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Review article



Characteristics of collaborative care networks in functional disorders: A systematic review

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ABSTRACT

Objective: Functional disorders (FD) are complex conditions, for which multidisciplinary involvement is often recommended. Collaborative care networks (CCN) may unlock the potential of the multidisciplinary team (MDT) in FD care. To understand what characteristics should be part of CCNs in FD, we studied the composition and characteristics of existing CCNs in FD.

Methods: We performed a systematic review following PRISMA guidelines. A search of PubMed, Web of Science, PsycInfo, SocINDEX, AMED and CINAHL was undertaken to select studies describing CCNs in FD. Two reviewers extracted characteristics of the different CCNs. Characteristics were classified as relating to structure and processes of networks.

Results: A total of 62 studies were identified representing 39 CCNs across 11 countries. Regarding structural characteristics, we found that most networks are outpatient, secondary-care based, with teams of between two and 19 members. Medical specialists were most commonly involved and the typical team leads as well as main patient contacts were general practitioners (GPs) or nurses. Regarding processes, collaboration was demonstrated mostly during assessment, management and patient education, less often during rehabilitation and follow-up, mostly using MDT meetings. CCNs provided a wide range of treatment modalities, reflecting a bio-psychosocial approach, including psychological therapies, physiotherapy and social and occupational therapy.

Conclusion: CCNs for FD are heterogeneous, showing a wide variety of structures as well as processes. The heterogeneity of results provides a broad framework, demonstrating considerable variation in how this framework is applied in different contexts. Better development of network evaluation, as well as professional collaboration and education processes is needed.

1. Introduction

'Functional disorders' (FD) is an umbrella term for a number of related, recognisable medical conditions characterised and diagnosed by clusters of somatic symptoms, assumed to be caused by complex biopsychosocial factors [1]. These disorders have no reproducibly observable pathophysiology, and were previously referred to as Medically Unexplained Symptoms (MUS) [2]. Although in the absence of detectable abnormalities FD are sometimes interpreted as innocent problems,

patients with FD (such as fibromyalgia or functional seizures) have at least a comparable loss of health-related quality of life as patients with similar symptoms due to a well-recognized disease [3]. Though prevalence rates are unclear, FD are common [4–6], and represent a significant burden on healthcare services, with persistently high attendance rates [7]. The healthcare burden is associated with significant costs, both direct healthcare costs as well as, to a larger extent, indirect costs especially from work absence [8].

Alongside this, there is significant fragmentation in care associated

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with varying practices across disciplines and specialties involved in FD care [2]. This fragmentation is associated with frustration and poor experiences for both patients and professionals [9]. Patients in general value a main contact who can coordinate their care, such as a general practitioner (GP) [10,11]. The importance of the GP as a main contact is supported by findings showing that continuity by GPs in general care is associated with reduced hospital admissions and mortality [12]. There is also notable evidence on the impact on patient outcomes and satisfaction of different strategies of integrating care. For example, over 50% of services that focus on improved communication between service providers had a positive impact on patient outcomes and satisfaction [13].

Collaborative care networks (CCN) may be a way to unlock the potential of the multidisciplinary team (MDT) in FD care. This should also help resolve the issues related to care fragmentation. CCNs may be defined as care that “involves providers from different specialties, disciplines or sectors working together to offer complementary services and mutual support, to ensure that individuals receive the most appropriate service from the most appropriate provider in the most suitable location, as quickly as necessary, and with a minimum of obstacles. Collaboration can involve better communication, closer personal contacts, sharing of clinical care, joint educational programs and/or joint program and system planning” [14]. Studies on CCNs in the field of FD are limited and no systematic synthesis on this topic is available. One such study does show feasibility of CCNs, with improved addressing of psychosocial issues and referral to psychotherapy. However, other outcomes are less clear - with no significant changes in diagnostic detection rates or recommendations to initiate psychotherapy [15].

Collaborative care is clearly linked to integrated care, with many services that are collaborative being also integrated and vice-versa. However, much confusion arises when defining the two [16]. For the purposes of this paper, collaborative care is taken to focus on the communication and shared decision-making of team members and integrated care on the functional integration of services.

Studies in related fields suggest that collaborative care may offer positive outcomes. In two reviews, it was concluded that collaborative care resulted in better outcomes than usual care in treatment of psychiatric disorders, also showing improvements in patient satisfaction [17], and cost effectiveness [18]. Another review found significant improvements in outcomes through CCNs in dementia care, including cost neutrality or savings [19].

There is a need for systematic studies on CCNs of FD, to gain more information towards developing and evaluating them and towards solving the issue of care fragmentation. As a first step, we aimed to systematically describe existing CCNs for FD, as a reflection of the knowledge and experiences of clinical experts. By means of a systematic review, we will describe the structural characteristics such as network composition, and processes that are aimed to foster collaboration.

2. Methods

The current study is part of the innovative training network ETUDE (Encompassing Training in fUNCTIONAL Disorders across Europe; etude-itn.eu), ultimately aiming to improve the understanding of mechanisms, diagnosis, treatment and stigmatisation of FD [2]. The study was registered on the open science forum (OSF - osf.io/4gv2t).

2.1. Search strategy

A systematic search was undertaken using PubMed (Medline), Web of Science, PsycInfo, SocINDEX, AMED, and CINAHL to identify relevant papers. A scan of references of included studies and relevant systematic reviews was also undertaken. The guidelines on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 were followed throughout the systematic review [20], unless indicated otherwise.

The search terms used were based around two central concepts: one

concept related to FD and related terms, whereas the other concept focused on CCN and related terms. The full list of search terms can be found at: osf.io/usc7a. Searches took place on 31/12/2021.

The screening and data extraction process was undertaken using Cochrane's Covidence platform, though initial deduplication was done manually as well as by utilising EndNote software [21].

2.2. Eligibility criteria

Our original inclusion criteria for this review were [1] any studies dealing with FD and persistent somatic symptoms; [2] describing an intervention in the form of a CCN as per the stated definition above [14]; [3] including a description of the network, an evaluation of process or quality indicators, and/or results evaluating the network. Exclusion criteria were [1] non-human studies, [2] studies on interventions focusing only on an organic issue, [3] studies on interventions that are not network-based - as per the CCN definition. There were no study design, language or publication date restrictions. With regards study design, case reports were also considered as long as they provided a description of a reproducible collaborative care process. We also did not exclude paediatric populations as collaborative care is also relevant in this population. Since study selection resulted in a very high number of included studies, the first inclusion criterion was modified to focus only on studies dealing with FD and the related concept of MUS. In practice, the definition of CCN used was simplified as “two or more health or social care professionals working together in a collaborative way showing shared management of patients”.

2.3. Data extraction & management

Title and abstract as well as full text screening were conducted by two independent reviewers (NM and MK) [22]. Disparities were resolved by discussion with a third reviewer (DH) available to resolve any disputes in both stages of screening.

The data extraction process utilised one reviewer (MK) extracting data, and a second reviewer (NM) independently checking all data extraction to ensure no errors - this shows moderate error rates irrespective of method, with no clear method identified as best; especially with no outcome data being gathered in this study, dual independent data extraction is considered less important [23].

The following information was extracted from the included studies: Study ID (including authors and year of publication), study design characteristics, type of FD, outcome measures, and network characteristics. These CCN characteristics could be divided into two broad groups - the structure and process aspects of networks. Structural aspects included details about the care setting and location, team make-up and size, team lead and main patient contact. Procedural aspects included the aspects of care that were collaborative, aspects of team collaboration such as education for professionals and family involvement, and treatment modalities offered.

2.4. Analyses

We performed a narrative synthesis, summarizing structure and process aspects of CCN for FD, taking into account notable similarities and differences between the various networks. We initially planned to study outcomes of CCN for FD as a secondary aim, and to perform a risk of bias assessment of included studies related to this, as recommended by the PRISMA guidelines. However, the heterogeneity of the studies made such analysis unrealistic, and the current review is therefore restricted to the planned primary aim of describing the characteristics of CCN for FD. The quality of the descriptions, however, are discussed in the review.

3. Results

3.1. Study selection

Of 8117 studies identified, 277 full texts were screened. In total, 62 studies representing 39 CCNs were included (see Fig. 1 for flowchart). The main reasons for exclusion were: no network described ($n = 63$), insufficient network description ($n = 40$) and no evidence of collaboration ($n = 31$).

3.2. Study characteristics

Table 1 describes the characteristics of the 39 CCNs for FD (for the full list of 62 studies, including papers representing the same studies listed in Table 1, please see appendix A). The studies were conducted in 11 countries, with 33% in the US and 66% from across Western Europe, as well as Canada, Australia and Israel. A mixture of randomised controlled trials, case studies and other study designs were used. Among the case studies are examples of CCNs created in direct response to a clinical need; in one case this related, at least initially, to the needs of a single patient, however with a detailed description of a reproducible CCN.

The most common conditions targeted by these networks were fibromyalgia ($n = 10$) and chronic fatigue syndrome (CFS) ($n = 8$). Beyond this, there was a wide range of conditions studied, such as somatoform disorders, functional gastrointestinal disorders (FGID) and MUS, with some studies including a mixture of diagnoses and conditions. Most studies were performed in adults with some studies on paediatric populations.

Most studies measured outcomes, with the vast majority focusing on symptoms and function improvement. A number of them looked also at cost benefit, healthcare utilisation and patient satisfaction. Exceptional among these were one study looking at mortality, and one looking at network processes – including the rate of patients receiving mental health treatment among other outcomes.

3.3. Network structures

Table 2 describes the structural characteristics of the different networks. Networks were run across different settings, with the majority being in outpatient secondary care in a single location. A few inpatient and a number of mixed inpatient/outpatient networks are documented, as well as a number of networks in other settings including primary care, and networks across multiple locations.

Teams were varied in number and make-up. Sizes of teams ranged from two to 19 members – most commonly five - representing different disciplines. The most common disciplines included were medical specialists other than psychiatrists ($n = 29$), followed by physiotherapists ($n = 22$), GPs ($n = 19$), psychologists ($n = 18$), and nurses ($n = 16$), with psychiatrists included less often ($n = 11$). Many teams also had other specific members, including of note, psychoeducation nurses, behavioural therapists and enterostomal therapists, as well as care managers and clinic coordinators.

Of the 21 networks that had a stated team lead, teams were most commonly led by GPs ($n = 8$) or nurses ($n = 5$). Alongside this, three patterns were noted with regards to the person that held the role of team lead. Firstly, GPs were most often team lead when they were part of the team. Secondly, a similar pattern is seen with psychiatrists and

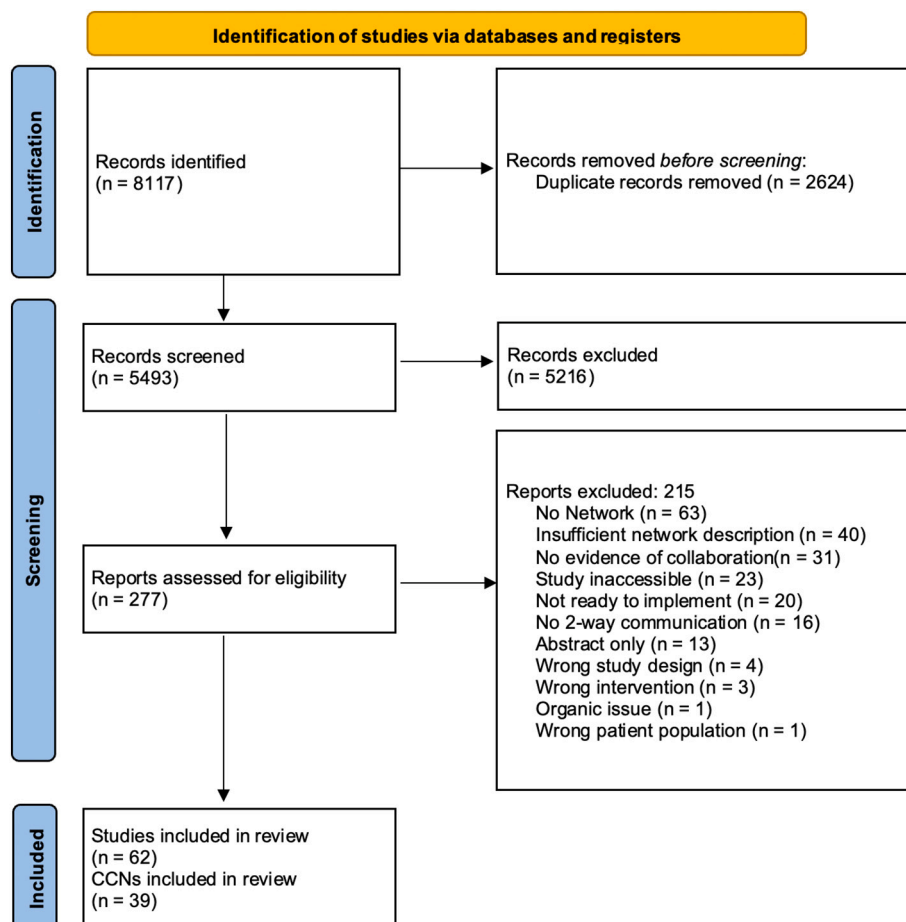


Fig. 1. PRISMA.

Table 1
Study details.

RefID	Study ID	Country	Study design	Conditions	Population	Network aim	Outcome measures						
							Symptom	Function	Cost	Healthcare use	Patient knowledge	Satisfaction	Other?
01	Abbey 1987 [24]	CA	Treatment programme description	Persistent somatisation	Unspecified	Help patients achieve highest level of physical, social & occupational functioning which can be realistically attained							
02	Arnold 2016 [25]	US/UK	Review and Intervention Design	Fibromyalgia	Adults	Engage multiple HCPs in hands-on management to assist patients in navigating the care system							
03	Basnayake 2020 [26]	AU	RCT	FGID	Adults	Improve symptoms	y						
04	Burley 2007 [27]	UK	Case report & intervention design	CFS/ME	Adults	Improve condition through occupational therapy principles		y					
05	Calvert 2003 [28]	AU	Case report-illustrated rehabilitation package design.	Conversion disorder/ reaction; hysterical paralysis; psycho-somatic presentation; somatisation disorder; functional pain	Paediatric	Increase functional ability		y					
06	Colas 2021 [29]	FR	RCT	Fibromyalgia	Adults	Long-term therapeutic adherence; improved lifestyle, health status & function; estimate of budgetary impact		y					
07	Deacy 2019 [30]	US	Retrospective observational study	Paediatric FGID	Paediatric	Improve health outcomes, reduce healthcare utilisation, improve satisfaction and improve financial savings	y	y				y	
08	Essame 1998 [31]	UK	Non-randomised experimental study	CFS	Adults	Reduce invalidity		y					
09	Gerson 2003 [32]	US	RCT	IBS	Adults	Relieve symptoms	y	y					
10	Gustafsson 2002 [33]	SE	Non-randomised experimental study	Fibromyalgia; chronic widespread pain	Women	Provide participants with adequate knowledge of fibromyalgia & chronic widespread pain, and help them see the pain in a more understandable context	y	y					
11	Hardin 2019 [34]	US	Case report	FNSD	Adults	Returning to full premonitory independence and functionality		y					
12	Harrison 2002 [35]	UK	Retrospective follow-up study	CFS	Adults	Help sufferers from CFS to learn the principles, and practice techniques of managing their illness	y					y	
13	Heddaeus 2019 [36]	DE	Cluster-randomised, prospective, parallel-group superiority trial	Somatoform disorders (and mental health disorders)	Adults	Improve care for patients with reduced symptom burden & costs through improved coordination of health services	y	y	y	y			
14	Hillert 2002 [37]	SE	Non-randomised experimental study	Environmental illness - hypersensitivity to electricity	Adults	Help participants refrain from avoiding normal environments in everyday life	y	y					

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Table 1 (continued)

RefID	Study ID	Country	Study design	Conditions	Population	Network aim	Outcome measures						
							Symptom	Function	Cost	Healthcare use	Patient knowledge	Satisfaction	Other?
15	Hubley 2017 [38]	US	Open trial	MUS; chronic medical symptoms	Adults	Develop a coherent narrative of patients' illness experience; define and clarify specific, achievable treatment goals; facilitate a revised treatment plan in collaboration with GP	y	y				y	
16	Hunt 2002 [39]	US	Programme description	Fibromyalgia; IBS	Adults	Mitigating the impact of predisposing factors, preventing precipitating factors and managing perpetuating factors							
17	Jones 2011 [40]	US	Retrospective follow-up study	Fibromyalgia	Adults	Diagnose the patient; and provide the referring PCP with individualised recommendations for the patient's management of fibromyalgia.	y	y				y	
18	Konnopka 2016 [41]	DE	RCT with economic evaluation	MUS	Adults	Improve symptoms and function partly through improved understanding of illness and self-management	y	y	y				
19	Kuo 2007 [42]	US	Case report	CFS	Paediatric	Optimise management							
20	Libbon 2019 [43]	US	Programme description and chart review	NES/FND	Adults	Reduce the number of attacks and improve quality of life	y	y					
21	Makkes 2013 [44]	NL	Case series	MUS	Adults	Improve health situation							
22	Margalit 2008 [45]	IL	Prospective controlled trial	MUS; biopsychosocial diagnoses	Adults	Reduce the cost of healthcare related to unexplained symptoms				y			Mortality
23	Moser 2014 [46]	US	Retrospective review of clinic service	Paediatric GI diseases including FGID	Paediatric	Identify psychological factors that influence medical status and administer brief, problem-focused therapy using evidence-based practices			y	y			
24	Petrochilos 2020 [47]	UK	Pre- post- outcome analysis	FNSD	Adult	Reduce symptoms, improve functional performance and improve health status	y	y					
25	Pfeiffer 2003 [48]	US	Interrupted time series	Fibromyalgia	Adult	Increase patients' physical and mental health functioning; impart accurate and research-based information; create a standardised treatment approach	y	y					
26	Poenaru 1997 [49]	CA	Cross sectional study	(Paediatric) functional constipation	Paediatric	Treat functional constipation	y	y		y		y	
27	Rasmussen 2017 [50]	DK	RCT	Fibromyalgia; chronic widespread pain	Women	Improve functioning and improve mental health-related quality of life	y	y					
28	Shedden-Mora 2015 [15]	DE	Pre- post- intervention study	MUS; somatoform disorders; FD	Adults	Improve the early detection and management of somatoform disorders in primary care; accelerate the successful diagnosis and referral to psychotherapy	y			y		y	Network processes

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Table 1 (continued)

RefID	Study ID	Country	Study design	Conditions	Population	Network aim	Outcome measures						
							Symptom	Function	Cost	Healthcare use	Patient knowledge	Satisfaction	Other?
29	Swenson 1992 [51]	CA	Case series & retrospective analysis	Somatoform disorders (and mental health disorders)	Adults	Improve integrated care & continuity of care for co-morbid medical & psychiatric issues including through professional education							
30	Teo 2017 [52]	CA	Prospective pre-post- feasibility study	Fibromyalgia	Adults	Provide a comprehensive, integrated, community-based model of care for fibromyalgia	y	y					y
31	Tobback 2014 [53]	BE	Programme description	MUS; CFS; abnormal fatigue	Unspecified	Identify patients 'at risk' in an early stage							
32	Turk 1998 [54]	US	Cross sectional study	Fibromyalgia	Adults	Increase self-efficiency	y	y					
33	vanderFeltz-Cornelis 2006 [55]	NL	RCT	MUS; undifferentiated somatoform disorder; persistent pain disorder; neurasthenia; hypochondrial disorder; somatisation	Adults	Improve the health and situation of persons with MUS, aiming to lower health care use	y	y		y			
34	Verhelst 2011 [56]	BE	Case series	CFS; pathologic fatigue	>15 years	Better coordination of diagnostics and treatment of CFS				y			y
35	Vincent 2013 [57]	US	Clinical feasibility assessment	Fibromyalgia	Adults	Increase self-management and function	y	y					
36	Viner 2004 [58]	UK	Non-randomised prospective study	CFS/ME	Paediatric	Improve function	y	y					
37	Vos-Vromans 2012 [59]	NL	RCT	CFS	Adults	Improve treatment effectiveness	y	y				y	y
38	Zeylemaker 2015 [60]	NL	Case series and programme description	MUPS	Adults	Improve quality of life, functional status, and occupational performance	y	y		y			
39	Zimmermann 2016 [61]	DE	Cluster-RCT	Somatoform disorders (and anxiety, depression)	Adults	Enhance self-efficacy (proxy for self-management)	y	y	y	y			

Table 2
Network structures.

RefID	Setting	Inpatient/ Outpatient	Location	Team make-up											No. of team members	Team lead/Care coordinator	Main patient contact				
				GP	Medical specialist	Psychiatrist	Psychologist	Nurse	NP	PT	OT	SW	Other	Medical specialist (s)							
1	2°	Mixed	Single		y	y			y					y	y	Biofeedback technician, dietetic technician Pharmacist, physician assistant, health coach, behavioural health coach, care coordinator Dietitian, behavioural physiotherapists, gut-focused hypno-therapists Counsellors, admin staff Speech pathologists APA teacher, myology unit and pain centre staff Biofeedback clinician, clinic coordinator, advanced practice nurses	Internist; rehab physician	19	Psychiatrist	Nurse	
2	1°	Outpatient	Multiple	y				y		y								9	GP as team lead; care coordinator also present	NS	
3	2°	Outpatient	Single		y	y			y					y			Gastroenterologists	NS	Gastroenterologist	Gastroenterologist	
4	2°	Mixed	Single		y				y					y	y		Neurologist	NS	OT	OT	
5	2°	Mixed	Single		y		y							y	y		Managing medical team	NS	Dependent on needs of case	NS	
6	Mix	Outpatient	Multiple	y	y				y								Internal medicine; occupational health	NS	Nurse	Nurse	
7	2°	Outpatient	Single		y				y						y		Two paediatric gastro-enterologists	5	Paediatric gastroenterologist & psychologist	Nurse	
8	2°	Inpatient	Single		y									y	y	y	Counsellor, dietician	NS, but likely psychiatrist (admission was to psychiatric ward) Gastroenterologist	NS	NS	NS
9	3°	Outpatient	Single		y												Rheumatologist	2	NS	NS	
10	Rehab	Outpatient	Single		y				y						y		Rehabilitation specialist	6	Nurse	NS	
11	2°	Mixed	Single		y									y	y			4	Psychologist & physician	NS	
12	2°	Inpatient	Single	y												y	Counsellor, nutritionist	5	NS	NS	
13	Mix	Mixed	Multiple	y	y		y										Psychosomatic specialists	NS	NS	GP or mental health specialist	
14	2°	Outpatient	Single	y	y									y		y	NS	NS	NS	NS	
15	1°	Outpatient	Single	y													Behavioural health provider Mental Health provider	3	Psychologist	NS	
16	2°	Outpatient	Single	y										y		y		NS	NS	GP	
17	2°	Outpatient	Single		y									y	y	y		4	NS	NS	
18	1°	Outpatient	Multiple	y	y												Psychosomatic specialist	2-4	GP	GP	

(continued on next page)

Table 2 (continued)

RefID	Setting	Inpatient/ Outpatient	Location	Team make-up										No. of team members	Team lead/Care coordinator	Main patient contact			
				GP	Medical specialist	Psychiatrist	Psychologist	Nurse	NP	PT	OT	SW	Other				Medical specialist (s)		
19	1°	Outpatient	Multiple	y										Academic CFS specialist	Primary care paediatrics specialist	2	GP	GP	
20	2°	Mixed	Single	y		y							y	APPs, behavioural health providers	Neurology, psychosomatic fellow	NS	NS	NS	
21	Mix	Outpatient	Multiple	y	y			y					y		Can vary according to patient need: e.g. neurologist, gastroenterologist, rheumatologist	NS	GP ± practice nurse	GP & practice nurse	
22	1°	Outpatient	Single	y				y							GP has expertise in BPS approach	3	NS	NS	
23	2°	Outpatient	Single	y			y							Other unspecified team members	Paediatric gastro- enterologist	NS	NS	NS	
24	2°	Outpatient	Single	y			y						y	y	CBT therapist	Neuropsychiatrist	NS	NS	NS
25	3°	Outpatient	Single	y		y	y	y	y	y	y				Ancillary staff	Rheumatologists, rehab (physiatry), internal medicine Physician (rotating between two paediatricians, one paediatric gastroenterologist, and one paediatric general surgeon)	NS	NS	NS
26	2°	Outpatient	Single	y						y					Enterostomal therapist/nurse educator, dietitian, psychosocial nurse specialist	5	NS	NS	
27	NS	Outpatient	Single	y			y			y	y				Rheumatologist	5	NS	NS	
28	Mix	Mixed	Multiple	y											Psychotherapists; mental health clinic staff	NS	GP	GP	
29	2°	Inpatient	Single	y		y	y	y							Internist & neurologist (consulting)	NS	Psychiatrist	NS	
30	1°	Outpatient	Multiple	y		y		y							Exercise therapist, dietician	Rheumatologist	7	GP	NS
31	1°	Mixed	Multiple	y	y		y						y	y		Internist, rehab physician	NS	GP	GP
32	2°	Outpatient	Single	y	y		y						y	y		Rheumatologist (consulting)	5	NS	NS
33	Mix	Outpatient	Multiple	y		y											2	GP	GP
34	NS	Outpatient	Multiple	y	y	y	y										4	CFS consultant	CFS consultant
35	2°	NS	Single	y				y	y						Care manager Exercise and endurance coach	Rheumatologist	5	NS	Nurse
36	2°	Outpatient	Single	y				y					y		Specialist nurse, nurse counsellor	Paediatricians	NS	NS	Nurse specialist
37	2°	Outpatient	Multiple	y			y						y	y	y	Rehab physician	8–10	Rehab physician	NS

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Table 2 (continued)

RefID	Setting	Inpatient/ Outpatient	Location	Team make-up		Psychiatrist	Psychologist	Nurse	NP	PT	OT	SW	Other	Medical specialist (s)	No. of team members	Team lead/Care coordinator	Main patient contact
				GP	Medical specialist												
38	2°	Outpatient	Single	y	y	y	y			y					8	NS	NS
39	1°	Outpatient	Multiple	y				y							2	Nurse	Nurse

1° - Primary care.
 2° - Secondary care.
 3° - Tertiary care.
 APA – American Psychological Association.
 APP – Advanced practice providers.
 BPS - Biopsychosocial.
 CBT – Cognitive behaviour therapy.
 CFS – Chronic fatigue syndrome.
 GP - General Practitioner.
 NP – Nurse practitioner.
 NS – Not Specified.
 OT – Occupational therapist.
 PT - Physiotherapist.
 Rehab – rehabilitation medicine.
 SW – Social worker.

psychologists when GPs did not hold this role. Thirdly, in CCNs that either focused on organ-specific conditions, or with a specific aim, these defined who led the team. For example, gastroenterologists were generally the team lead in networks aimed at FGID, and in a network where the focus of the study was the impact of occupational therapy on managing CFS, occupational therapists held this role.

With regards to the main patient contact, when specified, this was most commonly either the GP or the nurse. For those studies that stated both roles of team lead and main patient contact, the same team member in most cases held both roles. In two studies, however, the two roles were held by different team members; in these cases, the main patient contact was the nurse whereas the team leads were the psychiatrist in one case, and in the other, the paediatric gastroenterologist and psychologist shared the role.

3.4. Network processes

We could distinguish three categories of network processes in the CCNs, namely with regard to collaboration in different stages of care, collaboration across all processes of care and treatment modalities.

3.4.1. Collaboration in different stages of care

Table 3 describes the processes fostering collaborative care in the CCNs. Looking at the overall process of care, we could identify five main stages of care in which collaboration was performed: patient education, assessment of condition, management (primarily referring to treatment plans), rehabilitation, and follow-up. One addition to that was a network that included professional collaboration on research alongside providing children with management and education for FGID. In this particular network, there were weekly research meetings, and the teams worked alongside each other in clinic and on research projects – which is suggested to be part of improving the working relationship and care provided.

Of the 39 CCNs, 19 provided collaborative patient education. Techniques used included a mixture of group education, information booklets, websites and seminars from specialists. In some cases of education sessions, including groups sessions, family members were also invited to participate in networks working with both paediatric and adult populations. Broadly speaking, the education was focused on providing information of the condition or training on the therapy options (especially behavioural techniques).

CCNs provided collaborative patient assessment in 25 cases. Of these, one CCN focused on the assessment of patients with fibromyalgia to provide treatment recommendations, along with some patient education. In the 24 other CCNs, the collaborative assessment was followed by collaboration on disorder management.

All CCNs collaborated on disorder management, with the exception of the network described above. In 14 CCNs, there is collaboration on management but not assessment. It is also worth noting that in some cases, the management in itself is already rehabilitation-focused.

While some CCNs do not go beyond mentioning rehabilitation, others describe complex programmes of rehabilitation. When rehabilitation is specifically mentioned, this is the focus of the treatment offered, and therefore of the CCN. A few CCNs do not mention rehabilitation, but have rehabilitation physicians in their teams. In certain CCNs this starts as an inpatient rehabilitation programme and continues in the community [24,27]. One CCN highlights the importance of the programme taking place during normal life activity, thus recommending continuing with work, and with encouragement to keep applying the strategies learnt during and after the programme.

With regards to follow-up, this was only described in eight CCNs and organized in different ways. In one case, this was within the rehabilitation programme, with social workers and other team members involved in preventing relapse by reinforcing the work done by the patient and the team [59]. In another case, follow-up took place after the rehabilitation programme and specifically included a collaboration

Table 3
Network processes.

RefID	Collaborative stages of care							Team Collaboration				Treatment modalities											
	Education	Assessment	Management	Rehabilitation	Follow-up	Other?	Education for HCPs	MDT meetings	Family involved	Info sharing platform	Further information	Psychological therapy	Group sessions	Pharmacotherapy	Physiotherapy	Occupational therapy	Exercise	Education	Self-management	Lifestyle management	Social rehabilitation	Alternative therapies	
1		Y	Y	Y	Y		n	Y	Y				Y	Y	Y		Y	Y		Y		Y	
2		Y	Y					n		Y				Y			Y	Y	Y	Y			
3			Y					Y					Y							Y		Y	
4			Y	Y			Y						Y	Y	Y	Y	Y			Y		Y	
5		Y	Y	Y				Y	Y				Y	Y	Y	Y	Y	Y	Y			Y	
6	Y	Y	Y					Y								Y	Y						
7	Y	Y	Y					Y	Y	Y			Y		Y				Y	Y	Y	Y	Y
8	Y	Y	Y					Y	Y				Y		Y	Y	Y			Y		Y	
9			Y											Y						Y			
10	Y	Y	Y	Y	Y			Y					Y		Y			Y	Y				Y
11	Y		Y	Y				Y	Y	Y			Y		Y	Y			Y				
12	Y		Y	Y									Y			Y							
13	Y	Y	Y				Y	Y		Y			Y		Y			Y	Y		Y		Y
14	Y		Y					Y					Y	Y									
15			Y					Y		Y			Y										
16			Y					Y	Y				Y	Y		Y				Y	Y		Y
17	Y	Y						Y	Y						Y	Y			Y				
18	Y		Y				Y						Y	Y					Y				
19			Y		Y			Y	Y	Y				Y	Y					Y	Y		
20		Y	Y					Y	Y				Y										
21		Y	Y					Y	Y				Y		Y								
22	Y	Y	Y				Y	Y	Y	Y			Y		Y				Y	Y			
23	Y		Y				Research	Y	Y	Y	Y		Y										
24		Y	Y	Y	Y			Y	Y				Y		Y	Y	Y		Y				
25	Y	Y	Y						Y						Y	Y			Y	Y			
26	Y	Y	Y					Y	Y				Y						Y	Y	Y	Y	Y
27	Y		Y	Y				Y	Y				Y		Y	Y	Y						
28	Y	Y	Y				Y	Y	Y				Y	Y					Y				
29	Y	Y	Y				Y	Y					Y	Y	Y								
30	Y	Y	Y		Y			Y					Y	Y			Y	Y		Y			
31	Y	Y	Y		Y		Y	Y					Y		Y		Y	Y				Y	
32	Y		Y					Y					Y	Y	Y	Y	Y		Y				
33	Y	Y	Y				Y	Y	Y				Y		Y							Y	
34		Y	Y					Y	Y	Y			Y		Y								
35		Y	Y						Y				Y				Y		Y				
36		Y	Y	Y	Y				Y					Y			Y				Y	Y	
37		Y	Y	Y	Y		Y	Y					Y		Y		Y				Y	Y	
38	Y	Y	Y					Y	Y				Y		Y								
39			Y		Y			Y					Y					Y	Y			Y	

GP - General practitioner.
 HCP – Healthcare professional.
 MDT - multidisciplinary team.

planning session of the patient, medical team members, employer and insurance, with a further meeting three-months later [33]. A contrast to these is the ongoing follow-up of a GP with their patient with irregular but ongoing discussion with a CFS specialist during this time [42].

3.4.2. Collaboration across all processes of care

Collaborative care processes relate to team collaboration across all processes include network-wide education for professionals, MDT or related meetings, family involvement, and information sharing platforms.

Only two CCNs described the use of informal education of healthcare professionals, while others specified more formal education for the team members. This included covering guideline recommendations or training in ‘manualised interventions’, teaching about the specific conditions covered, and case management using specific therapy techniques. In one CCN, psychologists and gastroenterology specialists provided didactic presentations on behavioural health and gastrointestinal-related topics respectively to the each other. The importance of teaching assessment and management to residents, interns and medical students was a stated aim of one CCN, however, how this was achieved was not described [51].

Only 7 of the CCNs did not report MDT or related meetings, with only one CCN specifically stating no MDT meetings were held, instead holding informal case discussions. A mixture of team-collaboration strategies was also described. Many MDT meetings included sessions for patients jointly-delivered with different disciplines, as well as meetings with the referring doctors. Other strategies included contact with external ‘stakeholders’ such as social insurance offices and employers, and quality circles within the MDT as a network-improvement process.

Twenty CCNs specified the involvement of family as part of the CCN's processes, in decision making as well as treatment. This occurred both in paediatric as well as adult populations, with some CCNs specifically including family in consultations.

3.4.3. Treatment modalities of care

The third category of procedural characteristics included the offered treatment modalities utilised by the CCNs. These represented a holistic, biopsychosocial approach and include a variety of psychological therapies (offered by 28 CCNs) – primarily psychotherapy, cognitive behavioural therapy (CBT), counselling, and behaviour therapy; physiotherapy including psychomotor therapy (offered by 17 CCNs); lifestyle management including nutrition (offered by 15 CCNs), self management (offered by 10 networks), as well as social rehabilitation (offered by 9 CCNs). Six CCNs offered complimentary therapies, including biofeedback, acupuncture and Alexander Technique.

4. Discussion

4.1. Principal findings

This systematic review of 39 existing CCNs for FD provided an overview of structural characteristics and procedures fostering collaborative care for FD. The typical CCN consisted of several members from different disciplines, most often led by a GP or nurse, supported by medical specialists, physiotherapists, and psychologists. These disciplines collaborated mostly during assessment, management and patient education, less often during rehabilitation, and rarely during follow-up, mostly using MDT meetings. Some gaps in reporting are noted with regards to MDT communication and collaboration as well as healthcare professional education, including when it was specified as an aim for the CCN [51]. CCNs provided a wide range of treatment modalities,

reflecting a biopsychosocial approach, including psychological therapies, physiotherapy, and social and occupational therapy.

4.2. Strengths and weaknesses

The main strength of this study is that we focused on the different characteristics of network structures and network processes. Within this, we looked at the areas in which the CCN collaborated and what this collaboration looked like.

This review did have some limitations worth raising. One limitation is that we did not undertake a quantitative assessment of the network outcomes. This was outside the scope of our primary research question, and the large heterogeneity would likely not allow for a meaningful meta-analysis. However, it does mean that it is more difficult to comment on the relative importance and effectiveness of different characteristics. Consideration of the studied CCNs that are based in similar contexts may provide some possible direction. However, it is difficult to draw specific conclusions due to specific differences in context. An alternative means of evaluating networks – the choice of characteristics to include as well as their effectiveness – must be sought.

One final limitation with the study is related to our restricting this review to CCNs for treatment of FD. The care of FD is more commonly secondary care-focused, whereas other conditions such as chronic pain are more often primary care-focused. This means that we are drawing conclusions that are more applicable to secondary-focused CCNs. For example, CCNs identified in our review most often involved a medical specialist, whereas this may not be the case when a CCN is primary care-focused - where GPs and other healthcare professionals may indeed prove more central.

4.3. Comparison with the literature

In relation to other studies, we are not aware of any systematic review looking at characteristics of CCNs in FD. One review did focus on stepped care in co-morbid mental and somatic disorders. In this review it is stated that collaboration between professionals is not a defining characteristic of stepped care [62]. It does, however, highlight the importance of communication between involved professionals to improve collaboration. As such, while multi-disciplinary care is commonplace in the management of chronic pain, mental health care and other areas, the communication of CCNs has not been commonly described in reviews in the field of FD.

Systematic reviews looking at characteristics of CCNs more broadly are also limited. Two such systematic reviews, looking at depressive disorders and severe mental illness, offer some limited detail on the networks. Among the network information they provide, one documents the number of networks in different settings, who holds the role of case manager and the primary care and mental health providers [63]. Another, having only identified one relevant study, describes the setting, team members and treatment modalities offered [64]. In both cases little is stated in terms of processes, while focusing primarily on the outcomes such as symptom improvement, adherence and recovery, or rates of admission. In this regard, however, it is important to note that our review has shown a similar heterogeneity in composition and activities among the different networks to such studies outside of FD. These studies have shown a significant mixture of settings, case managers, involved professionals and treatment options [62–64].

4.4. Implications of the study and future research

The various networks have several structure and process elements in common, however, there is significant variation in how these are

applied in the local context. This is in accordance with a systematic review on values of integrated care, a concept closely linked to collaborative care. In this systematic review, it is argued that generic knowledge is applied in various settings, but local needs and circumstances impact the practical execution [65]. This means that the broader picture of the characteristics will be utilised across different contexts but their application will look very different. For this reason, a 'one size fits all' approach is unlikely to yield the most effective results, and therefore a deeper understanding of how to apply the characteristics in specific contexts should be sought, as this is more likely to be fruitful. Indeed, taking particular note of the local needs and context, and utilising the broad framework shown here, could aid in CCN development.

This review can serve as a starting point for deciding on elements to include in a new CCN for FD, or elements to bring into an active network. However, some prioritisation of what to include and how to evaluate CCN results is needed, linked to the CCN's aims. A common concern among healthcare professionals is that there is a lack of consensus on best practices for managing FD and a lack of tools to support them in daily practice [9]. A stronger focus on education for healthcare professionals as well as MDT communication and collaboration within CCNs can help tackle the twin issues of consensus on FD management practices and the fragmentation of care. It can also tackle the challenges associated with lack of trust in healthcare professionals, as well as the negative attitudes patients encounter from healthcare professionals [66,67]. It is already recognised from previous research that education increases knowledge and competences on FD [68–70]. Further exploration of CCNs would be beneficial in terms of the educational impact, as well as whether and how this educational improvement can result in improvement of patient outcomes and quality of care. Unfortunately, only a limited number of studies explicitly documented education for professionals, or describe the ways in which MDTs communicated and collaborated. This makes it difficult to draw any significant conclusions on these areas - including effective methods for providing these, or their impact on quality of care. Giving these areas more importance may be the key to unlocking the potential of CCNs and therefore to improve outcomes.

5. Conclusions

This systematic review shows a wide variety of CCNs, with a mixture of structures and processes, designed to create an effective system for treating people with FD. We have shown the broad framework that makes up a CCN, the areas to consider when thinking about its structure, while also showing that there is a lot of variation in how this framework is applied in different contexts. We have also described the processes that are important to consider. More work needs to be done in understanding and developing processes, primarily in team collaboration and education for professionals. To further study effectiveness of CCN, an evaluation framework should be developed based on quality indicators. This information could be brought together into a toolkit that would allow for better development of CCNs fitting local contexts. One size does not fit all, however, the structure and process variables described, combined with quality indicators and awareness of the local context can provide a solid starting point for implementing new CCNs in the field of FD [65].

Declaration of Competing Interest

No conflicts of interest declared.

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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.2023.111357>.

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