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Running Head: COGNITIVE BIASES IN PSYCHODYNAMIC PSYCHOTHERAPY

The Role of Cognitive Biases in Short-Term Psychodynamic Psychotherapy

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The Role of Cognitive Biases in Short-Term Psychodynamic Psychotherapy

Abstract

The concept of biased thinking – or cognitive biases - is relevant to psychotherapy research and clinical conceptualization, beyond cognitive theories. The present naturalistic study aims to examine the changes in biased thinking over the course of a Short-Term Dynamic Psychotherapy (STDP) and to discover potential links between these changes and symptomatic improvement. This study focuses on 32 self-referred patients consulting for Adjustment Disorder according to DSM-IV-TR. The therapists were experienced psychodynamically oriented psychiatrists and psychotherapists. Coding of cognitive biases (using the Cognitive Errors Rating Scale; CERS) was made by external raters based on transcripts of interviews of psychotherapy; the reliability of these ratings on a randomly chosen 24% of all sessions was established. Based on the Symptom Check List SCL-90-R given pre and post, the Reliable Change Index (RCI) was used. The assessment of cognitive errors was done at three time points: early (session 4 to 7), mid-treatment (session 12 to 17) and close to the end (after session 20) of the treatment. The results showed that the total frequency of cognitive biases was stable over time (p = .20), which was true both for positive and negative cognitive biases. In exploring the three main sub-scales of the CERS, we found a decrease in selective abstraction, (p = .02) and an increase in personalization (p = .05). A significant link between RCI scores (outcome) and frequency of positive cognitive biases was found, suggesting that biases towards the positive might have a protective function in psychotherapy.

Key-Words: Cognitive Biases; Short-Term Dynamic Psychotherapy; Process; Process-Outcome

Practitioner Points:

1. Therapists may be attentive to changes in biased thinking across short-term dynamic psychotherapy for adjustment disorder.
2. Therapists may foster the emergence of positive cognitive biases at mid-treatment for adjustment disorder.

Introduction

Cognitive biases are central constructs to cognitive models of depression and anxiety disorders. Theoretically, it was assumed that the individual's subjective assessment of his/her experience and relationships is at the core of developing specific mental disorders and of building up resources to overcome them (Beck, 1991; Clark, Beck, & Alford, 1999). A depressive patient who believes, in a non-agentic way, that the surrounding world may not be within his possible influence, may change at the very moment he experiences himself as in control and realizing that he has a positive impact on other's lives. Similarly, an inhibited anxious patient who believes that the worst anticipations will come true may change when she understands that her negative fearful thinking with regard to the future is not supported by facts. While central to cognitive treatments, the role of cognitive biases are less well understood as ingredients of change in patients undergoing psychodynamic psychotherapy. This will be the focus of the present study.

Cognitive biases – or also referred to as biased thinking or cognitive errors – are central to cognitive psychotherapy. They were defined (as cognitive distortions) by Beck (1963, p. 324) as "the idiosyncratic thought content indicative of distorted or unrealistic conceptualizations". The latter conceptualization refers to a transformed or changed perception and evaluation of the reality and does not correspond to an objective assessment of the outer world (Beck, Rush, Shaw, & Emery, 1979). As such, cognitive biases not only include errors in logic, but more often biases in interpretation of the reality. As such potentially dysfunctional appraisal processes, cognitive biases affect emotion regulation, cognitive processing, coping and tend to maintain the prevalence and pervasiveness of core cognitive and interpersonal schemas (Gross, 2001; Beck et al., 1979; White, 1974). Empirical evidence support the conception of biased cognitive appraisal contributing to unfavorable outcome, including onset et maintenance of psychological problems, such as depression

(Blake, Dobson, Sheptycki, & Drapeau, 2016; Kwon, & Oei, 1992; Tang, DeRubeis, Beberman, & Pham, 2005), anxiety disorders (Butler, & Mathews, 1983; Lucock & Salkovskis, 1988; Weems, Berman, Silverman, Saavedra, 2001), borderline personality disorder (Arntz & Veen, 2001; Baer, Peter, Eisenlohr-Moul, Geiger, & Sauer, 2012; Kramer, Vaudroz, Ruggeri, & Drapeau, 2013; Layden, Newman, Freeman, & Morse, 1993; Napolitano & McKay, 2007), eating disorders (Shafran, Teachman, Kerry, & Rachman, 1999) and gambling addictions (Delfabbro & Winefeld, 2000).

So far, it is unclear, whether cognitive biases only contribute to the maladaptation and disadvantageous strategies of adaptation or whether they may also have an adaptive value. Gigerenzer and Brighton (2011) and Tversky and Kahnemann (1974) have repeatedly argued that certain combinations of cognitive biases might actually be helpful for the individual's adaptation. "Depressive realism" (Ingram, Miranda & Segal, 1998), for example, was discussed as a state which increased the accuracy of the judgment of certain stimuli in depressed patients, when compared with non-depressed. Certain positive (and biased) interpretations of the self might contribute to increased self-esteem which in turn might support adaptation and efficacy in certain tasks and might lead to a generally optimistic view of the future (Dimaggio, Semerari, Carcione, Procacci, & Nicolo, 2006; Taylor, 1983). Such a complex conceptualization of cognitive biases – being part of human heuristics of problem solving – might fall short in research, in particular psychotherapy studies which include treatment-seeking individuals. This might be for several reasons. Firstly, assessment of cognitive biases as part of problem solving strategies is a complex task; secondly, assessment of cognitive biases using self-report questionnaires might measure the representation an individual has of his/her own cognitive functioning, but not the cognitive functioning itself and, relatedly and thirdly, self-report questionnaires of such complex construct might be confounded with concept-unrelated aspects (Glass & Arnkoff, 1997), such as motivation,

interpersonal stakes, insight and quality of the patient-therapist collaboration in the context of psychotherapy.

In order to address these problems and at the same time to remain conceptually rooted within the cognitive tradition initiated by Beck, an observer-rated system was devised for the assessment of cognitive biases in the spontaneous speech as found in psychotherapy sessions (Drapeau, Perry & Dunkley, 2008; Drapeau, 2013; Kramer, de Roten, Drapeau, & Despland, 2013). This measure will be described in the Method section.

Understanding cognitive change in psychodynamic psychotherapy

Cognitive features change in patients undergoing psychodynamic psychotherapy. Messer and McWilliams (2007) review the notion of insight as a core mechanism of change – or "defining feature" – in psychodynamic psychotherapy (Freud, 1953; see also Connolly Gibbons, Crits-Christoph, Barber, & Schamberger, 2006; Holland, Roberts, & Messer, 1998; Hoglend et al., 2008). Insight has several components and routes, including cognitive, affective, motivational related to the Self and the Other. The patient's capacity of recognize patterns or connections between experiences, the self-observation and –reflective stances and the ability to revise maladaptive beliefs all play a crucial role when fostering insight in psychodynamic psychotherapy. Such cognitive and affective capacities build on and connect to what Badgio, Halperin and Barber (1999) have conceptualized as "adaptive skills" as core feature of change in psychodynamic psychotherapy.

From an empirical perspective, Connolly Gibbons, Crits-Christoph, Barber, Stirman, Gallop, Goldstein, Temes and Ring-Kurtz (2009) have demonstrated in a sample of 411 patients with a variety of disorders that changes in emotion regulation strategies ("coping") predicted symptom decrease in cognitive and psychodynamic psychotherapy. For 32 patients with adjustment disorder undergoing psychodynamic psychotherapy, Kramer, de Roten, Michel and Despland (2009; see also Kramer, Despland, Michel, Drapeau, & de Roten, 2010)

did not find a main effect for coping change, however they found an interaction between coping change and the therapeutic alliance; for stronger alliances, greater coping change was found in psychodynamic psychotherapy. In a case study, Perry, Beck, Constantinides and Foley (2008) found a clinically significant change in cognitive variables over the course of psychodynamic psychotherapy. For a short-term psychiatric-psychodynamic treatment for patients with borderline personality disorder, specific decrease in biased thinking was described in a pilot study by Kramer, Caspar and Drapeau (2013). These authors found that the decrease in negative over-generalizing biased thinking was related with the specific borderline symptomatology. In conclusion, more research looking at the actual session-by-session changes in cognitive biases is needed. In order to draw clearer conclusions with regard to the relevance of cognitive change in psychodynamic psychotherapy, it is important to also study the link with therapeutic outcome. This might inform the possible adaptiveness of cognitive biases, or a subset of heuristics, in the process of human problem solving.

Therefore, the present study has two main objectives: Firstly, we studied the evolution of cognitive biases in a sample undergoing short-term dynamic psychotherapy (STDP) and we hypothesized that the frequency of cognitive biases, more specifically the frequency of negative biases, should decrease during therapy. Secondly, we assumed links between the in-session frequency of cognitive biases and outcome, in particular, we hypothesized that low levels of negative biases at mid-treatment, as well as high levels of positive biases, related to good therapeutic outcome at the end of the treatment.

Method

Participants

Patients. This study included $N = 32$ self-referred patients at a University Consultation Center, consulting for mostly Adjustment Disorder according to DSM-IV. The present study is a secondary analysis of a previously published dataset on emotion regulation strategies in

short-term dynamic psychotherapy (Kramer et al., 2010). The individuals had an average of 24 years (SD = 3.86; range = 20-39) and 26 (82 %) were female. Patients who met diagnostic criteria for Psychosis, Addictions and Bipolar Disorder were excluded. A total of 7 (22%) presented co-morbid Personality Disorders (cluster B). A researcher clinician used the Structured Clinical Interview for DSM-IV (Axis I and II ; First, Spitzer, Williams, & Gibbons, 2004) to establish DSM-IV diagnoses (American Psychiatric Association, 2000). Research staff proposed the study to patients after their intake session. Patients were referred to one of the therapists after approving, by a written informed consent, that their data could be used for research. The study obtained ethical clearance by the expert commission of the Department of Psychiatry.

Therapists. The therapists (N = 12), who were experienced psychiatrists and psychotherapists with over 10 years of clinical experience in the field of Psychodynamic Psychotherapy, were blind to research data until the whole set was completed.

Raters. Evaluations were done by four Master's-level psychology students, trained during four months. The training involved the guided coding of 10 transcribed psychotherapy sessions prior to the start of the coding related with the present study. Inter-rater reliability was monitored during training and reached sufficient levels by the session number 7 into the training. For the coding of the study material, the raters were blind to the session number, to one another's scores, to treatment outcome, as well as the research hypotheses.

Treatment

Short-term psychodynamic psychotherapy (STDP) is a manual-based form of therapy (Gilliéron, 1997) based on psychoanalytic theory. This time-limited setting was developed in order to respond to the increasing demand for short-term efficient psychotherapeutic treatments (Malan, 1976; Gilliéron, 1997). The study includes psychotherapeutic treatments lasting up to one year, with a mean of 34 sessions (SD = 7.67; range 24– 48). The termination

of the treatment was negotiated between the patient and the therapist based on clinical criteria. However, the treatment had to be completed by session 40 the latest. STDP was shown to be efficient in mood, anxiety and personality disorders (Crits-Christoph, 1992; Leichsenring & Leibing, 2003).

Instruments

The *Cognitive Errors Rating Scale* (CERS; Drapeau , Perry & Dunkley, 2008), was used to identify and assess cognitive biases (or cognitive errors, CEs). Empirical validation have been presented by D'Iuso, Blake, Fitzpatrick, and Drapeau (2009) and Lewandowski, D'Iuso, Blake, and Drapeau (2011; Drapeau, 2013) for the original English version. For this study, the French translation, validated by Kramer and Drapeau (2011) was applied by the raters to the verbatim transcript of interviews. This instrument is based on the categories of cognitive errors described by J. Beck (1995) and A. Beck (1976). According to Lefebvre (1981), CEs can be classified into four sub-categories: fortune-telling, overgeneralizing, selective abstraction and personalization. These categories include 14 CEs in total. Given the sample size, only the sub-categories were used in the present study and not the individual CEs. We included the global score (number of cognitive errors observed per session) and the total of negative and positive cognitive errors as main scales. For exploratory purposes only and not hypothesis-driven (in order to understand each sub-category's potential contributions to the variance of the results), we analyzed the three major subscales overgeneralizing, selective abstraction and personalization (the cluster fortune-telling has not been analyzed, because of its very low base rate). Coding definitions and examples of verbatims are provided in Table 1. To control for participant verbal productivity, relative frequencies were calculated for all computations, by dividing the raw count of each CE cluster by the number of patient spoken words per session. This ratio of CEs per 1000 words was used in all analyses.

The *SCL-90* is a self-report questionnaire measuring symptomatic behavior of psychiatric outpatients (Derogatis, 1994). It has since been applied as a psychiatric case-finding instrument, as a measure of symptom severity, and as a descriptive measure of psychopathology in different patient populations (Derogatis, 1994). The SCL-90 is intended to measure symptom intensity on nine different subscales. The 90 items of the questionnaire are scored on a five-point Likert scale, indicating the rate of occurrence of the symptom during the time reference. The instrument's global index of distress is the Global Severity Index (GSI), which is the mean value of all the items.

Procedure

Word-by-word transcripts of three psychotherapy sessions for each case were produced according to the Mergenthaler and Stigler (1997) method. The assessment of CEs was conducted at three consecutive time points across each treatment: early (session 4 to 7), at mid-treatment (session 12 to 17) and close to the end (after the 20th session). A total of N = 96 sessions were analyzed in the present study. The reliability of the ratings on a randomly chosen 24% of all sessions was established.

Based on the Symptom Check List SCL-90-R (Derogatis, 1994), the Reliable Change Index (RCI) of Jacobson and Truax (1991) provides a statistical index measuring the significance of individual clinical change. Mean RCI for this sample was -6.14 (SD = 3.12); negative RCIs denote symptom decrease between intake and discharge from treatment. In this sample when using the Reliable Change Index, 90% had significantly clinical change and 10% remained unchanged.

Data Analyses

Hierarchical Linear Modeling (HLM; Bryk, & Raudenbush, 1987; program HLM6) was applied to the scores of CERS, in order to examine the change of CEs over the course of therapy and test the first hypothesis. This conservative method was selected, in order to

optimally take into account the within-subject inter-dependency of the data. Thus, sessions (level 1) are nested within patients (level 2); no nesting within therapist was conducted. In assessing change, HLM avoids some limiting assumptions of repeated measures ANOVAs and paired *t*-tests. An a priori power analysis yielded a minimum *N* of 30 (power: .84; Cohen's $d = .40$; $\alpha = .05$). In order to verify the second hypothesis, we performed a Pearson correlation between Reliable Change Index (RCI) and CEs relative frequency scores at mid-treatment. This time-point was chosen in order to inform about the mid-treatment level of CEs, thus avoiding the early features (likely to be less affected by the treatment) and late features (likely to be confounded with outcome measured at the end of treatment). Data were analyzed using SPSS.

Results

As preliminary analyses, we established inter-rater reliability for 24% of the ratings (23 randomly chosen sessions). The Intra-Class Correlation Coefficients (ICCs; Shrout & Fleiss, 1979) ranged for the entire CERS between ICC (1, 2) = .68 and .95 (on average .84, SD = .09). Positive cognitive errors ranged between .69 and .92 (on average .82, SD = .07) and negative cognitive errors ranged between .70 and .96 (on average .85, SD = .08). These coefficients were described as acceptable to excellent.

The number of words counted per session (after taking out therapist interventions and patient repetitions) varies between 1443 and 9216 words per session (on average between 4698 and 5202 per session) which is not different across the three timepoints ($t(1, 30) = 1,51$; $p = .14$). Normality of the main variables (CE; CEN; CEP) was tested and was acceptable.

The relative frequencies of cognitive biases in the early sessions of psychodynamic psychotherapy were 10.41 (SD: 5.00) for the general score, 8.03 (SD: 4.14) for the negative cognitive errors, 2.38 (SD: 2.86) for the positive cognitive errors (Table 2). We provide means and SDs for each time point, as well as indicative early to late effect sizes for the

change (Note that the change statistics reported in Table 3 was done using the more conservative HLM on three timepoints; as such the early-to-late *d* may not represent the actual rate of the individual change).

The results from the HLM model show (see Table 3) that the total frequency of cognitive biases did not change over the course of STDP ($p = .19$). Also, the relative frequency of positive errors remained unchanged ($p = .27$). In line with our first hypothesis, a trend reduction of negative errors was observed over the course of the STDP, which was only marginally significant ($p = .08$).

When exploring change in the three main sub-scales of the CERS, we found the following picture: A significant decrease in cognitive errors was observed in the sub-scale selective abstraction, ($p = .02$), along with an increase in the frequency of errors for the sub-scales personalizing ($p = .05$) and overgeneralization, ($p = .02$).

In terms of symptom change between intake and discharge, we used Pearson's correlations between the in-session frequency of cognitive biases at mid-treatment and the RCI. Because of lack of observed change in the main variables, we opted for the use of the mean at mid-treatment (and did not correlate the rate of change with outcome). The results partially supported our second hypothesis overall, which stipulated a potential link among cognitive errors and outcome; however, they do not support the specific link assumed between the negative cognitive errors and positive outcome, but Pearson's correlation coefficients indicated a significant association between RCI scores and the total number of positive cognitive errors (see Table 4).

Discussion

The present study examined the in-session frequencies of cognitive biases across a short-term dynamic psychotherapy. It examined three sessions of each therapy process, early, mid and late, within a single multi-level model. The study revealed two main findings.

Contrary to our first hypotheses, the total frequencies of biased thinking were relatively stable over the course of short-term psychodynamic psychotherapy. Contrary to expectations, overall, negatively and positively biased thinking did not decrease nor increase with (effective) treatment. When exploring the specific types of biased thinking, results revealed a differentiated pattern: The patients used fewer selective abstractions in the second part of the therapy, but they also attributed events more frequently to themselves and overgeneralized more with therapy. The latter results may be a surprise, given the results from earlier studies using the same process assessment (Kramer, Caspar, & Drapeau, 2013; Kramer, de Roten et al., 2013), where overgeneralizing and personalizing cognitive biases decreased over the course of treatment, yet, we observed an increase in these features. We may cautiously interpret that patients after short-term dynamic psychotherapy would learn to take responsibility of their own contribution to a specific event or interaction. While they discover this new stance of taking responsibility in the second part of their therapy, they use more personalizing in the narrative, which may be connected with a greater capacity to reflect on the self in interaction, to develop mentalizing resources or to gain insight into interactional patterns and dynamics.

We found that the increase in overgeneralizing was mostly observed in the positive overgeneralizing biased thinking (whereas the negative ones remained stable across treatment, from eyeball test). This might indicate that, again, as the patients gain new insight about themselves in psychodynamic psychotherapy, they may use more positive generalizations and report in a more optimistic manner, for example: “During this trip, everything was so welcoming and positive” (while we know from the context, that this person had also difficult experiences; thus rated as positive overgeneralizing). This global label, which is overly “positive” and inclusive, given the patient’s experience, might serve the patient’s broader goal of fighting depressive mood and demonstrating (to oneself) strength to face difficult

situations. As such, these biases may contribute to undo depressive realism, or other problem solving strategies (Clark et al., 1999; Dimaggio et al., 2006; Gigerenzer & Brighton, 2011), while at the same time they may represent a route to self-acceptance and increased self-knowledge, as fostered in psychodynamic treatments (Messer & McWilliams, 2007). A different explanation may be a possible mediation of cognitive change by changes in underlying defense mechanisms (Perry et al., 2008). The overgeneralizing stance may be explained by the underlying self-observing or intellectualizing defenses which both tend to increase across dynamic therapies, in particularly when assessed using consistent in-session observational coding (Kramer, Despland, Michel, Drapeau, & de Roten, 2010; Perry et al., 2008). It would therefore be of highest interest to examine cognitive biases together with possible underlying defense changes across psychotherapy.

Biased thinking related with selective abstraction consists of a selected view of the self, the world and the future in which a part of the information of a situation (ideational, affective, meaning) is ignored, discarded or minimized. The decrease – over the course of STDP – of these biases speaks to the construction of a more differentiated and nuanced self-image, as the patient describes his/her central interpersonal episodes.

The second finding from the present study involves specifically positive cognitive biases. When relating the frequency of mid-therapy positive cognitive biases with outcome, we found a positive effect. Again, positive biased thinking might help fighting depressive or anxious mood, as antidote to the negativity experienced in the context of adjustment disorder. According to Clark and colleagues (1999), so-called “normal” cognitive functioning does not mean complete accuracy to reality – the latter tending to be an individual’s construction –, but an “adaptive” way of information processing. Yet, Beck (1967) has pointed out that normal cognitive functioning is characterized by a slight bias towards the positive. This might be a particularly relevant psychotherapy process in young adults (Bernier, Larose, & Whipple,

2005), being university students for the most part, all suffering from adjustment disorder with depressive and anxious mood (Casey, Dowrick & Wilkinson, 2001; Despland, Monod & Ferrero, 1995; Katzman & Tomori, 2005), as in the present sample. It is surprising that the in-session frequency of negative cognitive biases remained unrelated with psychotherapy outcome. It is particularly surprising because several theoretical accounts on the mechanisms underlying cognitive therapy refer to the lessening of negative cognitive biases (Clark et al., 1999; Gotlib & Joormann, 2010). Our result might indicate that whenever change in negative cognitive biases might take place, it might be an epiphenomenon, not a central mechanism, of the actual psychotherapeutic change.

Taken together, this study has indicated that certain types of cognitive biases – positive ones – may, under certain circumstances, serve good adaptation of the individual. A certain hopefulness, optimism, or an open-minded view of the Self, the surrounding world, the future and the relationships, even if still somewhat biased, may help the individual in the process of successful adaptation to reality (Gigerenzer & Brighton, 2011).

The present study bears several clinical implications. Clinicians from various orientations may pay attention to the patient's use of biased thinking in-session, as marker of central experience. They may closely monitor over their treatment the patient's use of positive cognitive biases, also in psychodynamic psychotherapy. We may suggest that clinicians may focus on such cognitive biases, as an initial step in a constructive process of overcoming depressive or anxious mood. Positive thoughts and emotions are generally overlooked by psychotherapists, including psychodynamic psychotherapists, but it might bear a potential in increasing the effectiveness of the treatment (de Roten, Drapeau & Michel, 2008). Such a result is consistent with the integration of resource-activation in psychotherapy, which has shown increases in the effectiveness of the treatment (Flückiger & grosse Holtforth, 2008).

Therapists may proactively look for positive cognitive biases, examine them and foster their adaptive value.

The present study has several limitations we need to acknowledge. Firstly, the sample size is relatively small, preventing further statistical models, including mediation, to be tested in the present case, and preventing the joint examination of theoretically linked concepts, such as defense mechanisms, mentalizing and interpersonal patterns. However, we adapted our data analytic strategy to the context, by using a multi-level model, taking into account the progression over three time points. Secondly, the patients had some co-morbidities and it is unclear how these may have affected the use of in-session cognitive processes. The small sample size prevented from performing sub-group analyses addressing this limitation. Thirdly, this is a naturalistic study observing occurrences of cognitive processes over therapy; we do not know if these processes are the result of therapy or of spontaneous remission or some other uncontrolled factor. It is important to replicate the present study on larger samples with greater symptom load, undergoing longer therapy processes.

The present study examined in-session change in cognitive biases over the course of short-term dynamic psychotherapy for adjustment disorder. No change in the overall, negative and positive cognitive errors were found, but we observed a decrease in selective abstraction and an increase in personalizing and overgeneralizing; biases towards the positive were linked with clinically significant change. The direction of the latter result (the more positive biases at mid-treatment, the better the therapeutic result) indicated that future research may focus on cognitive processes as resources. Gigerenzer and Brighton (2011) have argued that cognitive heuristics are problem solving strategies, composed by specific sets of biased thinking. Future studies should focus on such in-session heuristics and link them with the individual patient's set of adaptive skills (Badgio et al., 1999). It may be interesting to study such processes in long-term therapy (Perry et al., 2008), in which it may be possible to observe more complex

patterns of change, per sub-category of biases, or describe a shape of change consistent with curvilinear evolution (i.e., increase in a specific category, followed by a decrease). It is needed to study cognitive biases in a controlled trial, comparing different therapy conditions, including cognitive therapy. Such a controlled design would enable to broaden our confidence in the central role cognitive biases may play in explaining therapy outcome.

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Table 1.

Examples of cognitive biases, as assessed using the CERS (Drapeau et al., 2008)

Category	Cognitive bias	Definition	Example
OG	Labelling	The individual puts a fixed global label on him or herself or others without considering evidence that leads to a less disastrous or less positive conclusion.	«She is a bimbo, beautiful from afar, but far from being interesting »
	Overgeneralizing	The individual makes a sweeping negative or positive conclusion that goes far beyond the situation.	« I have never had a very important place in someone's life »
SA	All-or-nothing thinking	The individual views a situation as fitting into one of two opposing categories, rather than as a mixture or on a continuum.	« it’s not exactly like this that I wanted this report, so it’s completely void»
	Discounting the positive or negative	The individual selectively dismisses or discounts information that is positive or negative, thus keeping	« I only have good moments with my children »

	only one valence of information as true, relevant or important.	
Magnification of the Negative or minimization of positive	When evaluating oneself or another person or a situation, the individual unreasonably magnifies the negative or minimises the positive, or the converse.	«It was just a little cancer»
Should and must statements	The individual has a precise and fixed idea of how others or oneself should behave.	« I must be strong before people, I must not show my emotions»
Emotional reasoning	The individual thinks something must be true because he or she feels and believes it to be true, while ignoring or discounting evidence to the contrary.	«Tonight I'm going out to gamble, I feel I'm gonna win, I have a feeling that today is my day!»
Jumping to conclusions	The individual takes one or two facts and draws unwarranted conclusions.	«When I enter the room, my colleagues stop talking, I'm sure they were talking

			about me»
P	Personalization	Seeing oneself as responsible for any bad or good occurrence.	«The boss looks angry, I must have done something wrong in the report that I gave him yesterday»
	Mind reading	The individual believes he or she knows what others are thinking, failing to consider other more likely possibilities.	« My husband cleaned the whole house, because he thinks I'm too good for him, so he works hard for not losing me»
	Inappropriate blaming of self	The individual takes blame for something that has gone wrong upon him or herself, while inappropriately leaving out the contributions of others to the same problem	«I don't know how the company would turn if I went on vacation, I think it would not survive »

Note. OG: Overgeneralizing; SA: Selective Abstraction; P: Personalizing. No examples provided for SA items Mental filter and Tunnel vision and for P item Inappropriate blaming of other (to save space, we do not provide examples for all the items).

Table 2

Means (and SDs) for cognitive biases for each time-point (*N* = 32 patients; *N* = 96 psychotherapy sessions analyzed)

Cognitive errors	Early M(SD)	Mid M(SD)	Late M(SD)	*d* pre-post
Total CE	10.41(5.00)	7.42(5.04)	7.71(6.26)	0.48
Total CE Negative	8.03(4.14)	6.13(4.15)	5.59(5.10)	0.53
Total CE Positive	2.38(2.86)	1.29(1.77)	2.03(2.91)	0.12
Overgeneralizing	0.47(0.46)	0.30(0.42)	0.52(0.60)	0.09
Selective Abstraction	1.45(0.83)	1.07(0.84)	1.20(0.96)	0.28
Personalization	0.12(0.20)	0.14(0.24)	0.24(0.28)	0.49

Note. Total CE : total number of cognitive errors ; Total CE Neg. : total number of cognitive errors with negative valence ; Total CE Pos. : total number of cognitive errors with positive valence; Overgeneralizing : number of errors of Overgeneralizing; Selective Abstraction : number of errors of Selective Abstraction; Personalization : number of errors of Personalizing, *d* = Effect size Cohen's *d* comparing early to late.

Table 3

Change in Cognitive Biases over the course of Short-Term Dynamic Psychotherapy

(Hierarchical Linear Modeling; *N* = 32 patients; *N* = 96 psychotherapy sessions analyzed)

Variable	Estimate	SE	Z	P-value
Total CE	-0.10	0.12	-0.86	.19
Total CE Negative	-0.14	0.10	-1.44	.08
Total CE Positive	-0.02	0.03	-0.62	.27
Overgeneralizing	0.05	0.02	2.12	.02
Selective Abstraction	-0.12	0.11	-1.01	.02
Personalization	0.01	0.01	1.64	.05

Note. Hierarchical Linear Model (HLM) ; Total CE : total number of cognitive errors ; Total CE Neg. : total number of cognitive errors with negative valence ; Total CE Pos. : total number of cognitive errors with positive valence; Overgeneralizing : number of errors of Overgeneralizing; Selective Abstraction : number of errors of Selective Abstraction; Personalization : number of errors of Personalizing.

Table 4

Pearson's Correlations between Total CE, Total CEN, Total CEP and outcome (N = 32)

	Total CE	Total CEN	Total CEP
RCI			
Pearson Correlation	.12	-.25	.51
Sig. (2-tailed)	.63	.22	.02

Note. Total CE: total number of cognitive errors; Total CEN: total number of negative cognitive errors; Total CEP: total number of positive cognitive errors; RCI: Reliable Clinical Change Index