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ACTA PSYCHIATRICA SCANDINAVICA

Cost-effectiveness of cognitive self-therapy in patients with depression and anxiety disorders

Stant AD, Ten Vergert EM, den Boer PCAM, Wiersma D. Cost-effectiveness of cognitive self-therapy in patients with depression and anxiety disorders.

Objective: Self-therapy interventions could potentially reduce healthcare expenses and the need for care in the treatment of depression and anxiety disorders. This study assessed the cost-effectiveness of cognitive self-therapy (CST) in patients with these disorders.
Method: A total of 151 patients were randomly assigned to CST or treatment as usual (TAU), and followed during 18 months. The Symptom Checklist 90 (SCL-90) was the primary outcome measure of the study. The reference year was 2003 (US$1.00 = €0.92).
Results: Mean costs of patients in the CST group (US$4364) were lower than that of the patients who received TAU (US$5241). The results of the SCL-90 were slightly in favour of CST. Valuing an additional unit of health outcome at US$108 will lead to an 83% probability that CST is cost-effective.
Conclusion: Cognitive self-therapy appears to be cost-effective. Wider implementation of CST may relieve the burden of many patients with emotional disorders whose treatment needs cannot be met in current healthcare systems.

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Key words: depression; self-therapy; cost-effectiveness; economic evaluation; anxiety disorders

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Significant outcomes

- Societal costs assessed during the 18 months of the study favoured CST over TAU.
- Clinical results in the CST group did not differ significantly from results in the TAU group, but the effectiveness of CST appeared to be (at least) comparable with that of TAU.
- Implementation of CST in current healthcare systems will lead to a more efficient use of healthcare resources.

Limitations

- A non-inferiority design may be more adequate for studies on self-help therapies than the superiority design applied in the current study.
- Baseline differences between groups on the SCL-90 were not statistically significant, but appeared to be clinically relevant. The conducted statistical analyses corrected for these initial differences.
- There is no consensus on acceptable (cost) benchmarks for additional units of health outcome, like points gained on the SCL-90 in the current study, which makes policy decisions less straightforward.

Introduction

Many patients suffering from depression and anxiety disorders cannot be adequately treated within European healthcare systems (1). The number of available therapists is limited and unable to meet the extensive need for care. Unfortunately, the consequences of inadequate treatment of mental illness can be serious, both for the well-being of patients as for national healthcare

expenses, especially in case of recurring or chronic mental disorders (2, 3).

Various studies have indicated that self-help strategies can form an effective alternative for treatment provided by therapists, also in depression and anxiety disorders (4). Self-help strategies are currently provided to patients in different formats, including self-help manuals and computerized programmes. For policy makers, the potential cost savings associated with self-help strategies aimed at emotional disorders are particularly interesting, especially when also considering the substantial costs these disorders impose on society (5, 6). Unfortunately, only a limited number of studies analysed both costs and health outcomes of self-help strategies in emotional disorders, and the methodological quality of available studies has been questioned (7). In one of the few economic evaluations of self-help strategies in patients with depression and anxiety disorders (8), the cost-effectiveness of computerized cognitive behavioural therapy (CBT) was examined. Based on costs and health outcomes registered during 8 months, the authors concluded that computerized CBT was likely to be cost-effective compared with treatment as usual (TAU). These findings underline the relevance of economic evaluations of self-help strategies, and provide support for economic studies on other forms of self-help strategies and in different healthcare settings as well.

Recently, a randomized controlled trial (9) focused on cognitive self-therapy (CST) in patients with depression and anxiety disorders. Cognitive self-therapy integrates self-help manuals and depression courses with support provided by paraprofessionals. There were indications of the effectiveness of CST (based on an unpublished pilot study), but no large trials had been conducted earlier.

Aims of the study

This paper presents the results of the economic evaluation that was performed alongside the clinical study on CST. The economic evaluation assessed the cost-effectiveness of CST in comparison with TAU in patients with depression and anxiety disorders.

Material and methods

The economic evaluation was part of an 18-month randomized controlled trial on the effectiveness of CST in patients with depression and anxiety disorders. Details on the design and results of the clinical study are provided elsewhere (9).

Study population

The recruitment of patients took place between 2000 and 2002 in four outpatient centres located in different parts of the Netherlands. Patients were eligible for the study if they had a diagnosis of depression or generalized anxiety disorder. Additional selection criteria included a history of mental healthcare utilization of at least 2 years, aged between 18 and 65, and an awareness of personal vulnerability in social contacts and/or relationships. Patients were excluded if they displayed suicidal behaviour or psychotic symptoms, had a comorbid diagnosis within the autistic spectrum or an organic disorder, were drug or alcohol dependent, or mentally handicapped (IQ < 85).

Randomization procedure and interventions

Stratified randomization was applied to ensure the comparability of patient groups. Strata were based on age: < 40 or ≥ 40 years of age and duration of complaints: < 7 or ≥ 7 years. Results of an unpublished pilot study on CST suggested that these strata would be relevant for the randomization procedure in subsequent studies. Patients were randomly assigned to two intervention arms, CST or TAU. Both interventions were provided in outpatient centres and included a first contact for diagnostic purposes. During the study, patients received any form of regular care they required in addition to the care that was part of the interventions.

Treatment as usual in the Netherlands consisted of 10–20 contacts with a psychologist, psychiatric nurse or social worker. During these contacts, healthcare professionals mainly focused on problem-solving and coping strategies, but they did not follow a prescribed treatment protocol.

Cognitive self-therapy is a method developed to restructure cognitive schemata and address problems in social functioning and relationships. Psychiatric nurses, social workers and psychologists can be trained to perform CST programmes and teach the CST method to patients. Patients use a CST manual (10) that acquaints them with the treatment principles. The patients' role in the treatment gradually evolves into that of a 'paraprofessional', such that they finally conduct CST sessions in reciprocal relationships with peers. The CST programme consists of: i) preparatory phase of one to three 45-min meetings, for informing the patient and for checking whether the patient is able and willing to participate in the CST course; ii) orientation course of three mornings, once in a week, during which the patients practice with

peers, before definitely making the choice to continue with the next phase; iii) basic course of 5 days, once in a week, in which patients learn to manage a CST session. Those who perform a CST session adequately with peers will become certified to participate in the last phase of the CST programme: iv) self-therapy meetings, once in a week, led by peers in accordance with the manual as was taught during the basic course. All certified patients had the free choice of participating in self-therapy meetings whenever they liked and could attend these meetings during the study period. Before the beginning of the study, the CST programme was uniformly implemented in all participating centres.

Outcome measures and power analysis

The Symptom Checklist 90 (SCL-90; 11) was the main outcome measure of the study. The SCL-90 is a multi-dimensional self-report inventory that can identify psychological problems and symptoms of psychopathology. The total score of the SCL-90 is based on nine subscales and can range from 90–450, where lower scores indicate better functioning. Power analyses were based on characteristics of this instrument in the patient population under study; 61 patients were required in each treatment condition to detect a clinically relevant difference of 23 points between groups (SD = 50) with an alpha of 0.05 and a power of 80%. In total, 151 patients were included in the study to account for an estimated drop-out rate of 20%. Measurement took place at 6-month intervals, starting at the time of inclusion till the end of the follow-up period 18 months later (T0, T6, T12 and T18).

Various additional instruments were administered during the clinical study, focusing on depressive symptoms (Beck Depression Inventory; 12), social anxiety (State-Trait Anxiety Inventory; 13), social functioning (Groningen Social Disabilities Schedule; 14) and quality of life (World Health Organisation Quality of Life Assessment-BREF; 15). For details on these additional instruments, the reader is referred to the published clinical results (9). The cost-effectiveness analysis focused primarily on the SCL-90. Results of economic analyses addressing the additional outcome measures were not presented in this paper, as the results were comparable with those of the main cost-effectiveness analysis.

Costs and unit prices

The economic evaluation was conducted from a societal perspective; therefore costs were assessed both within and outside the healthcare sector. Table 1 shows the various types of costs that were registered during the 18 months of the study. Costs of CST included costs of therapists who were training, educating and supporting patients during the various stages of the CST programme. Costs of travelling and invested time related to the CST meetings were registered during the study. Costs of invested time were valued in monetary terms based on the net income of patients.

Table 1. Registered medical and non-medical costs

Direct medical costs	Direct non-medical costs	Indirect non-medical costs
Cognitive self-therapy	Travel costs	Productivity losses with and without absence from work
Inpatient and semi-inpatient care	Time costs	
Outpatient and community care	Informal care	
General healthcare	Out-of-pocket costs	
Day activity institutions		
Medication		

Costs of informal care were based on the monetary valuation of the time invested by relatives or acquaintances in helping or assisting the patient. Additional costs related to the illness, like costs of non-prescribed medication, are combined under the heading out-of-pocket costs. The friction cost method (16, 17) was applied for estimating costs associated with productivity losses. When applying the friction cost method, production losses are assumed to be confined to the period needed to replace the sick worker (currently estimated at 5 months in the Netherlands). Quantities of used resources were registered for all the patients available at the various times of measurement. The information on costs was primarily collected by means of a questionnaire previously used in economic evaluations in mental healthcare (18). This questionnaire assessed, among others, number of admissions to psychiatric hospitals, contacts with psychiatrists and psychologists, and sick leave days of patients. Additional information, like medication use, was collected through various healthcare professionals. To facilitate comparisons with other economic evaluations, unit prices, i.e. the price of one unit of each included cost type (available on request), were mainly based on Dutch standard prices (19). True costs of used resources were estimated when standard prices were not available. All unit prices were based on the price level in the year 2003. In this paper, costs will be presented in US$ (US$1.00 = €0.92, based on conversion rates and purchasing power corrections recommended by the Organization for Economic

Cooperation and Development; http://www.oecd.org/std/ppp). Reference prices established for previous years were adjusted to prices of 2003 by applying the consumer price index.

Cost-effectiveness analysis

In cost-effectiveness analysis, costs and the primary health outcome associated with an intervention are used to calculate the incremental cost-effectiveness ratio (ICER) relative to one or more alternatives (20). In the present study, costs and health outcomes of patients who received CST were compared with results of patients in the TAU condition. Primary outcome measure in the cost-effectiveness analysis was the SCL-90, the instrument on which power analyses of the clinical study were based. Costs per point improvement on the SCL-90 were expressed by the ICER:

$$\mathrm{ICER} = \frac{(C_{\mathrm{CST}} - C_{\mathrm{TAU}})}{(\mathrm{SCL90}_{\mathrm{CST}} - \mathrm{SCL90}_{\mathrm{TAU}})}$$

where C_{CST} = mean costs per patient in the CST group, C_{TAU} = mean costs per patient in the TAU group, $\mathrm{SCL90}_{\mathrm{CST}}$ = mean SCL-90 difference score in the CST group and $\mathrm{SCL90}_{\mathrm{TAU}}$ = mean SCL-90 difference score in the TAU group.

When costs and health outcomes are measured over a long period of time, outcomes are often discounted in economic studies, as people are assumed to prefer immediate over postponed consumption (20). In the current study with a follow-up of 18 months, discounting would have had a minor effect on differences between groups. Therefore, costs and health outcomes were not discounted in the standard analyses, but the influence of discounting was examined in the sensitivity analyses. Uncertainty surrounding the calculated ICER was examined by the bootstrap method (21). Bootstrapping is an iterative method that consists of randomly selecting patient data (with replacement) from the observed population to create a simulated distribution of data. incremental cost-effectiveness ratios were calculated for each of the bootstrap iterations (5000 in the present study), simulated values of the mean estimates for the cost and outcome differences were added to the cost-effectiveness plane (CEP) (22). Finally, cost-effectiveness acceptability curves (CEACs; 23, 24) were calculated. Cost-effectiveness acceptability curves inform decision-makers on the probability that an intervention will be cost-effective for increasing monetary values placed on an additional unit of health outcome.

Sensitivity analysis

Various sensitivity analyses were performed to provide information on the robustness of the results of the economic evaluation. Discount rates were varied (4 and 5% instead of 0%) and consequences for differences between groups were examined. Costs of hospital admissions are known to have a large impact on total costs in mental healthcare. To examine the uncertainty of this cost aspect in the current study, costs of hospital admissions were increased with 20% in one of the intervention arms, while at the same time being decreased with 20% in the other. Subsequently, consequences for differences in mean total costs between groups were analysed. Finally, the economic analyses were repeated by using a healthcare perspective instead of a societal perspective, because of the ongoing (international) debate on the inclusion and quantification of various costs outside the healthcare sector.

Statistical analysis

Analyses of costs and clinical outcomes were conducted on an 'intention-to-treat' basis, using mixed models under the assumption of missingness at random. Mixed models is a repeated measurement analysis that uses all available data, i.e. also of patients for whom one or more measurements are missing. The applied models included main effects of treatment condition and assessment time and their interaction, with a random effect of subject. The baseline score of the SCL-90 was included to account for initial differences between groups.

Between-group baseline characteristics were analysed with student's *t*-tests for continuous variables and Pearson chi-square tests for categorical variables. *P*-values < 0.05 were considered statistically significant. All the analyses were carried out with SPSS 12.0.2 for Windows (SPSS Inc., Chicago, IL, USA).

Results

Patient characteristics at baseline

The CST group consisted of 52 women (69%) and 23 men (31%) with a mean age of 40.7 years (SD = 8.9). In the TAU group there were 48 women (63%) and 28 men (37%) with a mean age of 41.9 years (SD = 9.1). Main diagnoses in both groups were depressive disorder (91% in CST, 97% in TAU) and generalized anxiety disorder (9% in CST, 3% in TAU). More than half of the

patients (52%) had a co-morbid diagnosis of a depressive or anxiety disorder. The number of years since first contact with mental healthcare was 12.2 years (SD = 7.6) in the CST group and 13.1 years (SD = 9.0) in the TAU group. There were no statistically significant differences between groups on demographic (gender, age, living situation, level of education) or clinical characteristics (primary diagnosis, co-morbidity, time of first psychiatric contact, family psychiatric history) at baseline.

Service use and costs

Table 2 shows information on medical and non-medical cost, as well as service use. Means of each cost type were based on all patients in each group. If a patient did not make use of a specific cost type, costs of US$0 were applied when calculating group means. In addition, mean costs and number of patients who actually used the health services are presented as well.

Total costs (medical and non-medical) of providing the CST intervention were estimated at US$824 per patient. These costs consisted of costs of teaching CST to patients (US$350), as well as travel and time costs of patients directly related to the CST meetings (US$474). Costs of psychiatric hospital admissions, medication use and 'other out-patient care' contributed substantially to the total medical costs in both groups. Travel costs and costs of invested time were assessed when directly related to the CST intervention. Costs related to productivity losses, with and without absence from work, were relatively high in both groups.

Differences between groups in the number of contacts with various healthcare professionals were also analysed separately from the cost analyses. Significant differences in contacts were only found for 'other out-patient care' ($t = -4.029$,

Table 2. Medical and non-medical costs (US$†) during T0–T18

	CST group (n = 61)		TAU group (n = 59)	
Healthcare services and cost types	Mean costs whole group (SD)	Mean costs‡ (n)	Mean costs whole group (SD)	Mean costs‡ (n)
CST				
Therapy/training	350 (266)	381 (56)	–	–
In-patient and semi-inpatient care				
Psychiatric hospital admission	727 (4027)	22182 (2)	1675 (8066)	19769 (5)
Day care	2 (12)	96 (1)	91 (382)	1339 (4)
Outpatient and community care				
Psychiatrist	75 (140)	171 (27)	89 (150)	210 (25)
Psychologist	155 (229)	287 (33)	201 (351)	457 (26)
Social psychiatric nurse	62 (127)	190 (20)	145 (260)	372 (23)
Social worker	24 (79)	144 (10)	61 (145)	238 (15)
Crisis intervention	2 (19)	150 (1)	5 (27)	150 (2)
Psychiatric home care	9 (73)	567 (1)	36 (274)	2106 (1)
CAD§	0 (–)	0 (0)	0 (–)	0 (0)
Other out-patient care	270 (695)	967 (17)	881 (1078)	1368 (38)
General health care				
General practitioner	83 (197)	120 (42)	47 (105)	96 (29)
Alternative healthcare	24 (74)	205 (7)	29 (133)	345 (5)
Home care	3 (14)	56 (3)	3 (14)	50 (4)
Emergency care	0 (–)	0 (0)	0 (–)	0 (0)
Other general healthcare	25 (118)	222 (7)	20 (73)	168 (7)
Day activity institutions				
Day activity centre	39 (186)	969 (2)	0 (–)	0 (0)
Other day activity institutions	0 (–)	0 (0)	0 (–)	0 (0)
Medication				
Prescribed medication	277 (338)	393 (43)	473 (506)	582 (48)
Various non-medical costs				
Travel costs	19 (26)	27 (42)	–	–
Time costs	455 (437)	496 (56)	–	–
Informal care	17 (43)	105 (10)	8 (24)	57 (8)
Out-of-pocket costs	57 (170)	269 (13)	46 (147)	207 (13)
Productivity losses				
Paid work	1447 (3087)	4413 (20)	1014 (1865)	2718 (22)
Paid work without absence	248 (1748)	5050 (3)	416 (1832)	2729 (9)

CST, cognitive self-therapy; TAU, treatment as usual.

†US$1.00 = €0.92.

‡Mean costs of persons using the health services and cost types involved (number of patients using these services between brackets).

§Consultation office for Alcohol and Drugs addiction.

Table 3. Total costs (US$†) during the study

Measurement period	CST group			TAU group			
	n	Mean	Median	*n*	Mean	Median	95% CI‡
T0–T6	72	2056	1194	70	2134	918	−1385, +1101
T6–T12	65	877	588	62	1547	796	−1470, −36
T12–T18	63	1214	385	61	1820	445	−2678, +1041
T0–T18§	61	4364	2443	59	5241	2721	−4001, +1582

CST, cognitive self-therapy; TAU, treatment as usual; CI, confidence interval.
†US$1.00 = €0.92.
‡95% confidence interval of the mean cost differences between groups per measurement, generated by the bootstrap method. Lower and upper boundaries are presented.
§Displayed mean total costs during T0–T18 are based on data of patients for whom all the relevant measurements were available (complete cases).

$P < 0.001$), which was utilized by considerably more patients in the TAU than in the CST group (38 and 17 patients respectively). Other out-patient care consisted of various types of treatment, including individual and group therapy and social skills training.

An overview of total costs during each measurement period and total costs during the 18 months of the study is presented in Table 3.

The costs of teaching CST to patients in the CST condition were generated during T0–T6, while the costs of attending peer meetings mainly took place during the following periods. During T6–T12, mean total costs in the CST group were significantly lower, partially related to a decreased use of healthcare services. In the last 6 months of the study, mean costs slightly increased again in both groups in comparison with the previous 6 months.

Mean total costs during the entire study period were US$4364 per patient in the CST group (median costs US$2443) and US$5241 per patient in the TAU group (median costs US$2721). Differences in mean total costs per measurement between groups were examined by 95% confidence intervals (CI) generated by the bootstrap method, in addition to the longitudinal analyses with mixed models. Differences in mean total costs during the 18 months of study were not statistically significant (95% CI lower boundary: −US$4001; upper boundary: +US$1582) for patients for whom all the measurements were available. Results of the mixed model analyses on costs during T0–T18 are displayed in Table 4.

In the mixed model analyses, a significant effect of time was found, i.e. differences were found between costs over time for both groups. However, there was no significant treatment effect, nor was there a significant effect of the interaction between treatment and time. The fact that no significant differences between groups were found for costs should be interpreted with some caution, as the study was powered (as most economic evaluations) to demonstrate differences in health outcomes and not in costs.

Table 4. ANOVA table based on mixed effect analyses of costs and Symptom Checklist 90 (SCL-90) results

Outcome measure with model effects	df	*F*	*P*
Costs			
Effects			
Intervention	1, 138	0.04	0.85
Time	2, 258	32.14	<0.001
Intervention × time	2, 258	0.63	0.53
SCL-90			
Effects			
Intervention	1, 148	0.57	0.45
Time	3, 379	31.50	<0.001
Intervention × time	3, 379	0.13	0.90

Mixed effect analyses included a random effect of subject. Differences at baseline were corrected by means of covariance adjustment for SCL-90 results

Primary health outcome

Results of the SCL-90, the primary health outcome measure, are displayed in Table 5. In the mixed model analyses (Table 4), baseline SCL-90 scores were included as covariate because of the initial differences on this outcome measure between groups.

The effect of time was significant (later assessments showed lower scores in both groups), but there was no significant difference between treat-

Table 5. Results of the SCL-90†, means and standard deviations

Measurement	CST group		TAU group	
	n	Mean (SD)	*n*	Mean (SD)
T0	75	217.5 (54.2)	76	238.8 (58.6)
T6	70	184.7 (60.4)	71	211.0 (70.9)
T12	64	182.9 (68.8)	59	201.2 (79.7)
T18	62	178.5 (66.9)	59	200.3 (75.6)

CST, cognitive self-therapy; TAU, treatment as usual.
†Lower scores indicate better functioning.

ments, nor a significant effect of the interaction between treatment and time.

Cost-effectiveness analysis

The point estimate of the ICER and the results of the bootstrap analyses are presented in the CEP in Fig. 1. The calculated value of the ICER was −US$156 per point improvement on the SCL-90. Here, the negative value indicates that CST was associated with lower mean costs and better health outcomes. For each quadrant of the CEP, information is provided on the percentage of bootstrap simulations located in that quadrant.

Approximately 50% of the estimated mean cost and effect differences were located in the southeast quadrant. In other words, CST dominated TAU in 50% of the cases. Interpretation of outcomes in the northeast and southwest quadrants depends on how much decision-makers are willing to pay for an additional unit of health outcome. Figure 2 shows the probability that CST will be cost-effective for increasing monetary values placed on an additional unit of health outcome. When decision-makers are willing to pay US$108 per point improvement on the SCL-90, the probability that CST will be cost-effective increases up to 83%, and subsequently decreases. This decrease is due to the location of the joint density in the northeast and southwest quadrants of the CEP (24).

Sensitivity analyses

In the first type of sensitivity analysis, discount rates were varied and consequences for differences in mean total costs between groups were studied. Costs were discounted at 4 and 5%, instead of 0% in the standard analyses. Differences in mean total costs between groups were slightly smaller, i.e. US$853 (4%) and US$847 (5%) instead of US$877

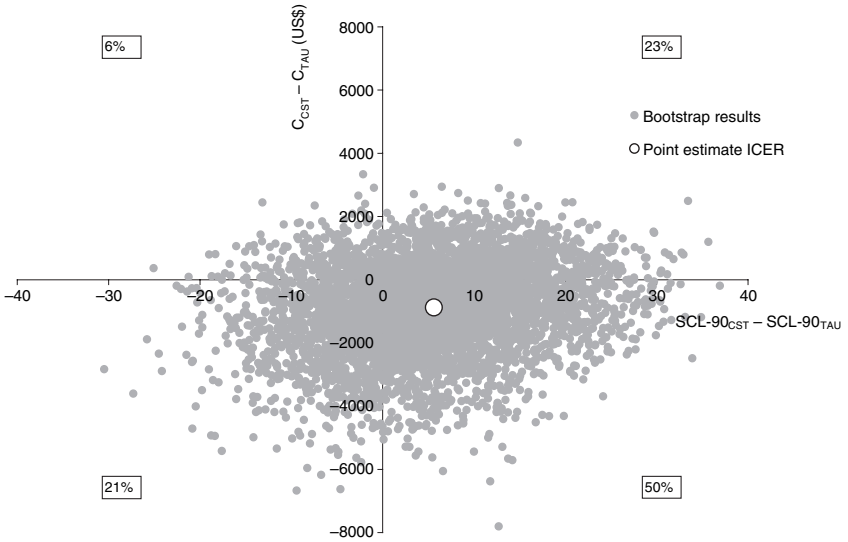

Fig. 1. Results of the cost-effectiveness analysis and bootstrap method.

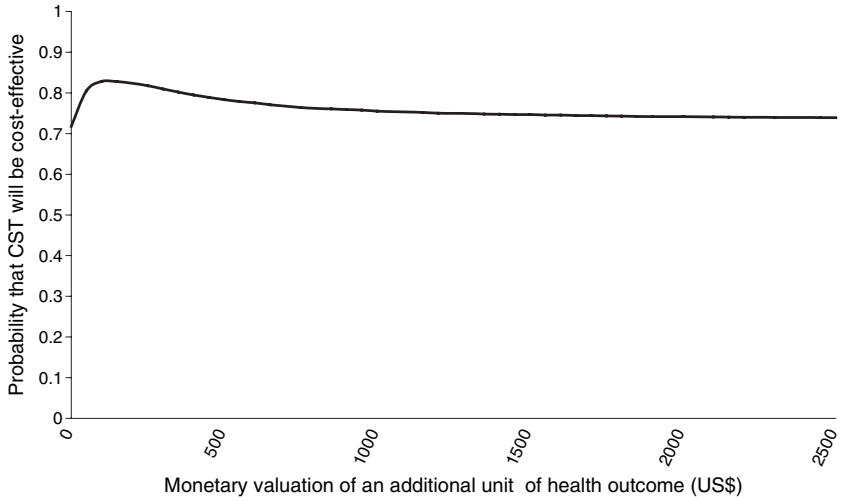

Fig. 2. Cost-effectiveness acceptability curve.

(0%) in favour of CST in the standard analyses. Other sensitivity analyses focused on variations in costs of hospital admissions, a cost category that may contribute considerably to the total amount of costs in mental healthcare (24% of the total costs in the current study). First, these costs were increased with 20% in the CST group, while at the same time being decreased with 20% in the TAU group. Subsequently, hospital costs were decreased by 20% in CST and increased in the TAU condition. The consequences of these variations for differences in mean total costs between groups were examined. Confidence intervals estimated by the bootstrap method indicated that mean cost differences between groups (US$396 and US$1357 in favour of CST respectively) were not significant. Finally, economic analyses were repeated using a healthcare perspective instead of the broader societal perspective applied in the standard analysis. When only focusing on direct medical costs, mean total costs were US$2120 in the CST group and US$3757 in the TAU group. In this alternative analysis, differences in mean total costs between groups (US$1637, 95% CI lower boundary: −US$4143; upper boundary: + US$341) were more pronounced than in the standard analyses (US$877).

Discussion

This paper presented the results of the cost-effectiveness analysis that was part of an 18-month clinical study focusing on CST in patients with depression and anxiety disorders. A comparison was made between costs and health outcomes of patients who were randomly assigned to one of the two treatment arms, CST or TAU.

The mean total costs of patients in the CST group were US$877 lower than the costs of patients in TAU. Cost types that contributed considerably to the total amount of costs were related to hospital admissions, medication use and other out-patient care (which included various forms of individual and group therapy, as well as social skills training). Furthermore, costs of productivity losses with or without absence from work were relatively high, which is in line with the results of previous studies examining (societal) costs of patients with depression and anxiety disorders (5, 25, 26). The costs of training therapists in CST were not included in the study. However, training costs will be relevant for decision-makers when considering the implementation of CST in current healthcare systems.

The primary outcome measure of the cost-effectiveness analysis was the SCL-90. Differences between groups on the SCL-90 were smaller than the expected clinically relevant difference on which power analyses during the design phase of the study were based. The various instruments administered in addition to the SCL-90 showed results comparable with the primary outcome measure (9). The overall outcomes of these instruments, which measured depressive symptoms, social anxiety, social functioning and quality of life, demonstrated that there were no statistically significant differences between groups on these aspects of health. Additional economic analyses focusing on these secondary outcome measures led to similar results (and conclusions) as the presented cost-effectiveness analysis, and were therefore not added to the current paper. As also indicated by a recent literature overview (4), self-help strategies are commonly associated with clinical results that seem comparable with those of other treatments. Consequently, using a superiority design, i.e. intending to find (significant) differences between interventions, may no longer be the preferred approach for studies focusing on self-help strategies. Especially since failure to demonstrate superiority does not allow one to conclude that two interventions are in fact comparable or equal. Therefore, it may be more appropriate for studies on self-help strategies to use alternative study designs, like for instance a non-inferiority design. Non-inferiority studies intend to show that an intervention is at least equal to an alternative in terms of effectiveness (27). Non-inferiority designs can be applied when there are other advantages to be gained from an intervention than strictly improving effectiveness, for instance, when an intervention is associated with lower healthcare costs, as seems to be the case for self-help strategies.

Because of various ethical and practical reasons, power analyses of economic evaluations are usually based on clinical outcomes in the patient population under study, and not on costs (28). Consequently, most economic studies are underpowered to identify statistically significant differences in costs, as the skewed distribution of costs (and high variance) requires larger sample sizes than comparisons of clinical outcomes. This was also a limitation in the current study, where power analyses were based on the SCL-90. In the economic analyses focusing on the balance between costs and health outcomes, a Bayesian approach was applied that allows for probability statements (instead of significance testing) that are considered highly relevant and appropriate in the context of decision-making. CEACs were assessed to present information on the probability that CST will be

cost-effective for an increasing willingness to pay per unit of health outcome gained. Unfortunately, there is no international consensus on acceptable benchmarks for an additional unit of health outcome, neither for generic outcomes as the quality-adjusted life years (QALY) nor for more specific outcomes like the SCL-90 applied in the current study. Decision-makers will therefore have to interpret whether the indicated costs per additional unit of health outcome seem acceptable or not. In the current study, the probability that CST will be cost-effective increased from approximately 71 to 83%, depending on the decision-maker's willingness to pay (ranging from US$1 up to US$108 per additional unit of health respectively). Such outcomes seem to favour a wider implementation of the studied intervention. Also the results of various sensitivity analyses (including analyses conducted from a healthcare perspective) were strongly in favour of CST, thereby providing further support for a more widespread use of this intervention.

Results of longitudinal studies can be biased by missing data because of patients who drop-out or are lost to follow-up (29). Recently, the potential impact of missing data has also been acknowledged in the area of economic evaluation (30). In the current study, mixed models were used for longitudinal analyses of costs and health outcomes to deal with missing data. In these analyses, baseline results of the SCL-90 were included as covariate to correct for initial differences between groups. Comparing the overall outcomes of the current cost-effectiveness analysis with other economic studies on self-help treatments is complicated because of the limited follow-up period of published studies. The time horizon of available studies typically ranges from 3 to 8 months (7, 8). Conclusions based on such short study periods should be interpreted with some caution. Especially as initial positive consequences of psychiatric interventions may diminish over time (31). In the present study, costs of patients slowly increased again in the last 6 months of the study, after a drop in service use during the previous measurement period (which was most pronounced in the CST group). This increase in costs during the last 6 months may reflect fluctuations in healthcare utilization because of the chronic nature of the illness under study. In the light of observed changes over time, it seems that study periods of at least 12–18 months are essential for economic studies in the field of mental healthcare to adequately inform decision-makers.

The current study demonstrated that CST appears to be a cost-effective intervention that should be considered for a wider implementation in current healthcare systems. Moreover, CST could be applied to relieve the burden of many patients with depression and anxiety disorders who currently do not receive the necessary care because of a limited number of available therapists. Future economic studies focusing on self-help strategies (for instance in primary care patients with a first episode of depression) may profit from the suggestions made in the present paper, including the use of a non-inferiority design and a follow-up period of at least 12–18 months.

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References

1. Bebbington PE, Marsden L, Brewin CR. The need for psychiatric treatment in the general population: the Camberwell Needs for Care Survey. Psychol Med 1997;**27**:821–834.
2. Chisholm D, Sanderson K, Ayuso-Mateos JL, Saxena S. Reducing the global burden of depression. Population-level analysis of intervention cost-effectiveness in 14 world regions. Br J Psychiatry 2004;**184**:393–403.
3. Barrett B, Byford S, Knapp M. Evidence of cost-effective treatments for depression: a systematic review. J Affective Disord 2005;**84**:1–13.
4. Den Boer PCAM, Wiersma D, Van den Bosch RJ. Why is self-help neglected in the treatment of emotional disorders? A meta-analysis. Psychol Med 2004;**34**:959–971.
5. Simon GE, Ormel J, VonKorff M, Barlow W. Health care costs associated with depressive and anxiety disorders in primary care. Am J Psychiatry 1995;**152**:352–357.
6. Cuijpers P, Smit F, Oostenbrink J, de Graaf R, Ten Have M, Beekman A. Economic costs of minor depression: a population-based study. Acta Psychiatr Scand 2007;**115**:229–236.
7. Bower P, Richards D, Lovell K. The clinical and cost-effectiveness of self-help treatments for anxiety and depressive disorders in primary care: a systematic review. Br J Gen Pract 2001;**51**:838–845.
8. McCrone P, Knapp M, Proudfoot J et al. Cost-effectiveness of computerised cognitive-behavioural therapy for anxiety and depression in primary care: randomised controlled trial. Br J Psychiatry 2004;**185**:55–62.
9. Den Boer PCAM, Wiersma D, Ten Vaarwerk I, Span MM, Stant AD, Van den Bosch RJ. Cognitive self-therapy for chronic depression and anxiety. A multi-centre randomised controlled study. Psychol Med 2007;**37**:329–340.
10. Den Boer PCAM, Raes CHJM. Contact & relationship: 1) self-therapy theory manual; 2) manual for practicing cognitive self-therapy; 3) manual for self-assessment of the treatment process. Groningen: Stichting Inde Granaetappel, 1997.
11. McKinnon R, Yodofsky C. The psychiatric evaluation in clinical practice. Philadelphia: Lippincot, 1986.
12. Beck AT, Steer RA. Manual for the beck depression inventory. San Antonio: The Psychological Corporation, 1993.

13. Spielberger CD, Gorsuch RL, Lushene RE. STAI manual for the state-trait anxiety inventory. Palo Alto: Consulting Psychologists Press, 1970.
14. Wiersma D, De Jong A, Ormel J. The Groningen social disabilities schedule: development, relationship with I.C.I.D.H., and psychometric properties. Int J Rehabil Res 1988;**11**:213–224.
15. WHOQoL Group. Development of the World Health Organization WHOQoL-BREF Quality of Life Assessment. Psychol Med 1998;**28**:551–558.
16. Koopmanschap MA, Rutten FFH, Van Ineveld BM, Van Roijen L. The friction cost method for measuring indirect costs of disease. J Health Econ 1995;**14**:171–189.
17. Jakob-Tacken KHM, Koopmanschap MA, Meerding WJ, Severens JL. Correcting for compensating mechanisms related to productivity costs in economic evaluations of healthcare programmes. Health Econ 2005;**14**:435–443.
18. Stant AD, TenVergert EM, Groen H et al. Cost-effectiveness of the HIT programme in patients with schizophrenia and persistent auditory hallucinations. Acta Psychiatr Scand 2003;**107**:361–368.
19. Oostenbrink JB, Koopmanschap MA, Rutten FFH. Manual for cost studies, methods and standard prices for economic evaluation in health care [In Dutch: Handleiding voor kostenonderzoek, methoden en richtlijnprijzen voor economische evaluaties in de gezondheidszorg]. Amstelveen: Health Care Insurance Council, 2000.
20. Drummond MF, O'Brien BJ, Stoddart GL, Torrance GW. Methods for the economic evaluation of health care programmes. Oxford: Oxford University Press, 1997.
21. Efron B, Tibshirani RJ. An introduction to the bootstrap. New York: Chapman & Hall, 1993.
22. Black WC. The CE plane: a graphic representation of cost-effectiveness. Med Decis Making 1990;**10**:212–214.
23. Van Hout BA, Al MJ, Gordon GS, Rutten FF. Costs, effects and C/E ratios alongside a clinical trial. Health Econ 1994;**3**:309–319.
24. Fenwick E, O'Brien BJ, Briggs A. Cost-effectiveness acceptability curves – facts, fallacies and frequently asked questions. Health Econ 2004;**13**:405–415.
25. Serrano-Blanco A, Pinto-Meza A, Suárez D, Peñarrubia MT, Haro JM, ETAPS Group. Cost-utility of selective serotonin reuptake inhibitors for depression in primary care in Catalonia. Acta Psychiatr Scand 2006;**114**(Suppl. 432):39–47.
26. Wittchen HU. Generalized anxiety disorder: prevalence, burden, and cost to society. Depress Anxiety 2002;**16**:162–171.
27. Span MM, TenVergert EM, Van der Hilst CS, Stolk RP. Non-inferiority testing in cost-minimization studies: practical issues concerning power analysis. Int J Technol Assess Health Care 2006;**22**:261–266.
28. Briggs A. Economic evaluation and clinical trials: size matters. BMJ 2000;**321**:1362–1363.
29. Little RJA, Rubin DB. Statistical analysis with missing data. New York: John Wiley and Sons, 1987.
30. Briggs A, Clark T, Wolstenholme J, Clarke P. Missing…. presumed at random: cost-analysis of incomplete data. Health Econ 2003;**12**:377–392.
31. Cooper PJ, Murray L, Wilson A, Romaniuk H. Controlled trial of the short- and long-term effect of psychological treatment of post-partum depression. Br J Psychiatry 2003;**182**:412–419.