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PACT: A protocol for assessment, mechanism-based case formulation and treatment planning

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Abstract

Background: Proponents of clinical case formulations argue that the causes and mechanisms contributing to and maintaining a patient's problems should be analysed and integrated into a case conceptualization, on which treatment planning ought to be based. Empirical evidence shows that an individualized treatment based on a case formulation is at least sometimes better than a standardized evidence-based treatment.

Methods: We argue that it is likely to improve decisions when two conditions hold: (a) knowing about the mechanisms underlying the patient's problems makes a difference for treatment, and (b) the case formulation is based on valid knowledge about mechanisms of psychopathology.

Results: We propose a protocol for assessment, case formulation and treatment planning (PACT), which incorporates transdiagnostic accounts of psychopathology. PACT describes a 5-step decision making process, which aims to help clinicians to decide when to resort to evidence-based treatments and when to construct a case formulation to individualize the treatment.

Conclusion: We show how PACT works in practice by discussing treatment planning for a clinical case involving symptoms of social anxiety, depression and post-traumatic stress disorder.

KEYWORDS
causality, clinical guidelines, explanation

1 | INTRODUCTION

Case formulation is one of the leading approaches to clinical decision making. Many different schemes have been suggested over the past decades.[1] A core element of all of them is to analyse the mechanisms that contribute to and maintain the problems of a patient.[2] The case formulation also summarizes the identified problems and diagnoses as well as the motivations and features of the patient that may affect the effectiveness of treatment. The case formulation – in turn – allows the clinician to select the most effective interventions for treatment.[3,4]

Given its long history, one may suspect that the treatment utility of clinical case formulations is empirically well supported. Surprisingly, the existing evidence is rather scarce. Only a few randomized controlled trials were conducted comparing standardized treatments with individualized treatments based on case formulations.[2,5] The majority of the studies found no difference. Yet, in two studies individualized treatments resulted in better outcomes.[6,7] These findings indicate that

analysing the mechanisms underlying a patient's problems to plan a treatment at least sometimes leads to a better outcome. Probably further conditions have to be met, including an endorsement of the case formulation by the patient and a good working alliance.

In this article, we pursue two aims. First, we explore the conditions under which a case formulation, which includes maintaining mechanisms, is likely to improve treatment planning and to result in a better outcome. Second, we propose the protocol for assessment, case formulation, and treatment planning (PACT), which provides guidance for planning an individualized treatment. We illustrate its usage with a clinical case.

2 | WHEN SHOULD AN INDIVIDUALIZED CASE FORMULATION BE CONSTRUCTED TO GUIDE TREATMENT PLANNING?

There are many reasons why the mechanisms contributing to and maintaining a patient's problems may be analysed before psychotherapy starts: (a) to educate the patient about his/her problems, (b) to motivate the patient to actively engage in the treatment by showing how the interventions change dysfunctional mechanisms, (c) to foster the alliance by generating a joint understanding of the problems. Each reason may already suffice to develop a case formulation in collaboration with the patient.[8] A final reason may be to plan a treatment. This is our focus.

Our question is when a case formulation should be constructed in order to decide on a treatment. The answer is: when a standardized, evidence-based treatment (EBT) fitting a diagnostic classification is not likely to result in the best outcome. In other words, when a case formulation allows clinicians to select the intervention(s) that target the mechanisms maintaining the patient's problems, while a standardized treatment manual may fail to address important mechanisms.

In clinical practice, a case conceptualization may improve a treatment under two conditions. The first condition is that there is one or several of the following:

1. Co-morbidity: Analysing the problems shows which of the mechanisms are relevant and important to address in treatment.
2. Atypical presentations: Analysing the mechanisms helps to focus on what is relevant rather than counting symptoms for a diagnosis.
3. Differential effectiveness of treatments: The analysis helps to establish the factors that indicate which intervention would be more effective.

A second condition for using a case formulation for treatment planning is that it has to be based on empirically validated theoretical models of psychopathology. Roughly speaking, there are two kinds of such models: Disorder-specific models and transdiagnostic models. Disorder-specific models are helpful if the patient suffers from a single condition well described by the respective disorder. In this case, a disorder-specific standardized treatment is likely to address all important mechanisms. In the case of multi-morbidity, however, transdiagnostic models of psychopathology work well. Several transdiagnostic models of psychopathology have been proposed.[9,10,11] These models are evidence-based and overlapping, but not identical to each other (see Table 1 for a crude overview of two models from the literature and our own list of relevant mechanisms and factors). All transdiagnostic models include biological, cognitive, and social mechanisms as well as environmental factors that may maintain or contribute to a patient's problems.

Note that case formulations not based on empirically validated theories of psychopathology are likely to be based on idiosyncratic assumptions instead. Studies found that causal explanations of a patient's problems are often idiosyncratic and may vary considerably between clinicians.[12,13] This may lead to suboptimal treatment planning and less than optimal treatment outcomes.

To sum up, we argue that a case formulation should be used when: (a) an EBTs developed for a diagnosis is likely to miss important mechanisms maintaining the patient's problems, and (b) the analysis is based on a valid theoretical model of psychopathology. The PACT suggests how to proceed in practice.

3 | HOW TO DECIDE ON A TREATMENT: THE PROTOCOL FOR ASSESSMENT, CASE FORMULATION, AND TREATMENT PLANNING

The proposed protocol is based on research and theories of decision making,[14] experience in teaching assessment and treatment planning, and experience in clinical practice. It extends existing approaches to case formulations,[15,16] and to shared and/or patient centred decision making in psychology and psychiatry.[17] PACT goes beyond these approaches in four ways: (a) it specifies preconditions for constructing a case formulation; it describes (b) how empirically validated theories and treatments should be considered in decision making, (c) how interventions for treatment should be chosen, and (d) how treatment progress should be evaluated and interventions should be revised.

Figure 1 shows all steps and decisions a clinician has to go through.[18] The five crucial steps for PACT are depicted in white. Before deciding on a case formulation (step 1), the clinician has to decide whether to take on the patient and whether an acute crisis requires immediate action. Somatic and psychological problems have to be assessed, diagnostic classifications have to be made, and an indication for treatment has to be established.

To illustrate PACT, we use the case of Francis. Francis is a 27-year-old architecture student in his final year. He contacted a counsellor, because he feels increasingly unable to sell his designs to customers and professors. He is frustrated, demoralized, and thinks about dropping out. In a first conversation, he describes himself as feeling increasingly anxious about giving a pitch. He feels bullied by his peers. Problems started a year ago after he was humiliated by a customer during a pitch. He feels 'haunted' by this episode. He sometimes 'sees' the customer, when he enters the room in which the episode happened. He has trouble sleeping and regularly experiences nightmares. He also describes other somatic problems and complains

TABLE 1 Overview of transdiagnostic mechanisms contributing to and maintaining patients' problems

Transdiagnostic mechanisms according to Frank and Davidson[10]	Transdiagnostic mechanisms according to the Research Domain Constructs (NIMH, 2016)		Transdiagnostic mechanisms according to the authors
Emotion regulation	Negative valence system	Fear, anxiety, loss, frustrative non-reward	Emotion regulation
	Positive valence system	Reward learning, reward valuation, habits	Impulse control
Information processing and storage Executive functions Cognitive misappraisal Attentional focus Attributional bias Repetitive negative thinking	Cognitive Systems	Attention, Perception, Declarative memory, Working memory, Cognitive Control	Cognitive regulation
	Systems for social processes	Social communication Perception and understanding of self Perception and understanding of others	Social processing
Arousal regulation and inhibitory control Sleep regulation	Arousal/modulatory Systems	Arousal, Circadian rhythm, Sleep-wakefulness	Regulation of arousal
	Sensimotor Systems		
Avoidance			
Learned responses			
Specific cognitive constructs (eg, fear of evaluation)			
Distress tolerance			Temperaments
Pervasive beliefs (negative schemas, metacognitive beliefs) Cognitive, emotional, and behavioural			Cognitive and meta-cognitive beliefs

about being overweight. He prefers to wear wide black clothes and sunglasses, because they make him feel more secure. He is single and lives on his own. He is in close contact with his single mother, who he describes as very caring and socially anxious.

Based on the clinical assessment, Francis is diagnosed with social anxiety disorder, because he specifically fears social-evaluative situations. His way of dressing is considered a safety-seeking behaviour. He does not show behavioural avoidance, as he still pitches his designs. An avoidant personality disorder is ruled out, as he does not report previous anxiety-related problems. A moderate depressive episode is dismissed, because he does not feel depressed on most days. Nevertheless, he reports a lack of joy, especially regarding his studies. Francis also shows signs of post-traumatic stress disorder (flashbacks, nightmares). A medical check-up finds that Francis has a metabolic syndrome and that he is pre-diabetic. An indication for treatment is given.

3.1 | Step 1: Decide on case formulation

The first decision is whether a case formulation is needed in order to decide on treatment. Recall that there might be different reasons to do so. To make this decision, the clinician may ask herself these questions:

1. Is there a guideline and/or are there EBT for the problems and diagnoses of my patient?
2. Would a case formulation make a difference to my choice of treatment? Could an analysis of the mechanisms and factors maintaining my patient's problems, change my treatment?

Question 1 asks the clinician to check for guidelines or EBTs applicable to the patient. Good sources for guidelines are the National Institute for Health and Care Excellence in the UK (www.nice.org.uk/guidance), the Trimbos Institute in the Netherlands (www.trimbos.nl), or the Association of the Scientific Medical Societies in Germany (www.awmf.org). If there are no applicable guidelines, a case formulation is the only alternative. When there is a guideline, Question 2 asks whether a case formulation would still make a difference. Sometimes guidelines ask for an assessment of certain factors to adapt the treatment to the patient. For example, guidelines for trauma related disorders advise to analyse specifics of the trauma. In other cases, the assessment may reveal problems that are not addressed by the guideline or the guideline just provides a rough guidance that still needs to be translated into a treatment for the specific client. If the answer to Question 2 is yes, the clinician should proceed to step 2. If the answer is no, an EBT recommended in clinical guidelines should be considered.

For Francis, the answer to the first question is yes with respect to social anxiety. The respective NICE guideline,[19] recommends cognitive behavioural therapy and Clark and Wells provide a well evaluated treatment manual.[20] However, Francis has several other problems,

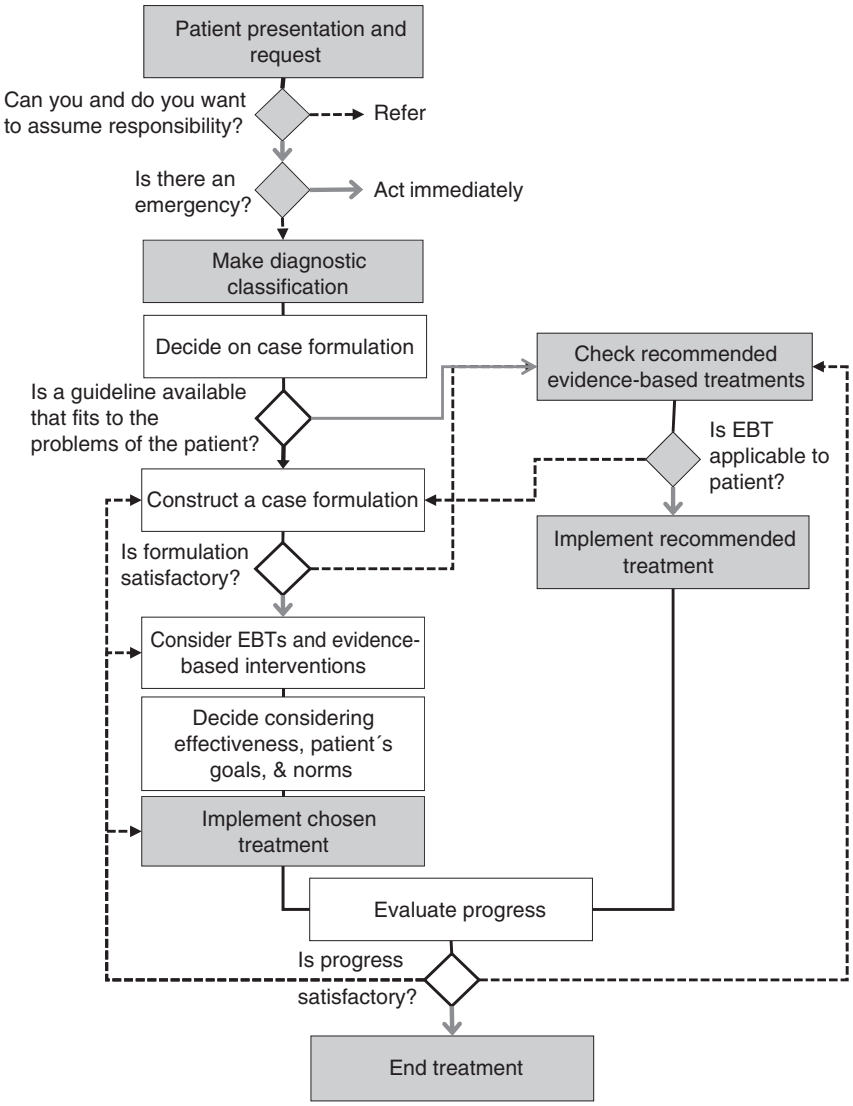

FIGURE 1 Protocol for Assessment, Mechanism-based Case Formulation and Treatment Planning. The five crucial steps are depicted by white boxes, other steps in grey. Yes/no decisions are depicted by diamonds with the respective question next to it. Dashed black arrows indicate implications of No-answers, bold grey arrows implications of Yes-answers

which are not addressed in the guideline. Therefore the answer to the second question is also yes. It would be important to know which mechanisms maintain the symptoms of social anxiety, post-traumatic stress, and depression. The set of mechanisms relevant for Francis probably goes beyond the mechanisms addressed by a CBT-based treatment of social anxiety.

3.2 | Step 2: Construct a case formulation

The next step is to assess the mechanisms and factors that may maintain and contribute to the problems of the patient. In principle, all transdiagnostic mechanisms and factors depicted in Table 1 might be relevant. Pointers to mechanisms that are likely to be relevant for specific conditions can be found in handbooks.[10,21] Often a clinical interview can be used. In addition, psychometrically sound psychological tests and behavioural experiments might be useful. Finally, the patient's ideas about the underlying factors as well as the treatment goals should be ascertained in order to make the assessment a collaborative process. Working together is useful because it leads to a better understanding of the patient.[22] It also boosts the alliance and motivates the patient.[23]

Based on the assessment, a case formulation can be constructed. The case formulation should summarize the problems of the patient (ie, the clinical manifestation of the dysfunctional underlying mechanisms) and the mechanisms and factors that maintain and contribute to these problems. Often a graph is useful to visualize the case formulation. We propose the template depicted in Figure 2. At the center of the graph are the mechanisms that are responsible for the problems of the patient, because they are dysfunctional. At the basis are the clinically manifest problems that should be addressed and ameliorated by the treatment and the goals the patient strives to achieve. At the top are factors that constitute vulnerabilities like temperament and personality, environmental factors, which might be resources or further stressors, and somatic and other factors which may moderate the effectiveness of treatments.

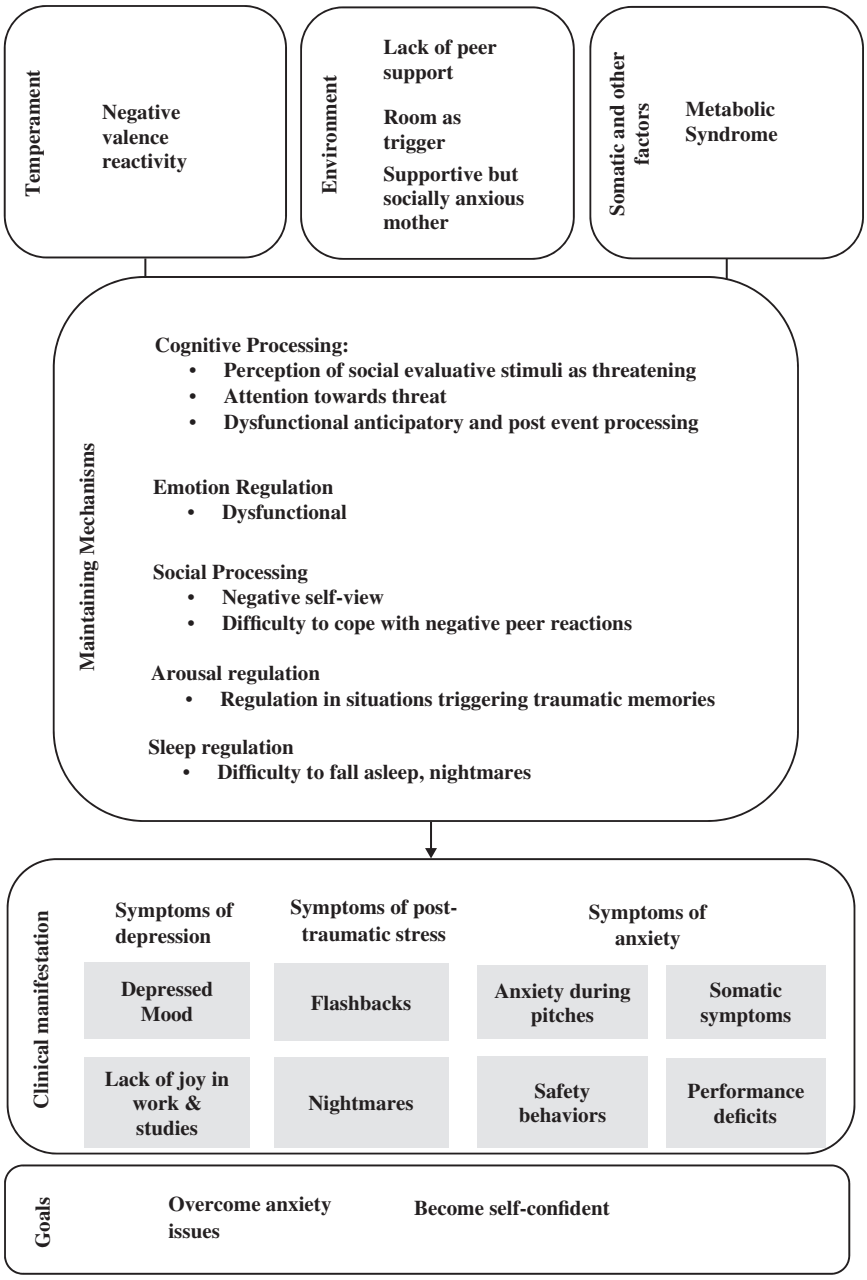

FIGURE 2 Case formulation for Francis. See text for explanations

Figure 2 shows a graph of the case formulation for Francis. Five domains of dysfunctional processing or regulation were identified. First cognitive processing: Francis perceives social evaluative stimuli like giving a pitch as threatening, he focuses on external threats and internal reactions to these threats, and he anticipates a negative course of events and gives a self-deprecating interpretation to events after the fact. He has trouble regulating his emotions in these cases and his negative emotions in general. His self-view is negative. He has difficulties handling negative reactions of his peers. In situations that remind him of being humiliated, he has difficulties regulating the resulting arousal. Finally, he has difficulties regulating his sleep. His high anxiety sensitivity makes him vulnerable. His environment provides little social support, some rooms at the university trigger memories of humiliation. His metabolic syndrome is a cause of his somatic problems and may moderate the effect of interventions. Note that no specific mechanism are listed that explain the symptoms of depression. This is because the assessment indicated that these symptoms are a consequence of Francis' other problems. Francis' main goal in life was to successfully finish his studies and start a career as an architect. His goal in therapy was to overcome his anxiety issues and become self-confident again.

After finishing the case formulation, the clinician has to decide whether it is satisfactory. The following two questions may be helpful.

1. Do the identified mechanisms and factors explain why the problems of the patient persist?
2. Do I know what needs to change for the patient to become better and achieve her/his goals?

If the explanation is not satisfactory, a more in-depth assessment is indicated to identify the mechanisms and factors that are still missing from the formulation.

3.3 | Step 3: Consider EBTS and evidence-based interventions

The case formulation shows which mechanisms maintain the problems of the patient. An effective treatment will have to address these mechanisms and help the patient to make them more functional. Most clinicians will know how to address the respective mechanism from their clinical training. There are textbooks that summarize intervention techniques for different treatments as well as the mechanisms addressed by them.[24]

Here are some questions to guide the process:

1. Which interventions or treatments are recommended in literature as effective for changing the mechanisms I identified as dysfunctional?
2. Considering the relations among these mechanisms, the other relevant factors, and the manifest problems, how should I structure the treatment?

Question 1 asks to consider evidence on effective interventions, which can be found in clinical guidelines and practical handbooks. Question 2 asks to consider potential relations among the mechanisms, the other identified factors and the problems of the patient, in order to find out where to start the treatment. In other words, the task is to envision the consequences of possible treatments including different orderings of individual interventions for the current patient. Treatment manuals of EBTs describe the interventions to take and at least sometimes provide guidance about their order (see below for an example). Nevertheless, clinicians will have to rely on empirical evidence and their professional expertise. The proposed treatment should include the interventions that will be most effective in changing the dysfunctional mechanisms and in achieving the patient's goals.

For Francis, the case formulation identifies five dysfunctional mechanisms and the metabolic syndrome, which should be addressed in treatment. The NICE-Guideline on social anxiety disorder[19] lists the following evidence-based interventions relevant for Francis: experiential exercises to demonstrate adverse effects of self-focus and safety-seeking behaviour, training to change self-focused attention, behavioural experiments to test negative self-beliefs, re-scripting problematic memories of social trauma, and restructuring dysfunctional beliefs regarding social situations. These interventions address the mechanisms listed under cognitive processing, emotion and arousal regulation. The case formulation, however, shows that other interventions regarding social skills, coping with trauma-related flashbacks, and sleep regulation might be helpful as well. For the metabolic syndrome, lifestyle modification therapy is recommended in the literature,[25] which establishes regular and healthier eating and more physical exercise. Note that no interventions concerning the depressive symptoms are considered, as they are assumed to be the consequences of the other problems.

Following the recommendations from the guideline, treatment started with experiential exercises and behavioural experiments. Imagery re-scripting was used to address Francis' trauma-related symptoms. First steps to modify his lifestyle were taken near the end of treatment.

3.4 | Step 4: Decide on a treatment considering effectiveness, patient's goals and preferences, and norms

To make a final decision, the following aspects need to be considered:

1. Is the proposed treatment in line with my patient's preferences?
2. Does the proposed treatment conform to all professional, moral, and/or institutional norms?
3. Does the patient agree with the proposed treatment? Is she/he motivated to engage in the treatment and take responsibility?

Concerning his treatment, Francis claimed no specific preferences apart from 'no meds'. He refused to modify his way of dressing, as he considered it a matter of personal style. Thus, the planned treatment conformed to Francis' preferences as well as all relevant norms. He also agreed.

It is important to note that the patient's goals and preferences may conflict with the therapist's goals and an effective treatment. For example, many patients with anorexia nervosa do not want to gain weight, although this is an important treatment goal. In that case, it is advisable to address the conflicting goals and decide jointly on the goals to be achieved. Shared decision making increases commitment, which tends to lead to better outcomes.[26]

3.5 | Implement treatment

Once a decision is made, the treatment will have to be implemented. This is also the case when the clinician decided to use a standardized, EBT.

3.6 | Step 5: Evaluate progress

Treatment progress should be systematically evaluated. Research showed that monitoring progress with standardized assessment tools (ie, routine outcome monitoring or ROM) and giving feedback to patients and clinicians can improve treatment outcome.[27] While ROM often focuses on alliance and summary scores of symptom load, PACT recommends reassessing the identified dysfunctional mechanisms regularly. This way the effectiveness of the treatment as a whole and specific interventions in particular can be tracked.

The following questions may guide a systematic and recurrent evaluation.

1. Is the patient's progress as expected? Did the problems, the level of functioning, the achievement of goals, and/or the well-being of the patient improve?
2. Did the identified dysfunctional mechanisms become more functional? Were the changes as expected considering the interventions implemented?
3. Is progress satisfactory? Can the treatment be terminated?

Question 1 asks the clinician to assess the outcomes. Whether observed changes are as expected could be judged by comparing the patient's progress to similar patients using an electronic database.[28] Question 2 requests clinicians to reassess the mechanisms identified as relevant in the case formulation. If the interventions were effective, these mechanisms should have changed.

The answers to Questions 1 and 2 indicate how to proceed. If there was no progress and the dysfunctional mechanisms did not change as expected, then the interventions were probably not effective. Hence, other interventions should be considered. If there was no progress but the identified mechanisms changed as expected, then the case formulation was wrong. Obviously, something else maintains the patient's problems. Thus, the case formulation has to be revised and interventions have to be changed accordingly. If there was progress, but mechanisms did not change as expected, then progress might be due to some non-specific factor (eg, alliance) or an external event (eg, a new romantic relation). In this case, it is best to consult with the patient on how to proceed. Finally, if there was progress and the mechanisms changed as expected, then treatment should continue as planned.

Questions 3 asks about the termination of treatment. There are several statistical and clinical indicators to make a judgement (eg, reliable change index or clinically significant change[29]). The clinician may use her professional experience in addition to objective criteria. When Question 3 is answered positively, the clinician may turn to relapse prevention and terminate treatment.

Francis´ perceptions of, cognitions about, and emotional and behavioural reactions to social evaluative situations were assessed regularly (using homework assignments). Flashbacks and nightmares were monitored by a diary as were his eating pattern and physical activities. Symptoms of depression and social anxiety were monitored monthly by the Beck Depression Inventory (BDI II[30]) and the Liebowitz Social Anxiety Scale (LSAS[31]). Alliance and subjective progress was monitored weekly using the Helping Alliance Questionnaire (HAQ[32]).

Francis' treatment progress with respect to his social anxiety was as expected. Behavioural experiments and experiential exercises helped to change his cognitive and emotional processing of social evaluative situations. By learning to refocus his attention during pitches on the task, his performance improved and feedback became better, which led to more self-assurance. After imaginary re-scripting, his representation of the humiliating episode changed and symptoms of post-traumatic stress vanished. His depressive symptoms disappeared over time. He kept his dressing style. Treatment progress with respect to the metabolic syndrome was below expectations. No healthy eating pattern could be established, as comfort food was used as a (dysfunctional) way of coping with the stress during the final year of his study. Francis was referred to his general practitioner for continued treatment of his metabolic syndrome.

4 | DISCUSSION

The first aim of this article was to explore the conditions under which a case formulation may be helpful for treatment planning and may lead to a better outcome than a standardized EBT. We identified two conditions: (a) knowing about the mechanisms underlying the patient's problems makes a difference for treatment, and (b) the case formulation is based on valid knowledge about mechanisms of psychopathology. We suspect that the first condition may be quite often fulfilled. Whenever there is co-morbidity or an atypical presentation, a standardized treatment for a particular diagnosis may fail to address all mechanisms that contribute to and maintain the patient's problems. In these cases, it is helpful to know the underlying mechanisms to select the most effective interventions for treatment. To fulfil the second condition may be hard in practice. There is a lot of empirically investigated, valid knowledge about biological, cognitive, emotional, and social mechanisms of psychopathology. This knowledge, however, is not easily accessible to clinicians. One reason is that many theoretical models have been developed and tested for individual disorders. In addition, many models focus on particular mechanisms and fail to integrate all existing evidence (see Reference 33 for a notable exception). We think that a transdiagnostic approach, which focuses on the most important potentially dysfunctional mechanisms, may be more useful for treatment planning. Such an approach ensures that no important mechanisms or factors are overlooked. It also makes case formulations more reliable and easier to communicate with patients and other clinicians.

Our second aim was to propose the PACT. PACT considers the two conditions, specifies how mechanisms should be assessed, how a case formulation should be constructed, and how progress monitoring should be used to test and revise the case formulation and treatment. The core ideas of PACT are: (a) Construct a case formulation only if it is likely to result in a better outcome than a standardized, EBT; (b) the case formulation considers the transdiagnostic mechanisms that may underlie a patient's problems; and (c) observed changes of these mechanisms during treatment are used to revise the case formulation and the treatment.

At present, there is only indirect evidence that PACT results in better outcomes for patients. Extensive research in cognitive psychology showed that causal models improve decisions on interventions.[14] Second, research on functional behavioural analysis, a theoretically well-funded type of causal analysis considering various types of learning as transdiagnostic mechanisms, showed that treatments based on such analyses are more effective.[34] Finally, research showed that the reliability of case formulations can be improved by training[35] and a well-structured process.[36] Therefore we are confident that future studies will show that PACT is useful for planning treatments and will result in better outcomes for patients. It is promising because PACT suggests a standardized EBTs as the default and case-formulation-

based, individualized treatments, only when they are likely to be superior.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors have contributed equally to the development of the PACT model and the writing of the contribution.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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