# Economic Evaluation of Schema Therapy and Clarification-Oriented Psychotherapy for Personality Disorders:
## A Multicenter, Randomized Controlled Trial

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## ABSTRACT

**Purpose:** To compare from a societal perspective the cost-effectiveness and cost-utility of schema therapy, clarification-oriented psychotherapy, and treatment as usual for patients with avoidant, dependent, obsessive-compulsive, paranoid, histrionic, and/or narcissistic personality disorder.

**Method:** A multicenter, randomized controlled trial, single-blind parallel design, was conducted between May 2006 and December 2011 in 12 Dutch mental health institutes. Data from 320 patients (diagnosed according to *DSM-IV* criteria) randomly assigned to schema therapy (n = 145), treatment as usual (n = 134), or clarification-oriented psychotherapy (n = 41) were analyzed. Costs were repeatedly measured during 36 months by interview and patient registries. Primary outcome measures were proportion of recovered patients as measured with the Structured Clinical Interview for *DSM-IV* Axis II Personality Disorders for the cost-effectiveness analysis, and quality-adjusted life-years (QALYs) for the cost-utility analysis. Bootstrap replications in the cost-effectiveness and the cost-utility planes were used to estimate the probability that one treatment was more cost-effective than the other. Mixed gamma regression on net monetary benefit for different levels of willingness to pay for extra effects was used as sensitivity analysis. Additional sensitivity analyses were done to assess robustness of the results.

**Results:** Due to higher clinical effects and lower costs, schema therapy was dominant over the other treatments in the cost-effectiveness analyses. Schema therapy has the probability of being the most cost-effective treatment (78% at €0 to 96% at €37,500 [$27,375] willingness to pay per extra recovery). Treatment as usual was more cost-effective than clarification-oriented psychotherapy due to lower costs. In the cost-utility analysis, schema therapy had a stable 75% probability of being cost-effective. Sensitivity analyses confirmed these findings.

**Conclusions:** The results support the cost-effectiveness of schema therapy but not of clarification-oriented psychotherapy.

**Trial Registration:** Netherlands Trial Register NTR566

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Prevalence of personality disorders fluctuates around 6% of the population.[1] Personality disorders are associated with high levels of social dysfunction, comorbidity with Axis I disorders, low quality of life, and a high economic[2,3] and disease burden.[4,5]

Studying the cost-effectiveness of personality disorder treatments is therefore important. Psychotherapy proved to be an effective and cost-effective intervention in earlier research.[6,7] Schema therapy proved to be cost-effective for borderline personality disorder,[8,9] which raised the hypothesis that schema therapy might also be cost-effective for other personality disorders. We conducted a multicenter, randomized controlled trial, including an economic evaluation from a societal perspective, comparing treatment as usual to schema therapy, for personality disorders. We also examined the cost-effectiveness of clarification-oriented psychotherapy (COP), but only in a small number of patients.

## METHOD

Details of the trial and the clinical effectiveness are described elsewhere[10,11] and summarized in the box in eAppendix 1.

### Participants and Study Design

Three hundred twenty patients were recruited in 12 mental health centers throughout the Netherlands between May 2006 and December 2011. Inclusion criteria were having an avoidant, dependent, obsessive-compulsive, paranoid, histrionic, and/or narcissistic personality disorder, assessed with the Structured Clinical Interview for *DSM-IV* Axis II Personality Disorders (SCID-II)[12,13] and being the principal diagnosis according to patient and staff. Additional inclusion criteria were age 18 to 65 years, being available for a 3-year study period, and being a native Dutch speaker. Exclusion criteria were IQ < 80; borderline, antisocial, schizoid, or schizotypal personality disorder (or subthreshold diagnosis); lifetime psychotic or bipolar disorder; immediate suicide risk; or substance dependence needing clinical detoxification.

After screening, patients provided written informed consent, completed a baseline assessment, and were randomly assigned. Because of limited availability of therapists, COP was delivered in only 3 sites.[11] Assessments occurred at 6, 12, 18, 24, and 36 months. Patients did not receive financial compensation for their participation in the study.

This study received approval from the Maastricht University Ethical Committee and was registered in the Netherlands Trial Register (NTR566).

**Clinical Points**

- Personality disorders are associated with high societal costs and are difficult to treat. Schema therapy, clarification-oriented psychotherapy, and treatment as usual were compared over a period of 3 years in 320 patients with cluster C, paranoid, histrionic, and narcissistic personality disorders.

- Schema therapy was the most cost-effective treatment, being both more effective and less costly when all costs were taken into account.

## Interventions

Both psychotherapies were individual outpatient and delivered weekly. All therapists received extensive training, yearly national supervision, and weekly peer-supervision. Both interventions had a standardized treatment protocol. Treatment duration was different: schema therapy consisted of 40 weekly sessions in year 1 and 10 booster sessions in year 2; COP was open-ended. Treatment as usual consisted of optimal care according to the Dutch multidisciplinary guidelines.[14]

## Cost Measures and Valuation

We identified health care costs, patient and family costs, and costs in other sectors. Since personality disorders can interfere with all life aspects, all costs were included (personality disorder–related or not). All societal costs incurred by participants within the study time frame were calculated, but an elaborated cost-of-illness study for these personality disorders was not within the study scope.

Health care costs comprised mental health care, medication, general practitioner visits, social work, emergency department, outpatient consults, admissions to general hospitals, formal care, community health service, centers for reproductive health and sexuality, family care, and alternative treatments. Mental health care was divided into intervention costs and other mental health care (see details in eAppendix 2). Patient and family costs comprised traveling costs, informal care, and out-of-pocket costs (alcohol, drugs, tobacco, and other costs). The latter proved highly relevant in earlier research on borderline personality disorder.[2] Costs in other sectors comprised losses in productivity from unpaid work (volunteer work and study), paid work (absenteeism and presenteeism), domestic activities, and judicial costs (police contacts). For paid work, short- and long-term absenteeism up to 2 years was taken into account as productivity losses.

Costs were assessed with structured cost interviews[15] by trained research assistants using a 3-month recall period. The only exception was in the case of potentially costly admissions to hospitals, where 6- or 12-month recall periods were used for intermittent and last assessments, respectively. To obtain cost estimates for periods not covered by the cost interview, data from each cost interview were interpolated.

As detailed information about intervention was collected, having assistants blinded to the psychotherapy was not possible. To assess presenteeism and compensation mechanisms of absenteeism, we used 2 modules of the PROductivity and DISease Questionnaire (PRODISQ).[16] To avoid relying solely on self-report for mental health care, information from the cost interview was combined with formal patient registries.

For valuation, overall, standard Dutch guideline prices were used.[17] If unavailable, average Dutch tariffs were used. Prices for over-the-counter medication, alcohol, drugs, tobacco, and other expenses were directly retrieved from the cost interview. For prescribed medication, prices were derived from the Dutch Pharmacotherapeutic Compass.[18] Productivity costs were valued according to the human capital approach.[19] We compensated elasticity for labor time versus labor productivity by using a 0.8[20] estimate. Shadow prices[17] were multiplied with absent hours to value volunteer work, study, and informal care.

Costs were expressed in euros for the year 2007, being the year in which most patients were included (the 2007 conversion rate to US dollars was 0.730, the rate used in this article). If necessary, costs were indexed by means of the consumer price indexes of Statistics Netherlands. As the duration of the study was 3 years, a discount rate of 4% was applied to account for cost increases over time.

## Outcome Measures

Primary clinical outcome was the proportion of patients recovered from personality disorders as measured by the SCID-II.[10] When follow-up SCID-II data were missing, recovery status was replaced by personality disorder–diagnosis information obtained from ADP-IV (Assessment of *DSM-IV* Personality Disorders Questionnaire[21]) data, measured at the last available intermittent assessment.[10] Both instruments have good psychometric qualities.[22,23]

The cost-utility analysis used quality-adjusted life-years (QALYs) gained during 3 years.[24] Utilities were calculated using the EuroQol EQ-5D-3L health status questionnaire,[25,26] which measures 5 dimensions (mobility, self-care, daily activities, pain/discomfort, and depression/anxiety).[27] The resulting profiles were converted in utilities based on the social tariffs, UK value set,[28] because of the better methodological characteristics and the greater external validity of the UK value set. QALYs were computed by the area-under-the-curve method.

## Data Analysis

Cost-effectiveness and cost-utility analyses were used to assess the value for money of treatments in terms of effectiveness measures. In general, for cost-effectiveness analyses, disorder-specific measures are used, and for cost-utility analyses, generic utility measures, such QALYs, are used. Analyses were performed according to the intention-to-treat principle, using all (N = 320) available data (of the 323 randomized, 2 patients moved away before randomization and 1 treatment-as-usual patient withdrew consent[10]). For base-case analyses, intermittent missing data were imputed using mean scores of previous and next assessments. Seventeen patients missed 1 intermittent cost interview, while 1 patient missed cost data at 12 and

**Table 1. Mean Costs at Baseline and at 36 mo, QALY, and Effectiveness Outcomes (N = 320)[a]**

| | Schema Therapy (n = 145) | | Clarification-Oriented Psychotherapy (n = 41) | | Treatment as Usual (n = 134) | |
|---|---|---|---|---|---|---|
| | Mean, € | 95% CI | Mean, € | 95% CI | Mean, € | 95% CI |
| **Baseline costs[b]** | | | | | | |
| Health care costs | 1,586.72 | 708–3,172 | 1,790.32 | 1,000–2,828 | 4,022.04 | 1,392–7,404 |
| Patient and family costs | 2,774.48 | 1,664–4,336 | 1,812.32 | 604–4,020 | 2,479.60 | 1,680–3,416 |
| Other costs | 7,597.32 | 6,320–8,928 | 8,939.00 | 6,328–11,960 | 7,022.80 | 5,644–8,332 |
| Societal costs | 11,958.52 | 9,704–14,548 | 12,541.60 | 8,840–17,440 | 13,524.44 | 10,248–17,660 |
| **Costs at 36 mo[c]** | | | | | | |
| Health care costs | 7,503.00 | 6,627–8,545 | 13,522.00 | 8,943–20,321 | 8,689.00 | 6,903–10,736 |
| Patient and family costs | 5,871.00 | 4,475–7,526 | 2,322.00 | 1,667–3,069 | 5,810.00 | 4,018–8,195 |
| Costs in other sectors | 10,430.00 | 8,633–12,277 | 14,226.00 | 9,520–19,687 | 11,834.00 | 9,325–14,619 |
| Societal costs | 23,805.00 | 21,014–26,791 | 30,070.00 | 22,618–38,732 | 26,333.00 | 22,384–30,605 |
| **Costs per cost item at 36 mo** | **Mean, €** | **SD** | **Mean, €** | **SD** | **Mean, €** | **SD** |
| Health care costs | | | | | | |
| Mental health care | 5,823.43 | 4,611.38 | 10,547.88 | 18,427.60 | 5,621.21 | 6,371.25 |
| Intervention | 4,313.33 | 1,745.17 | 5,705.73 | 3,311.46 | 0 | |
| Other mental health care[d] | 1,510.10 | 4,345.42 | 4,842.15 | 17,655.01 | 5,621.21 | 6,371.25 |
| Medication | 505.22 | 918.64 | 644.38 | 849.26 | 608.96 | 1,024.65 |
| Prescribed medication | 487.39 | 910.55 | 619.68 | 842.65 | 594.28 | 1,022.02 |
| Over-the-counter medication | 17.83 | 83.06 | 24.70 | 65.90 | 14.68 | 37.24 |
| General practitioner[e] | 190.09 | 315.15 | 200.84 | 209.35 | 145.10 | 212.82 |
| Social work | 53.30 | 500.17 | 53.78 | 202.80 | 27.42 | 122.31 |
| First aid station | 15.27 | 45.12 | 49.82 | 133.23 | 38.44 | 133.51 |
| Outpatient consults general hospital | 227.44 | 670.72 | 222.98 | 609.69 | 232.68 | 831.83 |
| General hospital stay | 162.70 | 872.87 | 441.46 | 1,746.61 | 820.20 | 5,234.16 |
| Community health service | 6.49 | 33.13 | 0.93 | 5.98 | 2.46 | 20.55 |
| Center for reproductive health and sexuality | 0.63 | 7.60 | 0 | | 1.71 | 19.78 |
| Family care | 48.39 | 421.20 | 58.18 | 219.01 | 34.23 | 241.35 |
| Formal care[f] | 153.08 | 740.33 | 897.85 | 2,766.39 | 899.97 | 3,486.88 |
| Alternative treatments[g] | 317.13 | 843.17 | 404.22 | 1,089.90 | 256.44 | 625.15 |
| Patient and family costs | | | | | | |
| Traveling | 351.53 | 305.00 | 432.95 | 241.70 | 347.76 | 432.21 |
| Informal care | 2,282.94 | 6,841.96 | 693.65 | 1,976.69 | 3,279.46 | 11,839.60 |
| Out-of-pocket costs | 3,237.02 | 6,746.11 | 1,195.19 | 1,277.19 | 2,183.10 | 2,900.94 |
| Alcohol | 852.86 | 1,426.73 | 552.68 | 812.26 | 784.38 | 995.87 |
| Drugs | 79.87 | 615.42 | 7.01 | 31.87 | 171.63 | 963.11 |
| Tobacco | 1,078.68 | 1,573.87 | 601.11 | 973.34 | 823.85 | 1,517.77 |
| Other expenses[h] | 1,225.61 | 6,474.74 | 34.39 | 212.35 | 403.24 | 1,458.34 |
| Costs in other sectors | | | | | | |
| Productivity costs[i] | 6,782.72 | 10,287.41 | 8,771.08 | 13,170.98 | 7,576.25 | 12,020.97 |
| Absenteeism without compensation | 4,664.72 | 9,278.39 | 7,260.84 | 11,887.98 | 6,402.99 | 11,857.49 |
| Absenteeism with compensation[j] | 835.53 | 3,420.05 | 894.07 | 2,859.90 | 835.79 | 3,277.59 |
| Presenteeism | 2,118.00 | 4,366.51 | 1,510.24 | 3,559.39 | 1,173.27 | 3,177.33 |
| Unpaid work | 127.72 | 595.59 | 730.22 | 4,366.28 | 181.26 | 751.13 |
| Absenteeism from voluntary work | 44.87 | 184.36 | 43.81 | 134.44 | 158.60 | 742.04 |
| Absenteeism from study | 82.85 | 572.84 | 686.40 | 4,371.27 | 22.65 | 144.24 |
| Losses in domestic activities[k] | 3,509.54 | 5,105.44 | 4,723.82 | 7,193.36 | 4,045.69 | 7,651.82 |
| Police | 10.36 | 81.84 | 0.51 | 3.27 | 30.99 | 134.81 |
| | | | | | | *(continued)* |

18 months. When patients were lost to follow-up due to dropout, data were imputed by the last observation carried forward (LOCF) method. Ten patients did not start treatment but were included in the analyses. To estimate their mental health consumption, we imputed the average mental health consumption of the treatment arm to which they were randomized. The percentage of "missings" varied from 0% (baseline) to 32% (3-year assessment), and was 22% overall.

Group differences in clinical effect (proportion of recovery) and quality of life were analyzed with logistic regression and nonparametric Kruskal-Wallis tests at the $P < .05$ significance level. As is typical in economic evaluations, the presence of relatively few patients with high costs and the absence of negative costs required a departure from statistical analyses that assume a normal distribution for cost data. Bootstrapping is a convenient nonparametric alternative that allows the

estimation of the sampling distribution by simulating many times the procedure of sampling with replacement from the original data.[28] This estimated sampling distribution is then used to construct confidence intervals around mean costs. Five thousand bootstrap simulations were performed to estimate sample uncertainty.

Incremental cost-effectiveness is displayed in cost-effectiveness planes, in which each data point relates to the difference in bootstrapped cost-effectiveness pairs between 2 treatments (see Figure 2). Cost-effectiveness was assessed by investigating the percentage of data points falling below a specific value for the willingness-to-pay for 1 additional unit of effect (which corresponds to a hypothetical diagonal line through the origin in the cost-effectiveness plane). Cost-effectiveness was assessed for a range of willingness-to-pay values, and the resulting probabilities that the treatment is

**Table 1 (continued). Mean Costs at Baseline and at 36 mo, QALY, and Effectiveness Outcomes (N = 320)[a]**

| | | Schema Therapy (n = 145) | Clarification-Oriented Psychotherapy (n = 41) | Treatment as Usual (n = 134) | |
|---|---|---|---|---|---|
| **Clinical outcome, % recovered** | | % | % | % | |
| Recovery from PD diagnosis SCID-II/ADP-IV | | 81.4 | 51.2 | 51.8 | |
| **Utility scores** | **Measurement** | **Median** | **Median** | **Median** | |
| EQ-5D-3L UK Dolan tariff | Baseline | 0.73 | 0.69 | 0.69 | |
| | 6 mo | 0.76 | 0.73 | 0.73 | |
| | 12 mo | 0.80 | 0.73 | 0.76 | |
| | 18 mo | 0.77 | 0.80 | 0.80 | |
| | 24 mo | 0.80 | 0.80 | 0.80 | |
| | 36 mo | 0.80 | 0.80 | 0.76 | |
| EQ-5D-3L Dutch Lamers tariff | Baseline | 0.72 | 0.69 | 0.69 | |
| | 6 mo | 0.77 | 0.72 | 0.73 | |
| | 12 mo | 0.77 | 0.72 | 0.77 | |
| | 18 mo | 0.77 | 0.81 | 0.78 | |
| | 24 mo | 0.81 | 0.81 | 0.81 | |
| | 36 mo | 0.81 | 0.81 | 0.81 | |
| **QALY[l]** | **Valuation** | **Median** | **Median** | **Median** | **P** |
| Base-case | UK Dolan tariff | 2.34 | 2.23 | 2.23 | .51[m] |
| Sensitivity | Dutch Lamers tariff | 2.31 | 2.26 | 2.26 | .54[m] |
| | | **Mean** | **Mean** | **Mean** | **P** |
| Sensitivity | Multilevel UK Dolan tariff | 2.43 | 2.31 | 2.39 | .24 |

[a]Costs are in euros. The conversion rate from euros (€) to US dollars ($US) in 2007 was 0.730.
[b]Time horizon of baseline costs was 3 mo.
[c]The upper and lower confidence limits are the 2.5th and 97.5th percentile based on 10,000 bootstrap replications.
[d]Comprises individual and group psychotherapy, individual and group counseling, psychiatric consults, different forms of day treatment, contacts with crisis service, psychiatric intensive home care, living under supervision, self-employed psychologist, day activity center, sheltered home, psychiatric hospital stay, company doctor, work reintegration projects, and Internet therapy.
[e]Consults at general practitioner office, home visits, and telephonic consults.
[f]Domestic help.
[g]Manual therapy, acupuncture, osteopathy, natural medicine, paramedical care, and alternative healing.
[h]Consists mostly of impulsive shopping, binge eating, and financial debts.
[i]In the sum of productivity costs and societal costs, only absenteeism costs without compensation and presenteeism are included.
[j]Meaning that productivity hours lost did not lead to productivity costs because lost hours were compensated by self or others in regular work time.
[k]Doing housekeeping and shopping for groceries, raising kids, gardening, and caring for pets.
[l]Maximum number of QALYs gained is 3.
[m]Kruskal-Wallis test.
Abbreviations: ADP-IV = Assessment of *DSM-IV* Personality Disorders Questionnaire, EQ-5D = EuroQol EQ-5D-3L health status questionnaire, PD = personality disorder, QALY = quality-adjusted life-year, SCID-II = Structured Clinical Interview for *DSM-IV* Axis II Personality Disorders, UK = United Kingdom.

cost-effective were plotted in cost-effectiveness acceptability curves (CEACs) (see Figure 3).

To test for robustness of findings, sensitivity analyses were performed. Except for the first sensitivity analysis, all analyses were executed on the data sets where missings were imputed with the LOCF method, and bootstrapped costs were included. For the first sensitivity analysis, we calculated individual net monetary benefit for varying levels of λ (willingness to pay) at each assessment. We then used mixed gamma regression multilevel analysis with transformed net monetary benefit so that the dependent variable was skewed to the right and > 0, without replacing missing data, as mixed regression deals with missings under certain assumptions. The fixed part consisted of baseline severity, condition, therapist cohort, assessment, and 2- and 3-way interactions between the last 3 predictors; the random part consisted of participant and center intercepts. This was the same model used in the clinical effectiveness study.[10] The (1-sided) *P* value corresponding to incremental net monetary benefit > 0 was used in CEACs for the multilevel analyses. For the second sensitivity analysis, we analyzed only study completers (participants missing no assessment: 97 schema therapy, 31 COP, 72 treatment as usual). For the third, we corrected for baseline differences

in costs and utilities. Other sensitivity analyses used a more stringent criterion for clinical effectiveness (recovered when no longer meeting subthreshold diagnosis), applied the Dutch tariff[29] for valuing the EQ-5D-3L, and varied societal costs by correcting for compensation mechanisms in calculating absenteeism costs.

The incremental cost-effectiveness and cost-utility ratios were graphically plotted in cost-effectiveness planes and CEACs.

## RESULTS

### Participants

Three hundred twenty patients were randomly assigned to schema therapy (n = 145), COP (n = 41) or treatment as usual (n = 134). Three additional participants were not included in this N = 320; 2 moved away before they learned of their randomized treatment condition, and 1 withdrew consent. Baseline characteristics are shown in eAppendix 3. There were no significant differences in baseline characteristics except in secondary diagnosis of substance abuse, of which frequency was too low in the treatment-as-usual group to use it as a covariate.

**Figure 1. Total Mean Costs Over Time (3 y), Stratified per Treatment Group[a]**
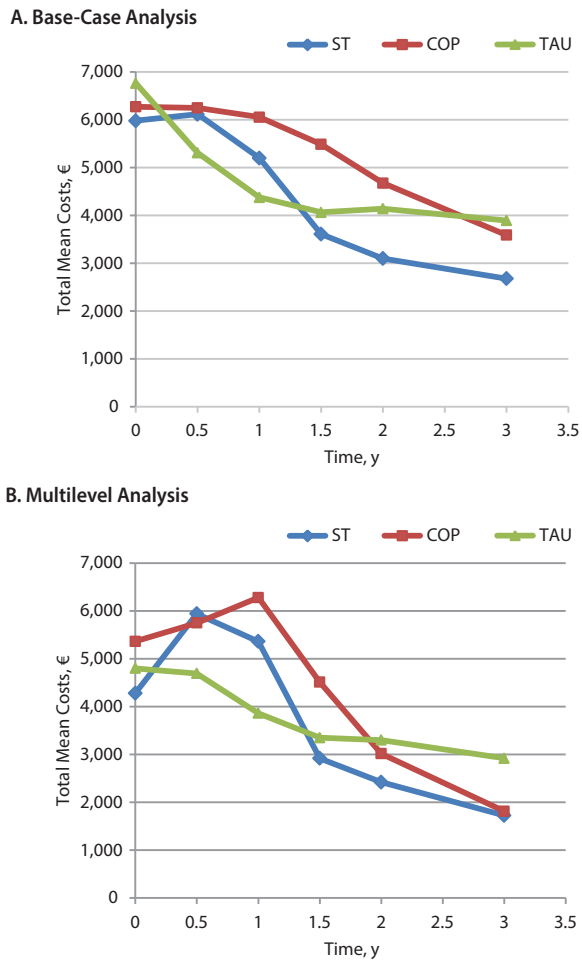


A. Base-Case Analysis

B. Multilevel Analysis

[a]Costs are in euros. The conversion rate from euros (€) to US dollars ($US) in 2007 was 0.730.
Abbreviations: COP = clarification-oriented psychotherapy, ST = schema therapy, TAU = treatment as usual.

### Costs

Mean volumes of resource use, stratified per treatment arm, are shown in eAppendix 2. Uncorrected costs of different cost items over 36 months are summarized in Table 1. COP showed the highest societal mean costs (€30,070 [$21,951]) versus schema therapy (€23,805 [$17,378]) and treatment as usual (€26,333 [$19,223]). In all treatment arms, at least 65% of health care costs consisted of mental health care costs. The latter were lowest in treatment as usual (€5,621 [$4,103]) and highest in COP (€10,548 [$7,700]). COP was high in intervention costs (€5,706 [$4,165]) and other mental health care costs (€4,842 [$3,535]). Patient and family costs were comparable in schema therapy and treatment as usual (€5,871 [$4,286] and €5,810 [$4,241], respectively) and lower in COP (€2,322 [$1,695]). With respect to costs in other sectors, whether or not taking compensation mechanisms into account in calculating absenteeism yielded substantial differences in eventual costs (for productivity losses, costs were reduced from €6,110 [$4,460] [mean of 3 groups] to €855 [$624]). Overall, COP had the highest

costs in productivity costs, unpaid work (volunteer work and study), and domestic activities; schema therapy had the lowest costs. The relatively high costs of domestic costs in each arm (about 15% of the societal costs) might result from the fact that more than half of all patients did not have a paying job.

When analyzing data with mixed regression, societal costs did not differ significantly between conditions ($P > .14$). Mean costs were lower in each condition compared to the base-case analysis (probably relating to weaker effects of extreme costs in the gamma regression, and the back-transformation of estimated means in the gamma regression model with log-link) and showed the following pattern: schema therapy (€17,734 [$12,946]) < COP (€20,539 [$14,993]) < treatment as usual (€20,742 [$15,142]).

Figure 1A and 1B depict the development over time of mean costs per treatment arm in base-case and multilevel analysis, respectively. As can be seen in Figure 1A, costs in schema therapy and COP increase or stay nearly equal in the first half year, mainly due to increased treatment costs, and then decrease in years 2 and 3. Costs in treatment as usual develop more gradually, with fewer costs in year 1, but maintaining nearly equal costs in the following years. Cost development over time based on mixed regression estimates (Figure 1B) mainly follows the same pattern. Different is that COP shows an increase in costs comparable to schema therapy in year 1, while baseline costs in treatment as usual are lower (probably the result of controlling for covariates, taking center as a level in the model, and handling missings differently).

### Effects

*Clinical effectiveness.* The proportion of recovered patients after 3 years was 81.4% in schema therapy, 51.2% in COP, and 51.8% in treatment as usual (Table 1). Controlling for baseline severity, center, and cohort effect, mixed logistic regression analyses showed clinical superiority of schema therapy over the other treatments, which did not differ.[10,11]

*QALYs.* Starting from baseline differences, all arms made progression, especially in the early stages (before 18 months) (see Table 1). QALY comparisons between arms, based on both UK tariff and Dutch tariff, yielded no significant differences between arms, with the number of QALYs gained in schema therapy being slightly higher (around 2.34) than in the other arms (around 2.23). Estimates of QALY based on multilevel analyses were slightly higher (between 2.31 and 2.43), while the difference between schema therapy and treatment as usual was smaller compared to base-case analysis. No between-group differences emerged ($P > .24$).

### Cost-Effectiveness: Base-Case and Sensitivity Analyses

Results are summarized in eAppendix 4. In Figure 2A, bootstrapped costs and clinical effects (recovered patients) of treatment comparisons are plotted in cost-effectiveness planes. The cloud shows that schema therapy is more effective than treatment as usual and is less costly: 83% of bootstrapped pairs are in the dominant southeast quadrant

**Figure 2. Base-Case Analyses: Bootstrapped Costs and Effects for Costs per Recovered Patient and per QALY[a,b]**



Costs per Recovered Patient

A. ST vs TAU—Clinical Effect

B. COP vs TAU—Clinical Effect

Costs per QALY

C. ST vs TAU—QALY
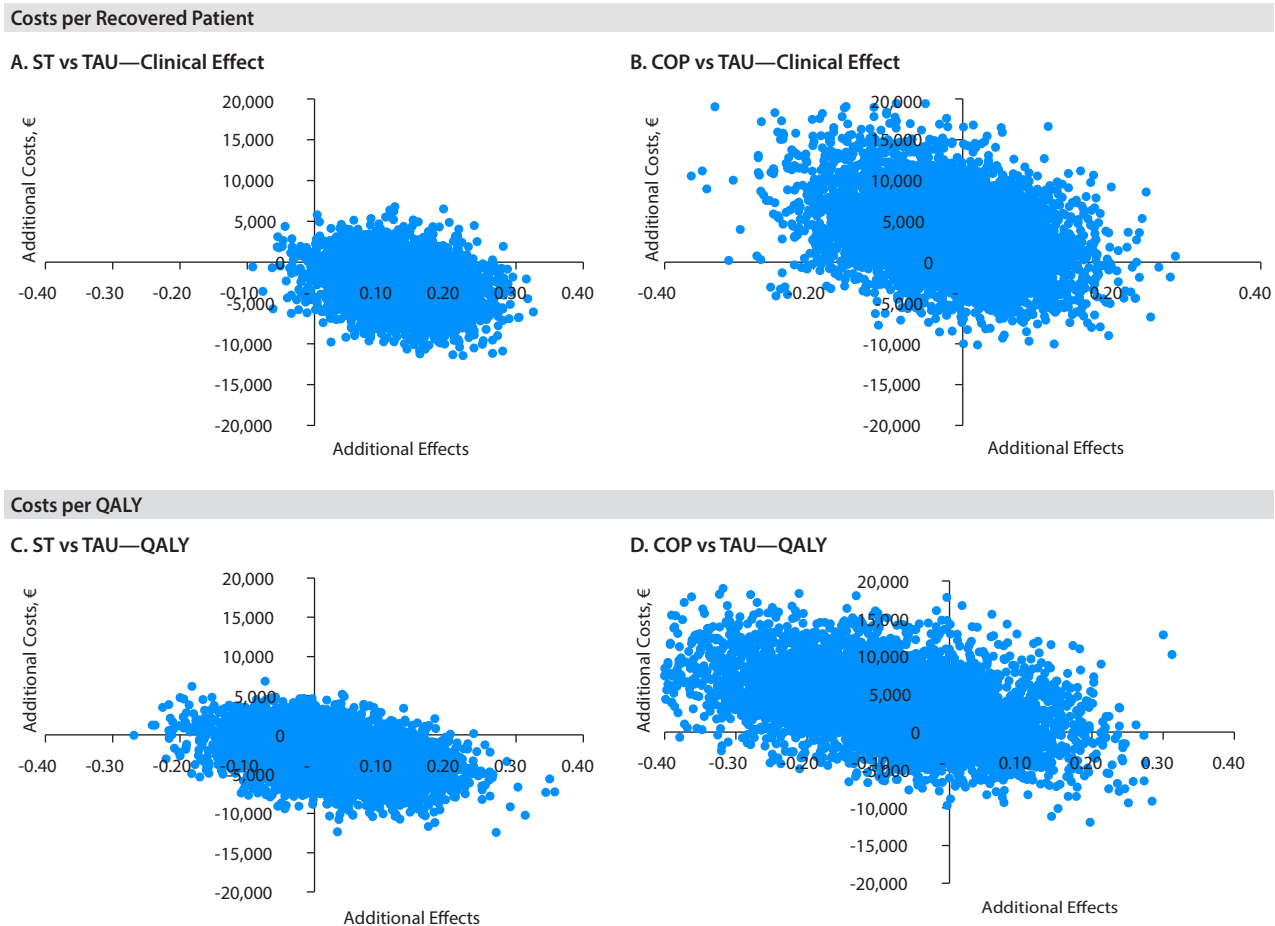
D. COP vs TAU—QALY

[a]5,000 bootstrapped cost-effectiveness pairs are plotted for incremental cost-effectiveness (A and B) and cost-utility (C and D) of ST vs TAU (A and C) and COP vs TAU (B and D). Additional costs are on the y-axis; additional effects on the x-axis.
[b]Costs are in euros. The conversion rate from euros (€) to US dollars ($US) in 2007 was 0.730.
Abbreviations: COP = clarification-oriented psychotherapy, QALY = quality-adjusted life-year, ST = schema therapy, TAU = treatment as usual.

(ie, more effects, fewer costs). The majority of replications of the COP versus treatment-as-usual comparison (Figure 2B) lies in the northwest quadrant (50%), which represents inferiority of COP (ie, more costs, fewer effects).

Bootstrapped costs and effects of cost per QALY (cost-utility analysis) are shown in Figure 2C and 2D. As can be seen, the cloud in the schema therapy versus treatment-as-usual comparison shifts to the left, meaning that schema therapy's superiority is somewhat diminished. However, 57% of the bootstrap replications still lie in the dominant quadrant. In the COP versus treatment-as-usual comparison, replications also shift to the left, indicating cost-utility superiority of treatment as usual over COP.

The CEACs of the corresponding base-case cost-effectiveness analyses are plotted in Figure 3A and 3B.

When costs per recovered patient are compared (Figure 3A), schema therapy has the probability of being the most cost-effective treatment (at least 78%), increasing with $\lambda$ up to 96% at a threshold value of €37,500 ($27,375). COP has the lowest chance of being most cost-effective, with a 6% maximal probability. Treatment as usual has a 16%

probability of being superior at a €0 threshold value, but this probability diminishes when the value is increased. From around €12,500 ($9,125) upward, the difference between probabilities of COP and treatment as usual is negligible. Figure 3B shows the CEAC for the cost-utility analysis and shows that the probabilities stay more or less the same independent of $\lambda$. Schema therapy has the highest probability of being cost-effective (71%–78%), COP the least (6%–7%).

To obtain cost-effectiveness acceptability curves for one-by-one treatment comparisons, we plotted probabilities of one-by-one comparisons in a CEAC frame (Figure 4A). In terms of clinical cost-effectiveness (Figure 4A), schema therapy is dominant over COP ($\geq 93\%$) independent from $\lambda$, while the dominance of schema therapy over treatment as usual sharply increases with $\lambda$. No evidence for cost-effectiveness of COP was found. When looking at cost-utility (Figure 4B), the comparisons resemble those of the clinical cost-effectiveness analyses, except that schema therapy is dominant over treatment as usual at around 75% without increase with $\lambda$.
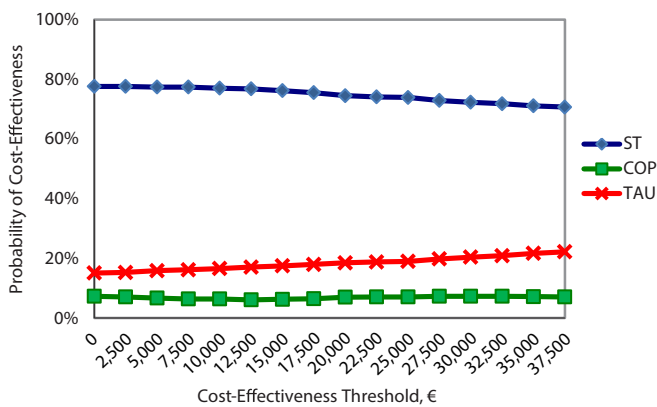
## Figure 3. Base-Case Analyses: Cost-Effectiveness Acceptability Curve of Costs per Recovered Patient and Costs per QALY[a,b]

### A. Costs per Recovered Patient
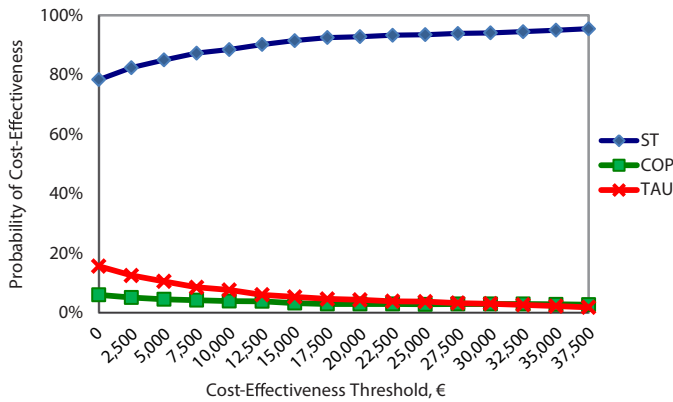


### B. Costs per QALY



[a]The curves indicate the probability of each single treatment plotted against the 2 others as being the most cost-effective option, given various threshold values (x-axis).

[b]Costs are in euros. The conversion rate from euros (€) to US dollars ($US) in 2007 was 0.730.

Abbreviations: COP = clarification-oriented psychotherapy, QALY = quality-adjusted life-year, ST = schema therapy, TAU = treatment as usual.

Overall, sensitivity analyses (eAppendix 4 and Figure 4C and 4D [for multilevel analysis results]) confirmed the base-case findings, indicating robustness of findings.

## DISCUSSION

The cost-effectiveness analyses indicated that schema therapy tends to be the optimal choice regardless of the amount of money that society is willing to pay per additional recovered patient. Considering cost-utility, schema therapy's dominance over the other treatments was less pronounced, showing a stable 75% probability of being cost-effective irrespective of the threshold value for an additional QALY. In all analyses, COP was inferior to treatment as usual, being equally effective and more costly. When closely looking at the division of costs, it appeared that costs for not only intervention but also other mental health care resources were high in COP. Interestingly, costs for informal care were lower in COP compared to the other conditions, suggesting that COP patients make more use of formal health care than informal care.

Results were overall confirmed by sensitivity analyses, indicating robustness of findings. When looking at our results in light of previous studies, we replicated the finding that schema therapy is a cost-effective treatment for personality disorders.[9]
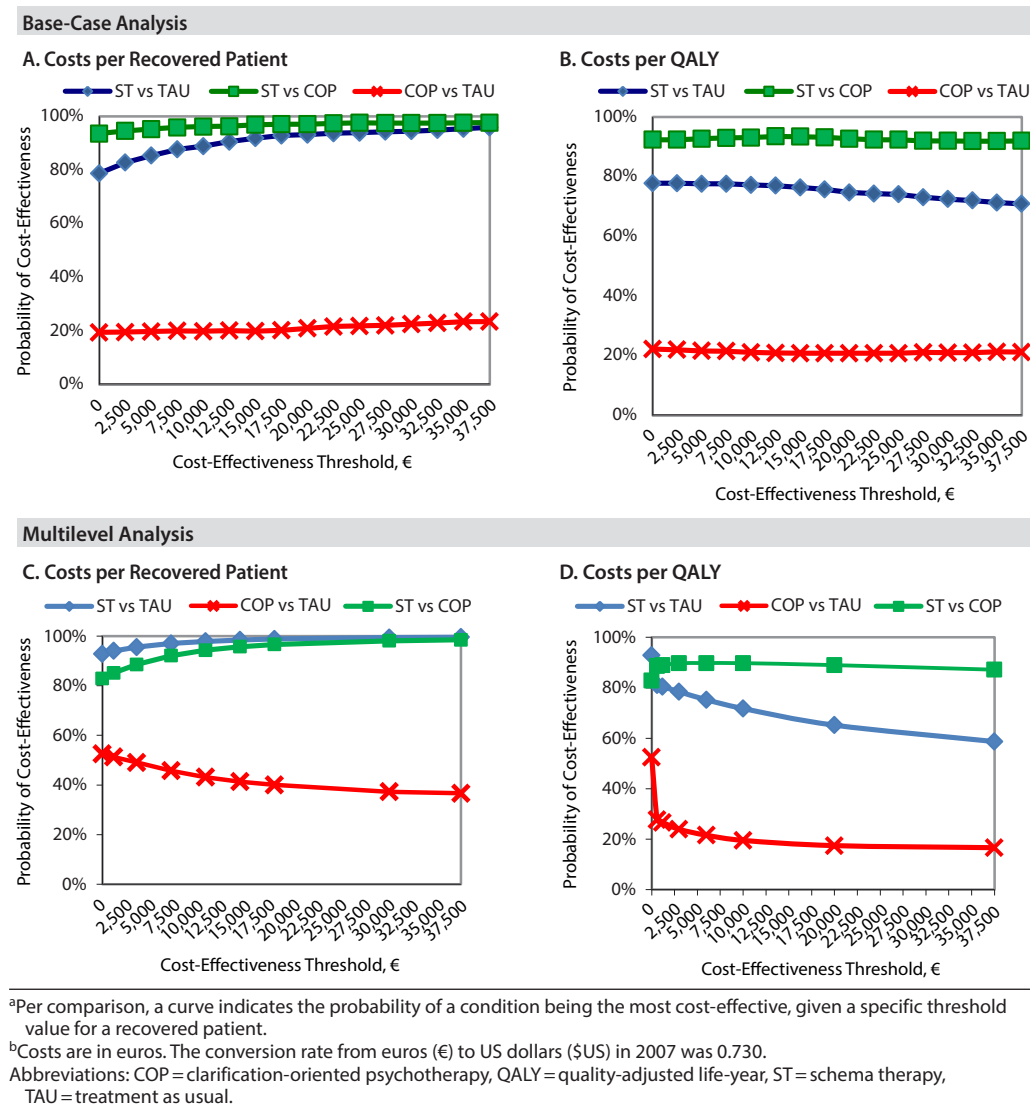
That the economic evaluation favored schema therapy more in terms of clinical outcome than in quality-of-life measures has been found before.[7,9] An explanation for this phenomenon could be that EQ-5D-3L focuses mainly on physical dimensions. Although quality-of-life instruments enable comparison across diseases and previously have been reasonably responsive in borderline personality disorder samples,[30,31] they probably are less sensitive and responsive for this population.[32]

### Methodological Considerations

Our study has several limitations. First, approximately 20% of assessments had missing data. To prevent bias caused by deletion of these cases, we used intent-to-treat analyses. In our base-case analysis, we used LOCF and individual mean imputation to estimate missings. As this option has been criticized,[33] we compared results to those of mixed regression, which takes all available data into account and yields valid effect estimates under certain assumptions on missings.[34] With mixed regression, we found even stronger evidence for cost-effectiveness of schema therapy, whereas cost-utility findings for the therapies were quite similar. Second, since many cost data were gathered through self-report, their validity could be questioned. Yet, 65% of total costs was double-checked with patient registry data. Moreover, a recent systematic review supported the use of self-report instruments and showed that these obtain sufficient agreement with databases.[35] Third, we encountered obstacles in trying to value costs that are typical for patients with personality disorders, notably, production losses (such as working too many hours due to perfectionism, presenteeism, influence on coworkers) and patient and family costs (such as impulsive spending). Although techniques are fine-tuned more and more, challenges remain related to the specific nature of personality disorders. For instance, instead of experiencing reduced productivity, an obsessive-compulsive personality disorder patient might suffer from working many hours extra because of perfectionism. Another example concerns calculating presenteeism costs, in which patients were asked to indicate on a 1-to-10 scale how they perceived their own work functioning on the last day before feeling ill. Although this rating system suits many "physical" diseases (where people function optimally until the moment they stop working due to acute illness), it might be less feasible to capture the instable working pattern often seen in personality disorders. Next to that, patients with personality disorder put a high burden on colleagues (eg, conflicts, inability to finish work). To date, no instruments exist to measure this burden. Moreover, a recent systematic study[36] in Europe revealed that in

**Figure 4. Cost-Effectiveness Acceptability Curves of Condition Comparisons: Base-Case and Multilevel Analyses[a,b]**

[a]Per comparison, a curve indicates the probability of a condition being the most cost-effective, given a specific threshold value for a recovered patient.
[b]Costs are in euros. The conversion rate from euros (€) to US dollars ($US) in 2007 was 0.730.
Abbreviations: COP = clarification-oriented psychotherapy, QALY = quality-adjusted life-year, ST = schema therapy, TAU = treatment as usual.

personality disorders, productivity costs seem to account for a great amount of total costs. Many patients in our trial reported huge out-of-pocket costs (eg, impulsive spending). No valuation mechanisms yet exist that can reliably estimate these costs; hence, our study also suffers from this drawback.

The fact that productivity losses were only taken into account for short- and long-term absenteeism up to 2 years implies that no productivity losses were taken into account for work disability longer than 2 years. This can be considered a limitation of the study, since previous research found that costs due to work disability are an important driver of total societal costs for patients with borderline personality disorder.[2,37] Further, although the time horizon of our trial was 3 years, this might be too short to measure long-term change in personality, QALYs, and costs. Other limitations include the possible overestimation of costs (due to taking all costs into account); the fact that research assistants who took cost-interviews were not blinded; the large proportion of cluster-C patients; limiting conclusions

for paranoid, histrionic, and narcissistic patients; and the inability to generalize study findings to those personality disorders that were not targeted in the study frame. As can be seen from Table 1, there is a huge difference in total societal costs depending on whether or not absenteeism is corrected for compensation. In our base-case analyses, we decided to include all production costs, whether they were compensated for or not. In our view, assuming that compensating equals no costs is unrealistic, as employers bear negative consequences from any absenteeism.

## CONCLUSIONS AND RECOMMENDATIONS

This report is the first economic evaluation to study schema therapy and clarification-oriented psychotherapy for patients with cluster C, paranoid, narcissistic and histrionic personality disorders. Findings suggest that schema therapy is cost-effective. As one single trial is never enough for balanced decision making, results should be replicated.

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Supplementary material follows this article.

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# Supplementary Material

**Article Title:** Economic Evaluation of Schema Therapy and Clarification-Oriented Psychotherapy for Personality Disorders: A Multicenter, Randomized Controlled Trial

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## List of Supplementary Material for the article

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Appendix 1. Box: Details and results of clinical effectiveness study

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**Personality disorders studied and distribution across treatments**
The majority of primary personality disorder diagnoses included in this study was cluster-C PD's (90.3% in ST, 87.7% in COP, 90.2% in TAU). Among cluster-C, avoidant PD was the most prevalent, followed by obsessive-compulsive and dependent PD. There were no group differences in the distribution of primary PD diagnoses.

**Interventions studied**
Schema therapy and clarification-oriented psychotherapy both are based on schema-conceptualizations and the idea that rigid characteristics of PDs are resulting from a negative childhood environment. Apart from sharing similar underlying theoretical constructs, there are important differences between these two treatments.
*Schema therapy (ST).* This is an integrative therapy, combining cognitive, experiential, behavioral and interpersonal techniques. Emphasis is on the mode model ('ego-states'), the therapeutic relationship, processing negative childhood experiences and experiential work to facilitate emotional change.
*Clarification-oriented psychotherapy (COP).* This originates in client-centered psychotherapy, stressing the dysfunctional interaction behavior and helping patients to discover these dysfunctional patterns themselves. Primary channel of change is through insight.
*Treatment-as-usual (TAU)* In the Netherlands, treatment as usual is primarily psychological treatment, varying from supportive low-frequency contacts to advanced psychotherapy. All primary treatment as usual was psychological treatment (insight-oriented psychotherapy, 42%; supportive therapy, 32%; cognitive-behavioral therapy, 19%; eye movement desensitization and reprocessing, 1.5%). 5.5% did not take up the indicated treatment.

**Results on clinical effectiveness**
A significantly greater proportion of patients recovered in schema therapy compared with treatment as usual and clarification-oriented psychotherapy. Clarification-oriented psychotherapy and treatment as usual did not differ. Findings did not vary with specific personality disorder diagnosis. Dropout was lower in the schema therapy and clarification-oriented psychotherapy conditions than in TAU. All treatments showed improvements on secondary outcomes. Schema therapy patients had less depressive disorder and higher general and social functioning at follow-up. Less ST-patients were in treatment at 3-year follow-up than in the other conditions. While interview-based measures demonstrated significant differences between treatments, differences were not found with self-report measures.

## Appendix 2. Volumes of cost items during 36 months (n=320)

| Cost items [units] | ST (n=145) m (sd); N | COP (n=41) m (sd); N | TAU (n=134) m (sd); N | Source prices |
|---|---|---|---|---|
| **Mental health care** | | | | |
| Individual psychotherapy [N sessions] | 40.63 (17.34); 143 | 54.15 (29.89); 41 | 23.40 (28.82); 98 | 1 |
| Individual treatment, non-psychotherapy [N sessions] | 3.06 (14.73); 20 | 4.41 (12.28); 8 | 6.67 (15.69); 41 | 1 |
| Group psychotherapy [N sessions] | 0.28 (2.95); 2 | 0.07 (0.47); 1 | 6.97 (21.54); 21 | 1 |
| Group treatment, non-psychotherapy [N sessions] | 0.24 (1.43); 5 | 0.02 (0.16); 1 | 1.51 (5.56); 15 | 1 |
| Psychiatrist [N sessions] | 2.63 (7.11); 41 | 3.93 (6.17); 20 | 3.01 (6.57); 43 | 1 |
| Day treatment, psychotherapeutic, full day [N days] | 0.89 (10.55); 2 | 1.02 (6.56); 1 | 2.02 (18.62); 2 | 1 |
| Day treatment, psychotherapeutic, half day [N days] | 0.25 (2.99); 1 | 4.98 (22.61); 2 | 1.37 (15.30); 2 | 1 |
| Day treatment, non-psychotherapeutic, half day [N days] | 0.01 (0.17); 1 | 0 | 0 | 1 |
| Crisis service [N consults] | 0.08 (0.54); 4 | 0.02 (0.16); 1 | 0.13 (0.83); 6 | 1 |
| Psychiatric intensive home care [N sessions] | 0.17 (1.99); 1 | 0.10 (0.62); 1 | 0.64 (3.75); 4 | 1 |
| Living under supervision [N sessions] | 1.43 (13.44); 2 | 0 | 0 | 1 |
| Self-employed psychologist [N sessions] | 0.74 (5.27); 5 | 0 | 0.19 (1.39); 4 | 2 |
| Internet therapy [N sessions] | 0 | 0 | 0.72 (6.54); 2 | 3 |
| Day activity centre [N days] | 5.94 (45.98); 5 | 0 | 9.11 (64.02); 6 | 1 |
| Sheltered home [N days] | 0 | 9.61 (61.53); 1 | 0 | 1 |
| Psychiatric hospital stay [N days] | 0.61 (5.69); 3 | 6.93 (30.84); 3 | 0.60 (6.65); 2 | 4 |
| Company doctor [N sessions] | 0.03 (0.27); 3 | 0.17 (0.95); 2 | 0.08 (0.43); 5 | 5 |
| Work reintegration program [N sessions] | 0.40 (2.38); 7 | 1.24 (7.50); 2 | 0.07 (0.63); 2 | 2 |
| **Health care** | | | | |
| Prescribed medication [€] | 487.39 (910.55); 90 | 619.68 (842.65); 27 | 594.28 (1022.02); 92 | 6 |
| Over the counter medication [€] | 17.83 (83.06); 41 | 24.70 (65.90); 13 | 14.68 (37.24); 43 | 7 |
| General Practitioner [N consults][a] | 9.63 (16.11); 100 | 10.98 (11.90); 30 | 7.19 (10.18); 23 | 4 |
| Social work [N consults] | 1.07 (10.03); 7 | 1.09 (4.07); 4 | 0.55 (2.47); 9 | 5 |
| First aid post [N consults] | 0.10 (0.31); 15 | 0.34 (0.91); 8 | 0.26 (0.91); 17 | 4 |
| Outpatient consults general hospital [N consults] | 3.78 (11.03); 41 | 3.73 (10.20); 10 | 3.90 (13.95); 43 | 4 |
| General hospital stay [N days] | 0.46 (2.43); 12 | 1.24 (4.92); 7 | 2.27 (14.40); 10 | 4 |
| Community health service [N consults] | 0.33 (1.70); 11 | 0.05 (0.31); 1 | 0.12 (1.03); 3 | 5 |
| Centre on reproductive health and sexuality [N consults] | 0.02 (0.25); 1 | 0 | 0.06 (0.65); 1 | 5 |
| Family care [N consults] | 1.49 (12.87); 5 | 1.78 (6.67); 4 | 1.05 (7.42); 4 | 4 |
| Formal care [N hours][b] | 13.84 (62.68); 11 | 93.22 (251.25); 7 | 58.40 (197.00); 22 | 4 |
| **Alternative treatments** | | | | |
| Manual therapy [N sessions] | 0.76 (4.50); 7 | 3.27 (10.53); 5 | 0.38 (2.56); 4 | 5 |
| Acupuncture [N sessions] | 1.20 (5.53); 9 | 3.18 (17.93); 2 | 0.34 (2.00); 5 | 5 |
| Osteopathy [N sessions] | 1.11 (9.75); 5 | 0.20 (1.25); 1 | 0.93 (5.51); 5 | 5 |
| Natural medicine [N sessions] | 0.77 (4.32); 5 | 0 | 0.15 (1.56); 2 | 5 |
| Paramedical care [N sessions] | 2.92 (8.78); 23 | 2.61 (8.36); 6 | 2.09 (7.04); 18 | 4 |
| Alternative healing [N sessions] | 1.54 (6.37); 15 | 1.46 (5.74); 4 | 3.86 (18.14); 20 | 5 |
| Informal care [N hours lost] | 262.41 (789.334); 85 | 79.51 (226.47); 19 | 371.91 (1337.52); 70 | 4 |
| Productivity losses in paid work [N hours lost] | 442.41 (875.58); 92 | 692.14 (1127.59); 24 | 606.67 (1118.10); 87 | |
| Voluntary work [N hours lost] | 5.08 (20.81); 17 | 4.91 (15.06); 7 | 17.91 (83.79); 20 | 8 |
| Study [N hours lost] | 9.53 (65.67); 9 | 77.70 (94.70); 2 | 2.55 (16.27); 4 | 8 |
| Domestic activities [N hours lost] | 399.35 (579.19); 114 | 536.69 (811.53); 32 | 459.16 (865.19); 109 | 8 |
| Police [N consults] | 0.24 (1.87); 4 | 0.01 (0.08); 1 | 0.71 (3.03); 13 | 5 |

Note. ST, Schema Therapy; TAU, Treatment as Usual; COP, Clarification Oriented Psychotherapy.

Source prices 1 = prices according to the Dutch Healthcare Authority 2007; 2= prices according to national professional organisation; 3=prices according to other economic evaluation in the Netherlands([38]); 4= based on standard Dutch unit prices (Oostenbrink et al.); 5= prices based on actual tariffs of 3 or more sources; 6= prices based on the Dutch Pharmacotherapeutic Compass; 7= based on patient report, when missing based on www.medicijnkosten.nl or on tariffs of 3 or more sources; 8= shadow prices based Oostenbrink et al.
[a] including all forms of GP consults being at GP practice, at patient's home, by telephone [b] including different forms of formal homecare being domestic help and nursing

Appendix 3. Baseline characteristics, description of treatments received, and results of treatment integrity checks.

| | schema therapy (n=145) | | clarification-oriented psychotherapy (n=41) | | treatment-as-usual (n=134) | | P value |
|---|---|---|---|---|---|---|---|
| **Baseline characteristics** | | | | | | | |
| **Age,** mean, sd | 37.57 | 9.69 | 39.20 | 9.37 | 38.06 | 9.63 | 0.63[a] |
| **Male sex,** nr, % | 66 | 45.5 | 18 | 43.9 | 55 | 41 | 0.75[b] |
| **Education,** nr, % | | | | | | | |
| Primary school | 6 | 4.1 | 3 | 7.3 | 3 | 2.2 | |
| Lower vocational education | 6 | 4.1 | 4 | 9.8 | 15 | 11.2 | |
| Lower secondary education | 22 | 15.2 | 3 | 7.3 | 8 | 6 | |
| Higher secondary education | 11 | 7.6 | 2 | 4.9 | 15 | 11.2 | |
| Intermediate vocational education | 46 | 31.7 | 15 | 36.6 | 45 | 33.6 | 0.85[c] |
| Pre-university education | 11 | 7.6 | 2 | 4.9 | 10 | 7.5 | |
| Higher vocational education | 29 | 20 | 12 | 29.3 | 25 | 18.7 | |
| Academic education | 14 | 9.7 | 0 | 0 | 13 | 9.7 | |
| **Employment status,** nr, % | | | | | | | |
| House wife | 7 | 4.8 | 1 | 2.4 | 5 | 3.7 | |
| Student | 7 | 4.8 | 3 | 7.3 | 6 | 4.5 | |
| Employed | 66 | 45.5 | 16 | 39 | 63 | 47 | 0.96[b] |
| Disability | 47 | 32.4 | 17 | 41.5 | 46 | 34.3 | |
| Welfare | 17 | 11.7 | 4 | 9.8 | 14 | 10.4 | |
| Retired | 1 | 0.7 | 0 | 0 | 0 | 0 | |
| **Primary personality disorder diagnosis,** nr, % | | | | | | | |
| Avoidant personality disorder | 74 | 51 | 19 | 46.3 | 70 | 52.2 | |
| Dependent personality disorder | 16 | 11 | 6 | 14.6 | 14 | 10.4 | |
| Obsessive-compulsive personality disorder | 41 | 28.3 | 11 | 26.8 | 37 | 27.6 | |
| Paranoid personality disorder | 8 | 5.5 | 1 | 2.4 | 5 | 3.7 | 0.86[b] |
| Histrionic personality disorder | 0 | 0 | 1 | 2.4 | 1 | 0.7 | |
| Narcissistic personality disorder | 6 | 4.1 | 3 | 7.3 | 7 | 5.2 | |
| **Secondary personality disorder diagnoses,** nr, % | | | | | | | |
| None | 80 | 55.2 | 19 | 46.3 | 69 | 51.5 | 0.58[b] |
| Avoidant personality disorder | 13 | 9 | 8 | 19.5 | 22 | 16.4 | 0.09[b] |
| Dependent personality disorder | 9 | 6.2 | 3 | 7.3 | 2 | 1.5 | 1.00[b] |
| Obsessive-compulsive personality disorder | 11 | 7.6 | 7 | 17.1 | 15 | 11.2 | 0.19[b] |
| Paranoid personality disorder | 3 | 2.1 | 3 | 7.3 | 4 | 3 | 0.23[b] |
| Histrionic personality disorder | 0 | 0 | 0 | 0 | 0 | 0 | |
| Narcissistic personality disorder | 0 | 0 | 0 | 0 | 1 | 0.7 | 0.50[b] |
| Passive-aggressive personality disorder | 6 | 4.1 | 1 | 2.4 | 3 | 2.2 | 0.64[b] |
| Depressive personality disorder | 41 | 28.3 | 13 | 31.7 | 39 | 29.1 | 0.91[b] |
| **Axis-I comorbidity (current),** nr, % | | | | | | | |
| Anxiety | 82 | 56.6 | 25 | 61 | 80 | 59.7 | 0.82[b] |
| Depressive disorders | 61 | 42.1 | 23 | 56.1 | 59 | 44.0 | 0.28[b] |
| Somatoform disorders | 17 | 11.7 | 4 | 9.8 | 11 | 8.2 | 0.62[b] |
| Substance abuse | 7 | 4.8 | 5 | 12.2 | 1 | 0.7 | <0.01[b] |
| Eating disorders | 3 | 2.1 | 1 | 2.4 | 6 | 4.5 | 0.50[b] |
| Other Axis-I | 11 | 7.6 | 7 | 17.1 | 19 | 14.2 | 0.11[b] |
| **Psychotropic medication at baseline,** nr, % | 71 | 49 | 18 | 43.9 | 74 | 55.2 | 0.36[b] |
| **Number of treatments before baseline,** mean, sd | 2.44 | 2.35 | 2.12 | 3.3 | 2.28 | 2.22 | 0.72[a] |
| **Number of treatment modalities before baseline,** mean, sd | 1.51 | 1.23 | 1.27 | 1.30 | 1.36 | 1.18 | 0.41[a] |
| **Total duration of previous treatments [d],** mean, sd | 29.73 | 42.70 | 31.98 | 78.51 | 35.75 | 63.73 | 0.68[a] |
| **Description of treatments received** | | | | | | | |
| **Number of principal treatments over 3 yrs,** mean, sd | 1.33 | 0.69 | 1.51 | 0.93 | 1.39 | 0.73 | 0.40[c] |
| **Number of secondary treatments [e] over 3 yrs,** mean, sd | 0.68 | 1.04 | 0.85 | 1.04 | 0.92 | 1.32 | 0.14[c] |
| **Total number of sessions of indicated principal treatment over 3 years,** median, 25-75 pct | 50 | 31;50 | 51 | 28;74 | 22 | 11;47 | <0.01[c] |
| **Total number of sessions of additional treatments over 3 year,** median, 25-75 pct | 0 | 0;11 | 5 | 0;18 | 3 | 0;18 | 0.04[c] |
| **Total number of days in principal treatments over 3 yrs,** median, 25-75 pct | 694 | 481;766 | 895 | 393;1038 | 522 | 243;863 | <0.01[c] |
| **Distribution of indicated principal treatment,** nr, % | | | | | | | |
| Did not get indicated treatment | 2 | 1.4 | 0 | 0 | 7 | 5.2 | |
| schema therapy | 143 | 98.6 | 0 | 0 | 0 | 0 | |
| clarification-oriented psychotherapy | 0 | 0 | 41 | 100.0 | 0 | 0 | |
| CBT | 0 | 0 | 0 | 0 | 26 | 19.4 | |
| EMDR | 0 | 0 | 0 | 0 | 2 | 1.5 | |
| Insight oriented psychotherapy | 0 | 0 | 0 | 0 | 56 | 41.8 | |
| Supportive therapy | 0 | 0 | 0 | 0 | 43 | 32.1 | |
| **Medication use during 3 years,** %, 95% CI | 40.4[w] | 34;47.1 | 50.0 | 40.1;59.8 | 58.2 | 51.2;64.9 | <.001[f] |
| **Number of patients still in treatment at follow-up,** nr, % | 19 | 13.1 | 15 | 36.6 | 35 | 26.1 | <0.01[b] |
| **Results of treatment integrity tests** | | | | | | | |
| **Schema therapy techniques,** mean, sd | 1.65[x] | 0.40 | 1.19 | 0.15 | 1.21 | 0.16 | <0.001[a] |
| **Clarification oriented psychotherapy techniques,** mean, sd | 1.60[x] | 0.41 | 1.79[z] | 0.46 | 1.51[y] | 0.38 | <0.001[a] |
| **Facilitative conditions,** mean, sd | 3.80[x] | 0.63 | 3.52 | 0.67 | 3.45 | 0.69 | <0.001[a] |
| **Explicit directiveness,** mean, sd | 3.47[x] | 0.50 | 3.15 | 0.48 | 3.24 | 0.60 | <0.001[a] |

Note.
a. F-test
b. Chi-square test
c. Kruskal-Wallis test
d. In months
e. Secondary treatments are treatments given alongside the principal treatment
f. F-test from mixed logistic regression analysis
w. Schema therapy differs significantly from each of the other treatments (p < 0.05)
x. Schema therapy differs significantly from each of the other treatments (p < 0.01)
y. Treatment as usual differs significantly from schema therapy (p < 0.05) and clarification-oriented psychotherapy (p < 0.01)
z. Clarification-oriented psychotherapy differs significantly from schema therapy and treatment as usual (p < 0.01)

# Appendix 4. Results of base-case and sensitivity analyses

| Type of analysis | | Costs | % recovered | QALY's | | Costs per recovered patient | % NE | % NW | % SE | % SW | Cost per QALY | % NE | % NW | % SE | % SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base-case | ST | 23813 | 81.4 | 2.15 | ICER ST-TAU | dominant | 16 | 0 | 83 | 1 | dominant | 6 | 10 | 57 | 27 |
| | COP | 30010 | 51.2 | 2.03 | ICER COP-TAU | inferior | 29 | 50 | 13 | 8 | inferior | 15 | 63 | 11 | 11 |
| | TAU | 26306 | 51.8 | 2.12 | | | | | | | | | | | |
| Multilevel | ST | 17734 | 81.4 | 2.43 | | | | | | | | | | | |
| | COP | 20539 | 51.2 | 2.31 | | | | | | | | | | | |
| | TAU | 20742 | 51.8 | 2.39 | | | | | | | | | | | |
| Only study completers | ST | 23666 | 82.5 | 12.18 | ICER ST-TAU | dominant | 24 | 12 | 54 | 11 | € 28646 saving/ recovery lost | 5 | 30 | 27 | 38 |
| | COP | 28319 | 64.5 | 2.10 | ICER COP-TAU | inferior | 4 | 71 | 5 | 20 | inferior | 10 | 65 | 6 | 19 |
| | TAU | 24855 | 77.8 | 2.23 | | | | | | | | | | | |
| Corrected costs and utilities | ST | 23890 | 81.4 | 2.14 | ICER ST-TAU | / | / | / | / | / | dominant | 6 | 11 | 53 | 30 |
| | COP | 30087 | 51.2 | 2.04 | ICER COP-TAU | | | | | | Inferior | 19 | 62 | 10 | 9 |
| | TAU | 26236 | 51.8 | 2.12 | | | | | | | | | | | |
| Stricter recovery | ST | 23813 | 66.9 | 2.15 | ICER ST-TAU | dominant | 16 | 0 | 83 | 1 | / | / | / | / | / |
| | COP | 30010 | 56.1 | 2.03 | ICER COP-TAU | € 157907 spending/ extra recovery | 44 | 35 | 16 | 0 | / | / | / | / | / |
| | TAU | 26306 | 53.7 | 2.12 | | | | | | | | | | | |
| Dutch tariff for QALY | ST | 23813 | 81.4 | 2.16 | ICER ST-TAU | / | / | / | / | / | dominant | 5 | 11 | 51 | 34 |
| | COP | 30010 | 51.2 | 2.06 | ICER COP-TAU | | | | | | Inferior | 14 | 64 | 10 | 13 |
| | TAU | 26306 | 51.8 | 2.15 | | | | | | | | | | | |
| Compensa-tion in production costs | ST | 19976 | 81.4 | 2.15 | ICER ST-TAU | dominant | 39 | 0 | 60 | 0 | dominant | 18 | 19 | 46 | 17 |
| | COP | 23703 | 51.2 | 2.03 | ICER COP-TAU | inferior | 27 | 49 | 13 | 11 | inferior | 16 | 61 | 10 | 14 |
| | TAU | 20784 | 51.8 | 2.12 | | | | | | | | | | | |

Note.

ST = schema therapy, COP = clarification oriented psychotherapy, TAU = treatment as usual, QALY = quality adjusted life year.

ICER = Incremental Cost-effectiveness (Cost-utility) Ratio (cost-effectiveness plane)

% NE = percentage of bootstrap replications in North-East quadrant (signifies experimental treatment being more effective and more costly)

% NW = percentage of bootstrap replications in North-West quadrant (signifies dominance of comparison treatment, being both cheaper and more effective)

% SE = percentage of bootstrap replications in South-East quadrant (signifies dominance of experimental treatment, being both cheaper and more effective)

% SW = percentage of bootstrap replications in South-West quadrant (signifies experimental treatment being less effective and less costly)