

## CASE REPORT

### Cognitive evolutionary therapy for depression: a case study

Cezar Giosan<sup>1,2,a</sup>, Vlad Muresan<sup>2</sup> & Ramona Moldovan<sup>2</sup>

<sup>1</sup>Liberal Arts, Berkeley College, 12 East 41st Street, New York City, New York, 10017

<sup>2</sup>Clinical Psychology and Psychotherapy, Babeş-Bolyai University, Republicii 37, Cluj-Napoca, Cluj, Romania

#### Correspondence

Cezar Giosan, Liberal Arts, Berkeley College, 12 East 41st Street, New York City, New York, 10017. Tel: +1-212-444-8577; E-mail: giosan@outlook.com

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<sup>a</sup>The first two authors contributed equally to this work.

### Theoretical and Research Basis for Treatment

#### Depression

Depression is one of the most prevalent mental disorders and the third largest contributor to global disease burden, outranking heart disease [1]; it is the number one contributor to disease burden in developed countries, costing an estimated \$81 billion in the U.S. alone [2] and €118 billion in Europe, where it is the most costly mental disorder [3].

The etiology of depression is far from being completely understood. Factors such as dysfunctional cognitions [4, 5] demographics [6], prior major depression [6], early traumatic experiences [7, 8], or negative life experiences (e.g., job loss, loss of a close one) [9] have been shown to be involved.

#### Current psychological standard of care in depression

Evidence-based treatments for depression are available and extensively used [10–14].

#### Key Clinical Message

We present an evolutionary-driven cognitive-behavioral intervention for a moderately depressed patient. Standard cognitive and behavioral therapy techniques focused on the patient's perfectionistic and self-downing beliefs, while novel, evolutionary-informed techniques were used to guide behavioral activation and conceptualize secondary emotional problems related to anger. The treatment reduced depressive symptomatology and increased evolutionary fitness.

#### Keywords

Cognitive-behavioral therapy, darwinian psychotherapy, depression, evolutionary psychology, evolutionary psychotherapy.

There is evidence that cognitive-behavioral approaches (e.g., see the American Psychological Association's list of empirically validated treatments at [www.apa.org](http://www.apa.org)) are among the best empirically supported, both in terms of theory and intervention.

Cognitive and behavioral therapy (CBT) is an umbrella term including a variety of therapeutic approaches (i.e., cognitive therapy, rational emotive and behavioral therapy, multimodal therapy, schema-focused therapy, etc.), sharing a common rationale: the mediational role of dysfunctional cognitions in maintaining, predisposing or causing depression [15–17]. This has resulted in a proliferation of publications and the development of treatment approaches designed to alter the cognitive contents or processes hypothesized to be depressogenic [18, 19].

Beck's theory of depression is arguably the most influential model developed around the causes, course, and treatment of depression [5]. Literature has been consistently showing that people have relatively stable cognitive patterns that develop as a consequence of early learning, and that leads them to make negative and distorted interpretations of specific life events [20]. CBT does not

provide an elaborate view of the origin of emotional disturbance, though it acknowledges that it is very likely that different people disturb themselves about highly aversive events differently [21]. More specifically, CBT is based on the premise that psychological problems stem from dysfunctional/irrational cognitions [20, 22] and, as such, the therapist works with the client to identify and focus on those cognitions in order to modify them and remedy associated emotional and/or behavioral consequences.

### Depression from an evolutionary perspective

Because of the universality and prevalence of mental illness, attempts have been made in Evolutionary Psychology to explain the possible functions of utility of some symptoms [23–25]. From this perspective, some mental disorders are seen as having present or past fitness advantages [26] and therefore might have been naturally selected (e.g., mild and moderate depression) [27] or are viewed as exaggerated responses to certain stimuli that constituted dangers in our evolutionary history (e.g., phobias) [28, 29].

Depression has been tackled in the evolutionary psychology research because of its high prevalence (5–10% in the US) [30], universality [31], and upward course [32], as well as because it sometimes leads to devastating fitness consequences, such as suicide [33]. Unlike the prevalent medical view, which views depression as a brain disorder [34–36], current evolutionary insights explain this condition by hypothesizing the functions it may serve [37–39]. From this perspective, depression is seen as a mechanism signaling fitness (i.e., reproductive) problems or risks (e.g., low mood is associated with lesser likelihood of engaging in risk-taking behaviors) [40].

### Cognitive evolutionary therapy for depression

CBT focuses on changing dysfunctional cognitions, thus leading to improvements in the depressive symptoms [4, 20]. From this perspective, dysfunctional beliefs are seen as proximate, or immediate causes of depression. But some have argued, for example, that Beck's cognitive distortions are a *consequence* of depression, not a *cause* of it [41]. In other words, the underlying evolutionary, or ultimate causes that might contribute to depression and to dysfunctional thinking are not addressed directly in the current therapeutic approaches and a unifying evolutionary-driven paradigm providing explanations about the ultimate causes of depression is lacking.

A Cognitive *Evolutionary* Therapy for depression (CET) would focus, besides proximal causes, on distal (ultimate, or evolutionary) mechanisms as well, such as inclusive

fitness or reproductive success, which are thought to lead to depression when prevented from functioning optimally [42]. Such an approach enhances the CBT paradigm by including information about the hypothesized *adaptive functions* of depressive symptoms, along with direct interventions on fitness-enhancing factors. In addition, attention is paid to unhealthy behaviors that generally lower fitness, targeting them specifically in the therapeutic process [42, 43].

Human behavior generally revolves around a finite set of biological and social adaptive problems (e.g., shelter/security, nutrition, sexuality, mating, parenting, and in-group and between-group interaction [44]). Research has shown that when people are successful at meeting these goals, they generally experience well-being and happiness [43]. Not meeting these goals has been associated with dissatisfaction, depression, tension, or frustration [43].

CET enhances the classical CBT approach by focusing on guiding the patients in solving fitness-related problems and by using an evolutionary-aware conceptualization in some of the problems they may encounter [42]. Like in the classical CBT, at the beginning of the therapy the psychotherapist and the patient select and define the list of problems that will be addressed during treatment. However, unlike the classical CBT, where the patients typically volunteer these problems, in CET they are identified at intake by an evaluation of the patients' fitness [42]. During the therapy, discussions about human nature from an evolutionary standpoint can encourage the patients to experience acceptance, a key ingredient in CBT [45, 46], by acknowledging basic human limitations. These evolutionary arguments can become powerful tools in the disputing process, commonly used in the standard CBT. Thus, evolutionary psychology concepts (e.g., cognitive modularity [47, 48], parental investment theory [49, 50], conspicuous consumption [51, 52] and costly signaling theory [53, 54]) can offer useful explanations for depressive symptomatology and the mechanisms underpinning it.

While some authors have hypothesized the potential therapeutic benefits of evolutionary approaches in clinical practice [55], there is virtually no empirical research testing the clinical implications (and applications) of these theories. To our knowledge no study has so far addressed the practical implications of this recent progress. The present case study is a first attempt aimed at examining the efficacy of CET for depression.

## Case Formulation

### History

For the present case study we selected the treatment of one of the patients enrolled in a randomized clinical trial,

which tests the efficacy of CET for Depression [42]. This study was approved by the Ethics Commission of Babe – Bolyai University.

Judy (not the real name) is a 22-year-old student who was referred for therapy by friends after a difficult break-up that affected her school performance and personal life. She is the only child of a typical middle-class family, living by herself during the school year and going back home (to a different city) during the holidays.

The patient enrolled in treatment after signing an informed consent. The initial psychiatric evaluation revealed that she had no prior history of depression or other psychiatric conditions.

The patient underwent CET following the protocol described by Giosan et al. [42]. The initial problem list presented by the patient included depressed mood, feelings of guilt, and anger because of the dissolution of a 6-month-old dysfunctional relationship. Judy felt personally responsible for the break-up, and believed that she would never be able to experience a similar level of emotional involvement again. Judy's goals for therapy were to get over the relationship and better cope with her situation. (At the time, in an attempt to distract herself, the patient was involved in binge drinking and reckless partying).

We selected this specific case because it illustrates the specific techniques used in CET and the rationale behind using it as an add-on to the classical CBT intervention. As further detailed below, the clinical conceptualization and the actual treatment both benefited from the evolutionary theory [2] by explaining the difficulties in overcoming depression using evolutionary insights and [3] by guiding and explaining the relevance of secondary goals (diet, exercise) in treating the patient's primary goals (depressive symptoms).

## Assessment

Self-report measures and the Structured Clinical Interview for DSM-IV [56] were administered to the patient throughout the treatment. Table 1 presents them, along with the scores (Table 1).

*The Structured Clinical Interview for DSM-IV (SCID)* [56] is the most widely used diagnostic exam used to determine DSM-IV Axis one disorders, designed to be administered by a mental health professional. It consists in the Overview, Mood Episodes, and Anxiety Disorders modules. The Overview module collects information about socio-demographic variables (i.e., date of birth, marital status, number of children, level of education, and employment status), drugs use, drinking, medication, physical and psychological treatment history (including any treatments, past or current, for depression), and current social functioning. The Mood Episodes and Anxiety Disorders Modules follow the diagnostic criteria of the DSM-IV-TR [57] for mood episodes and anxiety disorders.

*The Beck Depression Inventory-II (BDI-II)* [58] is one of the most widely used self-report measures of depression symptoms, and it includes 21 items referring to various psychological and physical symptoms (e.g., feeling sad, guilty, hopeless, being agitated). It has high test–retest reliability (1 week) (Pearson  $r = 0.93$ ) and high internal consistency (Chronbach's  $\alpha = 0.91$ ) [58, 59].

*The Attitude and Belief Scale II (ABS-II)* [60] is a self-report scale, with good psychometric properties, designed to measure irrational beliefs. The ABS-II has been shown to be a reliable and valid measure of rational and irrational beliefs [60, 61].

*The Automatic Thoughts Questionnaire (ATQ)* [62] is a 30-item self-report measure used to assess depression-

**Table 1.** Scores for the self-report measures administered at the beginning, during, at the end of treatment, and at follow-up.

Instrument	Intake	Session number												Final	FU
		1	2	3	4	5	6	7	8	9	10	11	12		
BDI-II	22	23	20	20	24	17	17	10	7	7	8	4	5	7	13
ABS-II	106				116				119					94	96
ATQ	112				103				68					67	77
PANAS-P	28				29				31					31	36
PANAS-N	40				29				24					25	36
FES	103													146	139
ETO	32				28				30						
WAI					75				77						
CSQ		30	30	32	31	32	32	32	32	32	32	32	32		

BDI-II, Beck Depression Inventory-II [58]; ABS, attitudes and beliefs scale 2 [60]; ATQ, automatic thoughts questionnaire [62]; PANAS-P, positive and negative affect schedule – positive score; PANAS-N, positive and negative affect schedule – negative score [65]; FES, fitness evaluation scale; ETO, expectation of therapeutic outcome; WAI, working alliance inventory [67]; CSQ, client satisfaction questionnaire [68].

related cognitions, with good convergent validity, internal consistency, and test–retest reliability [63]. The ATQ has also been shown to be sensitive to changes in the depression levels [64].

The *Positive and Negative Affect Scale (PANAS)* [65] is a 20-item self-report questionnaire, designed to assess positive and negative affect. The PANAS can be used to assess mood on various time scales by altering the instructions. Possible time scales include moment, today, past few days, week, past few weeks, year, and general. The validity and internal consistency of the PANAS is good, with test–retest reliability being the highest for the “general” temporal instruction [65].

The *Expectancies of the Therapeutic Outcome* are measured using four items on a 9-point Likert Scale. The items measure the patient’s perceived usefulness of the treatment (e.g., “How logical does this treatment seem to you?”; “How efficient do you think this treatment will be in reducing the symptoms that you experience?”). The scores range from 0 to 32.

The *Working Alliance Inventory (WAI)* is a 12-item self-report global measure of the working, or therapeutic alliance, presenting good psychometric properties [66, 67].

The *Client Satisfaction Questionnaire* [68–70] is an 8-item instrument used to evaluate the patients’ satisfaction with the treatment.

The *Fitness Evaluation Scale (FES)* is a 45-item (58 if the patient has children) scale, adapted and expanded by the authors from the High-K Strategy Scale (HKSS) [71], tapping into various dimensions and biosocial goals theorized to make up the indicators of fitness, as detailed in the Background section. The HKSS has been shown to be negatively associated with depressive symptomatology [72] and psychopathology in general [73]. The FES was preliminarily validated on a sample of 146 subjects and presents good internal consistency (Cronbach’s Alpha = 0.93). The FES is the therapist’s starting point in prescribing the evolutionary-driven interventions, as further detailed below.

## Procedure

Judy was assessed for eligibility for treatment with the SCID [56]. Following the initial assessment the patient was assigned to treatment and evaluated psychologically regularly as detailed in Table 1.

## Case conceptualization

Judy is a 22-year-old female student, belonging to a middle-class family, who was referred to psychotherapy after a difficult break-up that affected school performance and general quality of life. At intake, the level of depressive

symptomatology measured with the BDI-II was 23, signifying moderate depressive symptomatology [58], confirming the initial SCID clinical diagnosis. The level of expectancy for therapeutic outcome was 32 out of 32, showing that the patient was highly motivated and believed in the efficacy of the intervention offered. She reported intense depressed mood and bereavement, guilt, anger, trouble concentrating, and diminished interest in pleasurable activities. The completion of the FES revealed fitness deficiencies on the following dimensions: (1) low perceived attractiveness (the patient believed that she was not attractive, despite evidence to the contrary such as her friends’ opinions and the therapist’s own judgment); (2) poor eating habits (the patient predominantly consumed junk food), and (3) lack of physical exercise. Thus, the therapy goals list set at the beginning of the treatment included working on the dysfunctional coping behaviors (e.g., weekend drinking) and improving on the fitness deficiencies identified by the FES. The patient was offered a clinical conceptualization that centered on the evolutionary causes of depressive symptomatology (i.e., fitness problems) and proximal causes consisting of dysfunctional cognitions. Specifically, Judy’s depression was explained as being caused by a set of fitness-related issues, namely, unbalanced diet, lack of exercise, and poor self-image expressed through dysfunctional cognitions. The latter led to rigid irrational thoughts such as “I must be appreciated by my ex-boyfriend or else I am worthless”, “I will never find someone that will make me feel the same, and that is horrible”, or and “I am a stupid, weak person for not getting over it already.”

The main focus of treatment was to engage the patient in behaviors targeted at increasing fitness, while challenging the dysfunctional thoughts and increasing confidence in more rational and functional alternatives.

## Course of Treatment

Following the protocol described elsewhere [42], the first treatment session focused on educating the patient about depression and psychotherapy in general, emphasizing the importance of homework, taking responsibility for change and adjusting her expectations about what can be gained through therapy. Judy had a clear understanding about what psychological treatment entailed and what her responsibilities as a patient were.

Also, in the first session we focused on specific CET insights that helped her to gain a clearer understanding of the problems she was confronting, thus leading to a more accepting attitude about her symptoms. Thus, the patient was explained that cognitive structures that were adaptive in a Pleistocene environment are now “mismatched” with the current environment, sometimes leading to dysfunc-

tional emotions and behaviors [74, 75]. The patient was also explained that some scholars see Depression as an adaptation that might have conferred fitness benefits in the Environment of Evolutionary Adaptedness (EEA) [31], by encouraging cooperation and eliciting support from group members, things that are much harder to achieve in the modern society. Finally, the patient was informed about the research linking depression and fitness-enhancing behaviors, namely the relationship between diet and depression [76, 77] and exercising and depression [78]. While the patient had a general idea about the positive associations between diet, exercise and health, the realization that these associations hold true in the case of depression, too, helped in motivating her to begin exercising more and thinking about adjusting her diet in the sense of incorporating foods that our ancestors typically consumed [76, 77]. This was the point in Session 1 where we established a realistic behavioral activation plan that would tap into the above-mentioned fitness-related dimensions (diet and exercise). The homework focused on detailing the behavioral activation plan with specific behaviors that the patient was instructed to work on in the following weeks.

The next few sessions [3–7] focused on standard CBT tasks and techniques, aimed at enhancing the therapeutic relationship and negotiating behaviors that addressed fitness problems revealed at intake by FES. A specific problem that benefited in an important way from the evolutionary conceptualization was the difficulty Judy had to accept her reaction to the break-up. After realizing that being rejected affected her more than what she expected, she began to experience anger with herself. This kind of secondary emotions (i.e., emotions about emotions) are often an obstacle to the therapeutic change [45, 79, 80]. In Judy's case, her anger about her depression was caused by rigid beliefs such as: "I shouldn't be so upset about him; I'm a weak person because I'm depressed over the end of the relationship". In clinical practice, the therapist cannot address the problem of depression until the secondary emotion (anger in this case) is resolved [45, 81]. Indeed, one of the main reasons why Judy didn't get over the break-up by herself was her inability to accept her fallibility (i.e., the fact that as a fallible human being, she is allowed to make mistakes, and feel depressed). Furthermore, every attempt from her friends or from the therapist to help with the depression resulted in the activation of her perfectionistic belief ("I shouldn't be depressed about him, and I am a weak, worthless person because I am") and the resulting anger, which prevented her from gaining insight on why she was depressed in the first place.

The evolutionary conceptualization of Judy's depression greatly helped in teaching the patient to accept herself, an

effect visible in a 7-point drop on the BDI-II after the fourth session (see Table 1). Judy was explained that in the tribal living of the EEA, being rejected by a desirable mate in the group had severe fitness, status and reputation costs. In this context, a strong motivation for not being rejected and for hanging on to what we now call a dysfunctional relationship, would have been adaptive. However, she was further explained, the environment we are adapted to was very different from the present one: Firstly, there were few potential partners to choose from, as we lived in groups of 150–200 tribe members [82]. Secondly, being rejected often had higher reputational costs than today, and finding another high-quality mate was less likely. This evolutionary mismatch proved to be an important argument toward explaining to Judy why she was so fixated on her ex-boyfriend, further helping her to accept herself as a fallible human being. This important milestone in the treatment was followed by cognitive restructuring homework focused on changing the irrational belief "I should get over it faster, and if I can't I'm a weak, worthless person" to its more rational and useful counterpart "I'd like to get over it faster, but I can accept if it takes some more time, and if it does, it doesn't mean I'm a weak person, but a normal, fallible human being". After challenging this perfectionistic demand, cognitive work focused on the global evaluation that underlined her depressive mood (e.g., "If he rejects me that means I'm unattractive and worthless" and "If I'm not going to feel the same thing again nothing is worth living for"). We will not go into great detail about the CBT techniques as we followed existing CBT guidelines for depression [4, 83, 84]. Instead we will focus on specific evolutionary-informed techniques used in this patient's treatment.

Sessions 7–11 focused on maintaining the behavioral habits of healthier dieting and exercise, by finding alternative behaviors, so as not to reach saturation. Indeed, our ancestors would have likely travelled in different places every day, and we tried to build such variation in Judy's exercising routine, to avoid reaching boredom. Dieting was also addressed with behavioral techniques, by guiding the patient to replace fast-foods with healthier alternatives such as vegetables and foods low in saturated fats and high in Omega-3's [76], while continuously reinforcing the connection between a healthy diet and positive health and psychological outcomes. By session 8 Judy's depressive symptomatology was down substantially (from 22 at intake to 7 on the BDI-II at the eight session, a decrease of 68%), and at this point we began to address expectations about relationships, namely that a relationship based on a rollercoaster of physical and verbal aggression followed by intense physical attraction isn't sustainable or desirable on the long run. Assertive communication was

also practiced with her, and we explored the patient's expectations and preferences about future romantic partners. By the end of therapy Judy was beginning a new relationship, based on the mutual respect and communication, which was satisfying and enjoyable for both partners. The patient successfully rejected her ex's advances when he tried to get her back, something that she previously never thought she would be able to do.

As a consequence of working on self-acceptance [45, 79, 80] and developing her rational thinking skills, her low opinion about her own attractiveness – one of the problems identified at intake by the FES – improved substantially by the end of therapy.

In the last session we used standard CBT techniques to work with Judy toward developing the skills to become her own future therapist and to prevent relapse [20, 45]. The low BDI-II score that Judy achieved by the eight session was maintained until the end of the therapy (BDI-II = 7), which falls into the minimal or no depression range (0–13) [59]. Measures for both cognitions (ATQ & ABS-II) and negative emotions (PANAS-N) showed significant improvement, while there was also a substantial increase in evolutionary fitness (FES total score = 103 at intake FES total score at the end of therapy = 146).

A 3-month follow-up revealed that these therapeutic gains were maintained, with the BDI-II score continuing to show minimal to no depression. The other clinical outcomes measured also showed lasting positive effects (see Table 1).

## Concluding Remarks on Therapy Process and Outcome

This case study suggests that evolutionary techniques embedded in cognitive-behavioral therapies are beneficial in increasing an individual's perceived fitness, which, in turn, can lead to positive clinical outcomes. Identifying and addressing fitness problems in therapy, alongside patient-identified problem areas, can constitute, at least in some cases, an important adjuvant to the cognitive-behavioral therapy for depression. As seen in the case of this patient, the evolutionary-driven conceptualization can provide the patient with an extra level of prediction and control, thus increasing compliance and enhancing positive expectations about the treatment outcome.

The enhanced approach presented in this article should be relevant to most patients, and thus should be considered as a tool for enhancing the clinical conceptualization and intervention techniques of standard CBT. However, with patients that are very high on religiosity, or who explicitly reject Darwin's theory of evolution, a more traditional approach should be used in the conceptualization phase. Behavioral activation and fitness-enhancing tech-

niques, however, can be used regardless of the patient's religious beliefs.

These findings add support to recent studies that document links between depression and reproductive success [72]. Further studies should examine the effects of targeting fitness factors on depression in a controlled manner.

## Conflict of Interest

None declared.

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