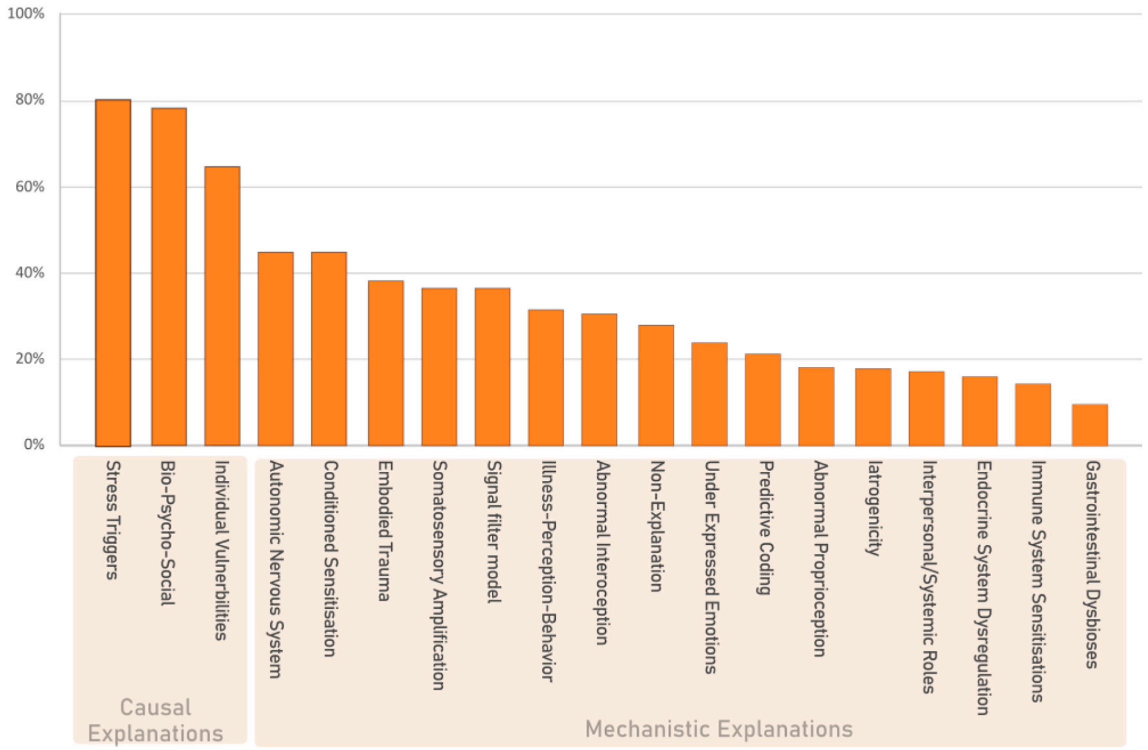

Fig. 1. Proportion of Healthcare professionals reporting 'often' or 'always' use of 17 explanations presented in the survey.

views (74%), the nature of the most troubling symptom(s) (69%) and the patient's educational level (65%).

3.4. *Applied explanatory models*

While the survey results established that HCPs use a broad range of explanatory components in a flexible manner, the qualitative analysis gave us insight into how these components are typically combined into coherent explanatory models which can be applied within patient education or in the clinic. Below, five main approaches are discussed, alongside a description of some of the data from which these were induced, with reference to the literature in which they are grounded. The explanatory models are summarized in Table 1.

3.4.1. *Multisystem stress*

80% of survey respondents across countries reported talking about 'stress-triggers' often or always when explaining FSS. The concept of stress serves as an all-purpose short-hand for how circumstances of life can impact on the equilibrium of physiological systems [20]. Physiological stress responsive systems have been a focus of research in recent decades and there is increasing evidence that a variety of FSS are associated with subtle dysfunctions in these systems [21,22,23]. However less than 1 in 5 HCPs surveyed regularly use explanations related to the Endocrine and Immune systems. Corresponding to findings from the survey, in the interviews, HCPs who conceptualized FSS as a stress response typically reported using the 'Autonomic Nervous System' to demonstrate how social or psychological stress affects us physiologically. Examples drawn from other stress responsive body systems were also rare in the PEM, where explanations about how stress impacts the body were usually supplemented with examples of how maladaptive illness perceptions and behaviours can have the unintended effect of maintaining the stress response.

3.4.2. *Sensitized alarm*

In the survey data, the explanatory component 'conditioned sensitization' was used more frequently by GPs (68%) than by Neurologists (35%). This might reflect the HCPs most likely to be consulted about chronic pain symptoms for which it is most commonly applied. In the PEM, explanations that spoke about sensitization were almost always found alongside the idea that the brain can make errors in filtering signals, errors of hazard perception or errors of proprioception. This relationship was typically made understandable through metaphors of the brain as an alarm that has become maladaptively sensitive to threats. As the codebook developed, these themes were subsumed within an overarching theme 'sensitized alarm'. Sensitized alarm was the dominant approach in many of the PEM resources addressing chronic pain or fibromyalgia and was represented alongside other approaches in PEM resources addressing a range of conditions. The interviewee quoted below confirmed she applies the sensitized alarm approach to a range of FSS.

> 'It is the same for pain as for the other symptoms, which can sometimes be chronic: dizziness, vertigo, visual discomfort, fatigue, insomnia… all the symptoms appear in a hazard assessment. I explain that this hazard assessment can appear when in reality the organism is not threatened by anything. It is an evaluative error of the protective central nervous system.'
>
> Family Doctor, Spain

3.4.3. *Malfunctioning software*

A third distinct explanatory model was clearly represented, especially in the PEM. It is based on another metaphor: the body as 'hardware' and brain as 'software'. Its origins are in the field of neurology [24]. However the idea that FSS can be explained by malfunctioning communication between the brain and the body was represented in PEM addressing a range of conditions (IBS, Fibromyalgia and MUS). It was difficult to capture a clear pattern that distinguished use of this model in the survey data, as it did not align with any of the explanatory components we specifically listed. In part this might be because 'Malfunctioning software' tends to be neutral about causes and mechanisms, perhaps to redress a historical over-emphasis on the role of stressors: PEM taking this approach typically mentions that stress is *not* a

Table 1

5 main approaches summarized from triangulation of all 3 data types.

1. Multisystem Stress

Cause: Individual Vulnerabilities + Stress. ***Mechanisms:*** Dysregulation of stress responsive body systems + Illness Perception and Behaviour ***Appropriate Treatment:*** Optimizing functioning of the stress axis through balancing activity and relaxation, alongside Cognitive Behavioural Therapy, and support to reduce social stressors. ***Course and likely outcome:*** Despite inevitable ups and downs, prognosis is seen as good, if the patient can be supported to develop sustainable and consistent strategies to manage stress. This may require significant changes to their life circumstances.

> ‘When we experience some form of stress, various organs are affected through an activation of the stress system (in technical language called the sympathetic nervous system). This activation should help us escape or fight a threat and thus ensure our survival… if the stress system is activated for a long time without being allowed to calm down again, it will eventually overload both the body and the brain. For example, we may find it harder to think clearly and solve problems, harder to sleep, and harder to recover from physical exercise.’

2. Sensitized alarm

Cause: Factors that alter how threat is perceived, through both top-down and bottom-up mechanisms. Adverse early life experiences are often implicated, as are previous injuries or infections, and chronic social stressors. ***Mechanism:*** Maladaptation of the Central Nervous System's threat responsiveness (‘Conditioned sensitization’) ***Appropriate Treatment:*** Typically focusses on ‘retraining the brain’ by 1) Reframing the perception of symptoms through neuroscience-based education 2) Teaching strategies to recognize and relax the threat response 3) Extinction of the threat response through exposure to avoided activities. ***Course and Likely Outcome:*** The prognosis is often presented as chronic, involving passive vicious cycles, which may not be fully reversible.

> “When pain becomes chronic, most people also experience a ‘sensitivity adjustment.’ This is sort of like that fire alarm that used to work perfectly fine, but now goes off every time you light a candle. Over time, your brain keeps track of everything that could possibly be related to your pain. It starts to become more fearful of anything it thinks might be a threat, and eventually, the threshold for the brain's danger signal to go off becomes pretty low.”

3. Malfunctioning Software

Cause: Unknowable in an individual case and not very important anyway. ***Mechanisms:*** Involuntary maladaptation of neural pathways involved in the communication between body and brain. Attentional mechanisms. ***Appropriate Treatment:*** Confidence in diagnosis is seen as key. A Multidisciplinary approach to treatment advised. Therapy (both physiotherapy and psychology) often involves strategies to regulate attention in respect to symptoms. ***Course and Likely Outcome:*** That there is no structural damage suggests potential for recovery.

> “In broad terms what seems to be wrong in functional dystonia is that this ‘map’ in the brain, for various reasons has gone wrong… It seems that physical injuries, weakness in the limb and immobility can all be things that can distort the map in the brain. The challenge of treatment is to try to ‘retrain the brain’ so that it can learn what ‘normal map’ of the limb should be.”

4. Embodied Experience

Cause and Mechanisms: Experiences, habits, and emotions, including pathogenic experiences such as trauma, are embodied and can manifest in symptoms. ***Appropriate Treatment:*** Therapeutic approaches promote awareness and re-conditioning of habitual patterns, often through somatic awareness, emotional expression, psycho-motor exercises, or interpersonal relational work. Patients are encouraged to explore different patterns of relating (to their bodies, environment and interpersonally) experientially within the safety of the therapeutic relationship. ***Course and Likely Outcome:*** Change within the embodied condition is inevitable but symptom improvement requires repetition of corrective experiences and reduction in re-enforcing patterns of action and experience.

Table 1 (*continued*)

> “I do think that for most patients they need to experience the explanation in the moment, to be really able to think: ‘Oh so we can see that the anxiety or the chest pain or the stomach-ache rises or diminishes as we work with the processes or emotions.’ And when we can experience that together, me and the patient, it's often quite obvious to both of us.”

5. Person-centred ‘Symptoms’ Approach

Cause and Mechanisms: Relies on the clinician-patient relationship to come to an individualized shared understanding of symptoms. ***Appropriate Treatment:*** Often based on acceptance and adaptation. ***Course and Likely Outcome:*** Clinician will perhaps share their experience that often such symptoms resolve in the course of time, but in some cases become chronic and require longer term management strategies.

> ‘I'm quite often led by what the patient uses. So if there's a patient who has researched and found a diagnostic label that seems to fit for them and I agree that it is it good fit then I will use that diagnostic label, but trying to get to a level of understanding of what is actually going on in the body, because that will then help us hopefully to manage it. Because the label alone doesn't tell you that. And that process would be very much led by them.’

necessary factor in development of FSS. Attentional perpetuating mechanisms are alluded to and provide the rationale for both psychological and physiotherapy interventions that engage attentional processes [25]. One of the strengths of the approach is that it has been developed alongside engagement with patient organizations, with widespread acceptability in mind. Despite this emphasis, the following interview quote suggests that individual tailoring of the explanation remains key.

> ‘Early on I used to just give the same metaphors of the hardware and software with everyone and some patients it worked really well with and some patients it was just a complete mess.. and they left more confused! So I've spent a long time trying to tailor each consultation, trying to use more simplistic language, more complex language as needed…’
>
> Neurologist, UK

3.4.4. Embodied experience

Clear descriptions of a fourth approach were given by several interviewees. The interview with a psychologist practicing emotional awareness and expression therapy, which has roots in the psychodynamic tradition, shared themes with interviews with a physical therapist and psychomotor therapist. These themes summarized as ‘Embodied experience’ mostly concerned the importance of relational and experiential processes in understanding symptoms, but also shared views of causal and therapeutic mechanisms. For example, mechanisms by which habits, and emotions, and pathogenic experiences such as trauma are embodied and can manifest in symptoms. In the survey the explanatory component ‘Embodied Trauma’ was reported to be used ‘often’ by 40% of HCPs and was especially common amongst psychiatrists and neurologists. Within our data there was limited PEM that reflected the ‘Embodied Experience’ approach. Helpful descriptions of symptom emergence according to this approach do exist in the recent literature [26], and perhaps have not yet been translated into patient education material. The model of mind-body-environment that underlies embodied experience approaches is best described as enactavism [27], onto which predictive coding models of neurological function map well [14]. Explanations based on the Predictive Coding Model were reported by 23% of survey respondents and are particularly common in Germany.

3.4.5. *Person-centred 'symptoms' approach*

This final approach was mainly described by interviewees working in primary care settings and is framed as response to the understanding that patient's view themselves as authorities on their symptoms and will dismiss explanations that differ too far from their own understanding [28]. A number of PEM characterized by 'complex' explanations [11] and de-medicalizing terminology, used this approach. These materials typically focused on acceptance of symptoms and the need to make adaptations to lifestyle in order to manage the illness. However, for HCPs who described using this approach in interviews, being prepared with ways to explain what's 'actually going on in the body' in FSS was key to the success of flexible person-centred explanations. The doctors interviewed highlighted that this sort of knowledge was not taught them in medical school: they had had to develop explanations based on their own understandings of physiology, a skill developed relatively late in their careers:

> "Looking back, it was quite remarkable that I'd come through medical school and a couple of years of foundation training and then three years of GP training, without really having a sort of a clear framework or any sort of sense of how I might explain those symptoms on the basis of what's actually going on in the body. For example with bowel symptoms the training was 'If this, this, and this test are normal and they've had all of that work up, it fits with these criteria we can label it as IBS, and this is what we can tell him to do'. And that was, I think, the extent of it."
>
> Family Doctor, UK

3.5. *Supplementary online material*

Supplementary material, including the survey instrument, codebook development journal, catalogue of Patient Education Material, the convergence matrix summarizing the data on the 5 main approaches from across data types and supplementary results from the survey are available at: https://osf.io/mzbg9/.

4. Discussion

This is the first study to describe how explanatory models of FSS are used by HCPs across a broad range of treatment settings. From three types of data, we found five main approaches, all of which have been party or fully described within previous research literature. Our analysis suggests that HCPs with special interest in FSS tend to be familiar with a range of explanations which they mix and match to meet the patient's prior illness understanding in a flexible manner.

4.1. *Scope of application*

By making explicit the explanations for FSS provided within treatment settings, we encourage reflection on the reasons for choosing explanations and the implications of the narratives we make available to patients looking for answers. Conceptualizing FSS as a manifestation of multisystem stress is widespread. However explanations based on stress may be unsatisfying to patients, and are considered stigmatizing in some cultures [12]. One aspect highlighted by this study is the paucity of explanations within current patient education that refer to the stress responsive immune and endocrine systems playing a role in FSS. Although modifiable psycho-social and behavioural factors remain key to supporting patients with FSS to navigate treatment and recovery, biomedical explanations are often favoured within lay medical discourse [29]. A failure to integrate these aspects could block therapeutic collaboration developing through establishment of a shared understanding of the problem between professional and patient [10]. Additionally there is perhaps a lack of focus on social factors. One advantage of the 'sensitized alarm' approach is that it allows psycho-physiological processes to be described in medicalized language as passive automatic adaptations, reducing perceived responsibility of the patient while opening up Bio-Psycho-Social treatment options [30]. 'Malfunctioning software' is an alternative, 'stress-neutral' explanatory paradigm to describe symptoms from a neurological perspective. The approach is perhaps more limited where positive signs cannot be elicited through clinical examination [31].

The Embodied Experience approach in patient education sits most comfortably within somatic focussed psychotherapies [32] and psychologically informed physical-therapies [33]. PEM explaining this approach is currently poorly developed, but the relevance of this approach is not just a reminder that explanations that relate to direct experience are intuitive and plausible. Supported by philosophical foundations of how experience and embodiment might affect each other in the manifestation of symptoms, this approach is promising in its ability to integrate current neuroscientific paradigms of symptom emergence [14] with the intuitive knowledge that accumulated biological, experiential, social and environmental conditions all impact our lived experience through the health of our bodies [34]. The person-centred symptoms approach is perhaps most relevant in primary care, where the nature of symptoms may still be unclear. However the art of co-creating explanations with patients is relevant for all HCPs working with FSS, where successful treatment often requires sustained patient engagement and self-efficacy [35]. It is important that clinicians remain aware of the increasingly sophisticated explanations for FSS within lay medical culture and adapt their explanatory models in response to these.

Patient education will continue to evolve in this field, with new findings from research expanding our ability to explain the mechanisms that underpin disorders characterized by FSS. Productive engagement of patients (and commissioners) in treatment of FSS relies on good explanatory models. We consider it a priority that coherent, research informed explanatory models are made accessible to the public. But as the internet democratizes access to all kinds of illness narratives, there is a risk HCPs are left on the back-foot. HCPs should receive training on crafting acceptable, research aligned and clinically pragmatic explanatory models of FSS [10]. The 5 approaches described in this paper can be considered as a foundation for a curriculum of medical explanation.

4.2. *Limitations*

This study provides a snapshot of the explanatory models patients with FSS might receive in Europe in 2022. There are several limitations: firstly, we study only the perspective of HCPs, and not patients' views. Secondly, special interest in FSS remains disappointingly rare in healthcare settings, by sampling HCPs with a self-identified interest in FSS we do not capture what happens in an average clinical encounter. Thirdly, our sampling method and use of English led to a bias towards understandings of functional disorders that sit within mainstream healthcare systems in north-western Europe. Conceptualizations of FSS can also differ significantly from the definition used in this study. Therefore approaches may exist that are not captured in our dataset.

5. Conclusion

This study summarizes explanatory models for Functional Somatic Symptoms (FSS) that are applicable in the training of a broad range of healthcare professionals. The five approaches described all provide routes to integrating biological mechanisms within broader models of human health. Rather than contradicting each other these approaches can be treated as part understandings of the complex whole and used flexibly can help patients make sense of a range of symptoms. Each has its own advantages and implications. Taken together they might form the basis of a curriculum of medical explanation with the potential to equip clinicians to form more collaborative relationships with patients across healthcare.

Declaration of Competing Interest

The authors have no competing interests to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2023.111155.

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