Qual Life Res (2014) 23:2407–2416
DOI 10.1007/s11136-014-0705-9

REVIEW

Defining recovery in chronic fatigue syndrome: a critical review

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Accepted: 22 April 2014 / Published online: 3 May 2014

Abstract
Purpose In chronic fatigue syndrome (CFS), the lack of consensus on how recovery should be defined or interpreted has generated controversy and confusion. The purpose of this paper was to systematically review, compare, and evaluate the definitions of recovery reported in the CFS literature and to make recommendations about the scope of recovery assessments.
Methods A search was done using the MEDLINE, PubMed, PsycINFO, CINAHL, and Cochrane databases for peer review papers that contained the search terms "chronic fatigue syndrome" and "recovery," "reversal," "remission," and/or "treatment response."
Results From the 22 extracted studies, recovery was operationally defined by reference with one or more of these domains: (1) pre-morbid functioning; (2) both fatigue and function; (3) fatigue (or related symptoms) alone; (4) function alone; and/or (5) brief global assessment. Almost all of the studies measuring recovery in CFS did so differently. The brief global assessment was the most common outcome measure used to define recovery. Estimates of recovery ranged from 0 to 66 % in intervention studies and 2.6 to 62 % in naturalistic studies.
Conclusions Given that the term "recovery" was often based on limited assessments and less than full restoration of health, other more precise and accurate labels (e.g., clinically significant improvement) may be more appropriate and informative. In keeping with common understandings of the term recovery, we recommend a consistent definition that captures a broad-based return to health with assessments of both fatigue and function as well as the patient's perceptions of his/her recovery status.

Keywords Recovery · Chronic fatigue syndrome · Operational definition

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Introduction

Recovery from an illness is a fundamental concept in health care, but its operational meaning remains vague [1]. According to the MEDLINEPlus Merriam-Webster Medical Dictionary, recovery is defined as "the act of regaining or returning toward a normal healthy state" [2]. Improvement, on the other hand, is defined as "the act or process of making something better," "the quality of being better than before," and "an addition or change that makes something better …" [3]. Thus, *recovery* from illness seems to imply a return to pre-morbid functioning, whereas *improvement* suggests positive progress, but not necessarily a restoration of health. Though these terms are fundamentally different, they are often used interchangeably or in conjunction with each other in the research literature. Within the field of chronic fatigue syndrome (CFS), data on recovery have been used to inform prognosis, e.g., [4], and investigate the efficiency of treatments, e.g., [5]. Yet there is no consensus on how it should be defined. This may be due in part to the absence of biomarkers or diagnostic tests for CFS.

This lack of agreement on defining recovery is not unique to the CFS literature. According to a systematic review of the low back pain literature, Kamper et al. [6]

found 82 studies with 66 different measures of recovery among them. Other studies of patients with chronic physical illnesses have assessed recovery with questions about recovery time from a particular illness-related event, e.g., dialysis session [7], or ratings of overall change (i.e., worse to completely recovered) based on patients' current health as compared to the time of diagnosis [8].

Better specified definitions of recovery have been proposed in research on psychiatric illness. For example, Lieberman et al. [9] have suggested that recovery from schizophrenia should be defined by a time duration of 2 years that shows a reduction in symptoms, participation in school or employment, self-sufficiency in the management of daily needs, evidence of pleasant family and peer relationships, and engagement in leisure activities [9]. Similarly, relatively precise criteria for recovery from anorexia nervosa [10] have been proposed that include physiological assessments (e.g., normal weight), behavioral indices (e.g., no dieting), and psychological factors (e.g., no eating disorder cognitions). Such multifaceted definitions draw upon the "well-being" aspect of recovery, i.e., the ability to live a productive, satisfied, and fulfilling life in spite of the possible occurrences of illness resurgence and associated limitations [11, 12].

Similar to psychiatric illness, assessing restoration of full health or recovery in CFS, given the absence of objective measures, often involves considerable subjectivity in the choice of domains and the recovery thresholds applied to them. Because divergent recovery criteria may create confusion as well as controversy in the interpretation of clinical outcomes, e.g., [13], the aim of this study was to systematically review and evaluate the different definitions of recovery proposed in the CFS literature and to offer recommendations for future research.

Methods

Initial search strategy

Studies for this review were obtained from searches of MedLINE, PubMed, PsycINFO, CINAHL, and Cochrane. The keywords of CFS AND recovery (recovery.mp) OR reversal (reversal.mp) OR remission (remission.mp) OR treatment response (treatment response.mp) were used to identify peer reviewed papers that measured or described patient outcomes using these terms.

Inclusion and exclusion criteria

In order to be included in this review, studies were required to meet the following criteria: (a) a study sample comprised of adult patients with CFS, or CFS-like caseness; (b) the use of the terms "recovery," "remission," "reversal," or "treatment response" in the Abstract, Methods, or Results section of the paper; and (c) an operational definition of the term "recovery" (or synonym). Trials of children with CFS were excluded because of their high recovery rates [14], which are generally accepted within the field. Studies published prior to 1988 were also excluded, as the term *chronic fatigue syndrome* was not used in any medical literature [15]. Finally, case reports and papers written in languages other than English were also omitted.

Two of the authors (J.A. and I.C.) separately reviewed the above databases and excluded articles that were clearly inappropriate based on the title and abstracts. The remaining papers were categorized in accordance with the above criteria. Full articles were then obtained to confirm that inclusion criteria were met. All included articles were approved by both authors; any disagreements between authors were resolved by the third author (F.F).

Post-review search strategy

Following the search of the above five databases, two of the authors (J.A. and I.C.) separately hand searched the reference lists of all articles that met study inclusion criteria. All of the referenced articles were cross-checked with our previous searches. The abstracts and full articles of any new titles were obtained to examine whether inclusion criteria were met. All included or excluded articles were approved by both authors.

Results

Search

Figure 1 outlines the number of papers that were screened and included by the initial search review. A total of 596 papers were identified from the search of the databases; while many of the articles mentioned recovery, it was rarely operationally defined. Eighteen articles met the study inclusion criteria. One article [16] which summarized a meeting on the development of outcome measures for CFS trials referenced two longitudinal studies that may have measured recovery. However, one of the referenced studies was unpublished, and the other was not cited. These papers and their data were not recoverable through inquiries with possible authors. Figure 2 outlines the number of papers that were screened and included following post-review hand searches of reference lists. A total of 492 papers were identified from this additional review, of which four met the inclusion criteria.

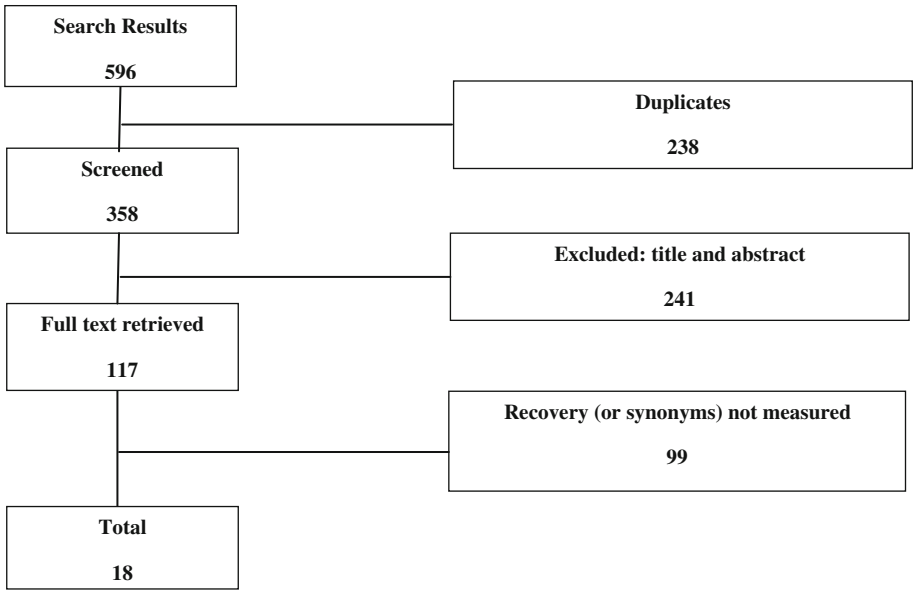

Fig. 1 Database search results. MEDLINE, PubMed, PsycINFO, CINAHL, and Cochrane database search of recovery, reversal, remission, and treatment response

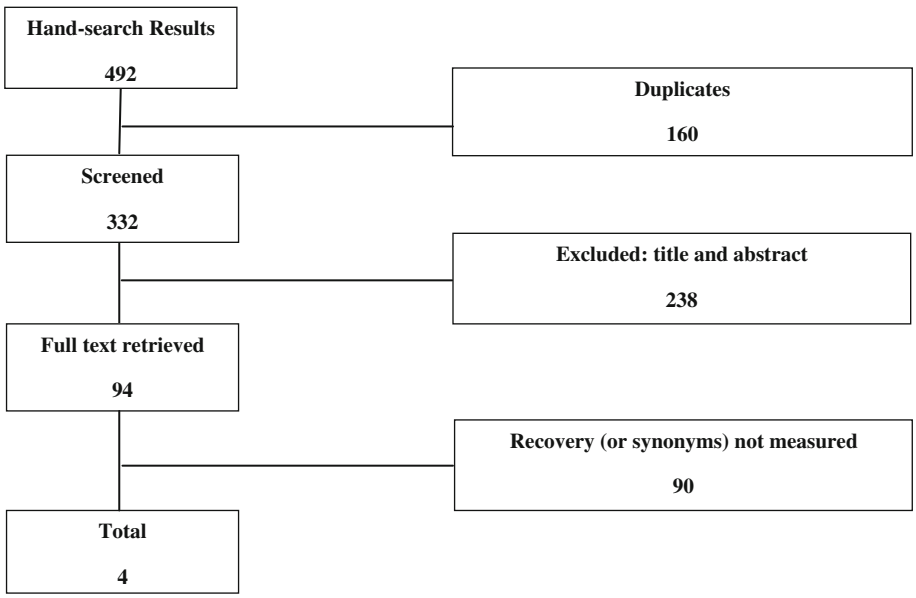

Fig. 2 Reference list search results. Results of the reference list search of the eighteen included articles

Data extraction

Definitions of recovery and its measurement were extracted from each of the included articles. Two authors (J.A. and F.F.) separately reviewed the articles and outlined the various dimensions assessed with respect to recovery. Operational definitions of recovery with varying levels of precision were identified and categorized by the specific domain(s) assessed. All disagreements between authors were resolved.

Definitions of recovery

Operational definitions of recovery (Table 1) were identified in reference to one or more of these domains: (1) pre-morbid functioning; (2) both fatigue and function; (3) fatigue (or related symptoms) only; (4) function only; and (5) brief global assessments.

Pre-morbid functioning

Of the 22 articles included in our search, three [5, 17, 18] offered a definition of recovery that considered pre-morbid functioning. The most recent study [5] assessed recovery in CFS patients after cognitive behavioral therapy (CBT) and operationally defined recovery in several different ways. Their most conservative criteria of recovery combined these elements: fatigue scores within the normal range, normal health perceptions, no physical or social disabilities,

Table 1 Operational definitions of recovery

Study	Domain	Measure(s)	Quantification(s)
Knoop [5][a]	Pre-morbid functioning	CIS-fatigue	Mean of healthy norm group + 1 SD
		SF-36 physical and social	Mean of healthy norm group − 1 SD
		SF-36 general health	Mean of healthy norm group − 1 SD
		FQL	Factor score negative = 0
Camacho [17]	Pre-morbid functioning	100-point scale	Rating of >70 % pre-morbid activity level within the last year on a scale from 0 to 100
Hinds [18]	Pre-morbid functioning	Questions	Patients were asked if they had recovered and (if so) if they have been able to return to their previous physical activity level
Deale [19]	Fatigue and function	Clinical interview	Checklist of UK diagnosis criteria
		Question	Are you currently employed and how many hours per week
		FQ	Score < 4
		SF-36 physical function	Score > 83
Huibers [24]	Fatigue and function	CIS	Score < 35
		Question	Self-reported work resumption
White [20]	Fatigue and function	CFQ	Score < 18
		SF-36 physical function	Score > 60
		Assessment	Research assessors judged participants on the Oxford CFS criteria, CDC CFS criteria, London ME criteria
		CGI	7-point rating of overall health change
Nisenbaum [26]	Fatigue and function	Clinical interview	1994 CFS case-definition criteria
Hill [25]	Fatigue and function	Evaluation Algorithm	Activity reduction of < 10 %, Severity of > 3 % on < 1 minor symptom
Poppe [23]	Fatigue and function	CIS-fatigue	RCI > 1.96; CIS score > 5.33
		SF-36 physical function	RCI > 1.96; SF-36 score > 52.83
Strickland [27]	Fatigue and function	Questions	"Have you fully recovered, without having any relapse?" "Are you still experiencing unusual fatigue that interferes with your life in some important way?" additional questions regarding activity, relapse, and recovery
Knoop [28][a]	Fatigue (or related symptoms) alone	CIS-fatigue	Score < 36 (for adult patients)
Rowbottom [29]	Fatigue (or related symptoms) alone	Questionnaire	Score of < 1 on all five categories (general fatigue, concentration difficulties, physical complaints, emotionality, sleep problems) following trial
Knoop [5][a]	Function alone	SF-36 physical	Mean of healthy norm − 1 SD
Saltzstein [34]	Brief global assessment	GIC rating	5-point rating of recovery (worse, same, somewhat improved, improved, recovered)
Russo [33]	Brief global assessment	Visual analogue scale	Visual analogue ranging from "significant worsening" through "no change" to "recovered"
Vercoulen [36]	Brief global assessment	GIC rating	4-point rating of recovery (completely recovered, improved, unchanged, complaints got worse)
Bonner [31]	Brief global assessment	100-point scale	0–100 % scale (>50 % = recovered or almost recovered)
Wood [37]	Brief global assessment	Interview	Interview establishes whether patients currently feel better, almost better, partly better, or as ill as ever
Brouwers [30]	Brief global assessment	GIC rating	4-point rating of recovery (recovered, improved, unchanged, worse)
van der Werf [35]	Brief global assessment	GIC rating	4-point rating of recovery (recovered, complaints improved, similar complaints, worse)

Table 1 continued

Study	Domain	Measure(s)	Quantification(s)
Clark [32]	Brief global assessment	Visual analogue scale	Visual analogue ranging from "significant worsening" through "no change" to "complete recovery"
Reyes [38]	Brief global assessment	Interview	Computer-assisted interview establishes whether patients consider themselves sick with a fatiguing illness and whether they have felt better for the last 4 weeks
Pheley [39]	Brief global assessment	Visual analogue scale	<3 cm on a visual analogue rating from "no difficulty" to "couldn't be worse" in regards to their fatigue in the past month and >8 cm on a visual analogue rating from "no recovery or worse" to "completely recovered" in regard to their degree of recovery

[a] Three different levels of recovery reported from the same cohort

CIS checklist for individual strength, *SF-36* Short Form (36), *FQL* fatigue quality list, *FQ* Fatigue Questionnaire; *CFQ* Chalder Fatigue Questionnaire, *CGI* clinical global impression of change, *GIC* global impress, *RIC* Reliable Change Index

and no negative perceptions of fatigue. Using these strict criteria, 23 % of their patients were classified as recovered [5]. This was the most stringent standard found, although it was rarely used.

Previously Camacho et al. [17] evaluated three groups of study participants: patients who recovered from CFS, patients who had not recovered from CFS, and a healthy control group. Participants were deemed recovered if they reported an activity level during the past year that reflected 70 % or more of their pre-morbid activity level. Using this standard, 15 subjects reported current activity levels within the recovery range. However, the authors noted "it should be clear that recovery does not mean a complete recovery in most cases, but rather a level of activity that suggests that these individuals have made considerable progress since initially becoming sick with CFS."

Furthermore, an early naturalistic study [18] that defined recovery with respect to pre-morbid behavior directly asked patients whether they had recovered, and subsequently, whether they had returned to their previous level of physical functioning. Fifty-four patients (18.6 %) indicated recovery from the illness.

Fatigue and function

Defining recovery in CFS patients by improvements in both fatigue and function was found in seven articles which yielded recovery rates ranging from 7 to 62 %. In a 5-year follow-up study of a randomized control trial of cognitive behavioral therapy in CFS [19], complete recovery was defined by these changes in fatigue and function: no longer meeting Oxford (UK) criteria for CFS, being employed full time, and scoring within the normal range on fatigue and function self-report questionnaires. Using this multi-domain definition of recovery, the authors reported a 23 % recovery rate [19].

A similar definition of recovery was used by White et al. [20] in their recent report on recovery from CFS following a large randomized trial [21] of CBT, graded exercise therapy (GET), adaptive pacing therapy (APT), or specialist medical care (SMC). Patient recovery was defined as being within the normal range on self-report measures of fatigue and physical function, no longer meeting Oxford criteria for CFS, and reporting an overall clinical global rating of "very much better" or "much better." Patient recovery rates ranged from 7 to 22 %, depending on treatment condition. A "clinical" recovery definition was also provided, which indicated that a patient no longer met Fukuda et al. [22] criteria for CFS, or London criteria for myalgic encephalomyelitis (ME) [21], an approximate equivalent of CFS. Application of these clinical criteria yielded similar recovery proportions [20].

In a recently published study [23], fatigue was assessed on a subscale of the checklist individual strength (CIS) and function (i.e., PQol; physical quality of life) was measured using the physical function subscale of the 36-item Short Form Survey (SF-36). Patients were considered recovered when they satisfied two criteria: achieving reliable change after treatment, assessed by the Reliable Change Index (RCI), and reaching set cutoff points (5.33 for fatigue and 52.83 for PQoL). Cutoff points were two standard deviations from the means of pre-treatment fatigue and PQoL scores. Following the cognitive behavioral intervention, Poppe et al. [23] reported that 16.3 % of patients as recovered on fatigue and 7.5 % on function. Furthermore, in a study of fatigued employees with CFS-like caseness [24], recovery was considered separately for fatigue and function improvements. Fatigue recovery (43 % of subjects) was characterized by

the absence of fatigue caseness on a self-report questionnaire, while functional recovery (62 % of subjects) was defined by self-reported resumption of work [24].

In an earlier 44 naturalistic study of patients who were initially diagnosed with a "severe" form of CFS [25], recovery was established by (1) patient-reported activity reduction of less than 10 % from "normal" daily activity, and (2) minimal symptom severity as determined by physical evaluation and self-report questionnaires. Using these criteria, four percent of patients were deemed recovered. Moreover, in another clinical study, a definition of "remission" in CFS [26] required that patients no longer met criteria for CFS [22], which included an absence of fatigue, a reduction in the number of required symptoms (<4), and no health interference with employment, educational, or personal activities. Sustained remission at the 3-year follow-up was found for 10 % of the study sample.

Lastly, a 10-year follow-up study on CFS and neuromyasthenia (a similar fatiguing illness) in Northern Nevada/California [27] declared that one of the main objectives of the study was to determine what proportion of the study participants recovered from their illness. Recovery was measured by these two questions: "Have you fully recovered, without having any relapse?" and "Are you still experiencing unusual fatigue that interferes with your life in some important way?" Additionally, further questions were asked about range of activity and relapse. While Strickland et al. [27] did provide a definition of recovery that included both symptomatic and activity-related items, no detailed information was provided on activity and relapse. Of the 50 participants who met the case definition for CFS, 7 (14 %) indicated that they recovered.

Fatigue (and related symptoms) alone

Fatigue scores within the normal range were identified as a single-criterion definition for recovery in one study: Knoop et al. [28] used the fatigue subscale of the CIS as a primary indicator of recovery following CBT for pain symptoms in both adult and adolescent CFS patients. Adult patients with a score lower than 36 on this fatigue subscale post-treatment (two standard deviations from the mean of a healthy adult control group) were considered recovered [28]. Using this standard, the authors reported a 66 % recovery rate.

Similarly, in a two-trial study comparing the physiological responses to exercise in CFS subjects and sedentary controls, Rowbottom et al. [29] defined recovery with five fatigue-symptomatic status scores, ranging from 0 (not at all) to 3 (extreme amount). The authors reported that "the results of trial one identified a score of 1.0 as the most efficient threshold to discriminate between CFS and control subjects for all five categories of symptomatic status." CFS participants who scored less than one on all given symptomatic status scores (general fatigue, concentration difficulties, physical complaints, emotionality, and sleep problems) were reassigned to the recovery group for trial two. Following the first trial of the study, six CFS participants (38 %) were deemed recovered.

Function alone

Functional status scores within the normal range have also been used as a measure of recovery. Applying their most stringent definition of recovery [reporting no physical disabilities on the physical functioning subscale of the SF-36 (scores > 80) following treatment] in a clinical behavioral treatment trial, Knoop et al. [5] reported that 59 % of their CFS patients were considered recovered.

Brief global assessments

Brief global assessments that usually involve a single rating of overall change were the most common outcome measures used to define recovery in CFS. Recovery rates based on global ratings have ranged from 0 to 55 % [30–39]. A rating of improvement in varying degrees in the patient's condition was often reported as complete recovery, i.e., [31, 32, 34, 35, 37] though it is not clear whether or not the patients identified themselves as recovered. Furthermore, the specific domains of recovery (e.g., fatigue, functioning) were usually not reported, nor were they incorporated in global ratings, thus limiting the understanding of the scope and significance of reported recovery rates. The few studies that did use an additional fatigue or functioning assessment posed questions that were somewhat vague and not particularly informative (e.g., patients were asked "do you still consider yourself sick with fatiguing illness" [38]).

Discussion

This review of clinical and naturalistic outcome studies in CFS revealed widely varying criteria, domains and measures used to define recovery. Rates of recovery also varied widely (0 to 66 %). The most common measure of recovery found was a brief global rating [30–39]. Although intuitively appealing as an overall indication of change in the patient's condition, the global rating does not provide any specific information about key illness domains such as symptoms and functioning. Furthermore, the broad benchmarks used in global impression of change scores do not provide assurance that patients have substantially recovered, rather than simply improved [40].

The second most common method of recovery assessment utilized both fatigue and function measures [19, 20,

23–27]. Other studies defined recovery by improvements in fatigue (and related symptoms) only [28, 29] or function only [5]. The most conservative definition of recovery was focused on restoration to pre-morbid functioning [5], although assessment of pre-morbid functioning was not well-characterized [17, 18].

Capturing important elements of recovery

The range of recovery concepts proposed in the chronic physical and mental illness literature parallel the widely varying standards used in studies of CFS. The mental health literature, perhaps because of the lack of objective constructs for diagnosis and recovery, has offered more thoroughgoing behavioral definitions of recovery that capture sustained symptom alleviation, multifaceted functional improvements, and well-being assessments. Likewise, the current absence of definitive tests for CFS may indicate the need for recovery criteria that set high but reasonable standards for behavioral recovery that approach restoration of pre-morbid health.

Apart from illness recovery, studies of patients with chronic physical illnesses may incorporate questions about time to recovery following a particular illness-related event [7]; yet these types of assessment are not commonly done in CFS. For example, researchers could routinely assess a CFS patient's recovery time following exertion (e.g., post-exertional malaise), which is a key aspect of illness debilitation [41] that may help to inform definitions of recovery from the illness itself.

In addition, while fatigue is a central symptom of CFS [22, 42] and functional improvement is an important aspect of recovery, focusing on only fatigue or function may potentially overestimate recovery rates because patients may show selective rather than overall change. For instance, a patient who reports a reduction in fatigue may still be experiencing functional disruptions, pain, sleep disturbances, or malaise, e.g., [43]. Although fatigue reduction may indicate a *substantial improvement* in the patient, the data suggest that symptom change alone is not equivalent to a fully restored status. Thus, the Knoop et al. [5, 28] findings of 59–66 % recovery rates were based on single domain definitions of recovery; however, when using multiple criteria (fatigue scores within the normal range, normal health perceptions, no physical or social disabilities, and no negative perceptions of fatigue) within the same cohort, a considerably reduced 23 % recovery rate was found. These multi-domain assessments of recovery may more closely correspond to its common meaning of return to health and will potentially facilitate cross-study generalizations about naturalistic outcomes and the success of interventions.

Recovery versus successful adaptation

In examining its various definitions, many "recovered" patients may not be reaching full recovery levels that indicate a return to health (assuming some adjustment for aging). Given that the majority of studies relied on patient self-report and did not utilize more objective measures of recovery, such as return to work or school [44] (e.g., following a medical leave), or laboratory-based assessments (e.g., 6-min walk test), it is difficult to know whether substantial recovery occurred. These arguable points have been expressed in letters to the editor that dispute recovery-labeled outcomes in published behavioral intervention studies in CFS, e.g., [13, 20, 45, 46].

In the absence of definitive measures, a more modest interpretation of "recovery" might characterize such outcomes as successful adaptation of illness-related behavior and attitudes to ongoing but perhaps diminished illness [47]. For instance, patients deemed "recovered" following treatment may have achieved their success by doing much *less* activity, i.e., symptom-producing behaviors, than they were doing prior to the intervention [48]. In this scenario, assessed functional abilities and fatigue may well improve perhaps within a normative range, but not to a level that reflects the patient's pre-morbid abilities. Relevant to this point, Whiting et al. [44] in her review of intervention studies in CFS presented the logical possibility that patients' perceptions of improvement after intervention could be due to lowered expectations of their abilities, rather than heightened functioning.

Empirical support for this more modest interpretation of recovery may be found in behavioral treatment studies which incorporated the relatively objective behavioral measure of actigraphy [49]. Although the cognitive behavioral model of CFS predicts increased physical functioning as a result of the intervention, these otherwise successful trials [50] did not find significant changes in actigraphy-measured physical activity from pre- to post-treatment or between intervention and control groups. One interpretation of the absence of objective activity change is that improved or recovered patients may have continued to avoid activity levels that provoked debilitating post-exertional symptom flare-ups [i.e., post-exertional malaise (PEM)], considered a core symptom of the illness according to a recent case definition [41]. Perhaps these "recovered" individuals are living within a safety "envelope" that avoids PEM [51], rather than enjoying resilient levels of recovered function and symptom alleviation. This type of outcome would seem to be more consistent with a hypothesis of successful adaptation rather than recovery.

Recovery and pre-morbid functioning

The issue of recovery and its relation to pre-morbid function also deserves further comment. If a patient does return to a presumably desirable pre-morbid state of health, the question can be raised about the advisability of resuming activity levels that may have been psychologically and physically stressful and unhealthy. Relevant to this point, Van Houdenhove and Luyten [52] found that patients with CFS have "action prone" traits that propel persistent and depleting overexertion which may contribute to the onset and perpetuation of the illness. Similarly, Ware [53] in a qualitative study of 50 women with CFS reported that these women described pervasively exhausting lifestyles prior to becoming ill.

Thus, the use of pre-morbid functioning as a standard of recovery may require qualification as to its sustainability and risk to health. Perhaps recovered CFS patients should consider themselves to be vulnerable to relapse given their tendency to increase functioning to illness-producing activity levels [52]. Given this possibility, it would be advisable not only to assess patients' pre-morbid activity levels, but to additionally determine through interviews with the patient and family members if pre-illness activity levels were excessive, exhausting, or unduly stressful and thus may have been a contributing factor to their illnesses [54, 55]. Thus, a new level of reasonable health vigilance, not characteristic of patients' pre-morbid lifestyles, may be required to sustain improvements perhaps at all levels. For instance, educating patients about healthy limits on activity may help to focus their enthusiasm about recovery on a sustainable level of functioning.

Patient perceptions of recovery

Finally, patients' perceptions of their recovery is a particularly important issue that was not assessed in the majority of reviewed papers. For instance, individuals who meet criteria for an operational definition of recovery may not view themselves as recovered. This divergence may be due to the patient's desire to fully restore health and well-being as indicated by an absence of symptoms, elimination of all functional impairments, and the reduction in psychological distress [56]. This level of expectation comports with common views of recovery and may constitute an important element of assessment. Perhaps the most sustainable levels of recovery evolve from a more flexible or adaptable view of potential illness vulnerability that is informed by the patient's lifestyle and its relation to illness flare-ups. As suggested by Ene [57], "the quest for treatment is not only a quest for relief of symptoms; it is also seen as a journey to find personal balance in one's life. Patients approach the recovery process by making decisions as to what works for the individual, rather than pursuing each recommended biomedical treatment." Inquiring about how patients' view recovery with respect to their own lives could reveal a full range of realistic and unrealistic expectations that may inform treatment, patient education, and the design of outcome studies.

Limitations

We conducted a thorough search of five separate databases, in addition to a hand search of numerous references lists for articles pertaining to recovery, remission, reversal, and treatment response. It is possible that additional articles were missed in our review; however, this is unlikely to compromise our principal finding of widespread inconsistency within the field on how to define recovery in this population.

Conclusions and recommendations

This systematic review found a broad range of recovery criteria in CFS outcome studies that utilized a multitude of measures to evaluate different domains. All 22 reviewed articles defined recovery uniquely, based on an array of illness characteristics and measures. Reported recovery rates ranged from 0 to 66 %. To increase comparability, the use of a consistent definition across studies is recommended. In keeping with commonly understood conceptions of recovery from illness, we suggest broadly based assessments in CFS studies that include criteria for normalization of symptoms and functioning as well as patient perceptions that indicate a return to health. In addition, another important aspect of the recovery concept, that is, recovery time following physical and mental exertion requires further investigation as the control of this process may be related to illness improvement and potential recovery. Finally, in the absence of a thorough evaluation for recovery, other more precise and accurate labels (e.g., clinically significant improvement) may be more appropriate and informative.

Acknowledgments We thank Stefan Schneider, PhD for his helpful comments on the manuscript.

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