Non-uniform effectiveness of structured patient-clinician communication in community mental healthcare: An international comparison

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Abstract

Background The effectiveness of psychosocial interventions in community mental healthcare has been shown to depend on the setting in which they are implemented. Recently structured patient-clinician communication was found to be effective in a multi-centre trial in six European countries, the DIALOG trial. In the overall study differences between centres were controlled for, not studied. Here we test whether the effectiveness of structured patient-clinician communication varies between services in different countries, and explore setting characteristics associated with outcome.

Methods The study is part of the DIALOG trial, which included 507 patients with schizophrenia or related disorder, treated by 134 keyworkers. The keyworkers were allocated to intervention or treatment as usual.

Results Positive effects were found on quality of life (Effect Size 0.20: 95%CI 0.01–0.39) and treatment satisfaction (0.27: 0.06–0.47) in all centres, but reductions in unmet needs for care were only seen in two centres (-0.83 and -0.60), and in positive, negative and general symptoms in one (-0.87; -0.78; -0.87). The intervention was most effective in settings with patient populations with many unmet needs for care and high symptom levels.

Conclusions Psychosocial interventions in community mental healthcare may not be assumed to have uniform effectiveness across settings. Differences in patient population served and mental healthcare provided, should be studied for their influence on the effectiveness of the intervention. Structured patient-clinician communication has a uniform effect on quality of life and treatment satisfaction, but on unmet needs for care and symptom levels its effect differs between mental healthcare settings.

Key words

physician-patient relations – computer-assisted decision making – community mental health services – population characteristics – health services research

Introduction

Established psychosocial interventions for people with severe mental illness, such as assertive community treatment [1, 2] and supported employment [3, 4], have been found to have non-uniform effectiveness across mental healthcare settings. This may be because settings differ in crucial aspects, such as patient selection or the 'treatment as usual' offered in the comparison condition of a trial, i.e. characteristics that are often left unspecified in research reports [5]. Alternatively, interventions may be perceived and appreciated differently in different cultures [6]. Burns and Catty [4] conclude that such differences in effectiveness of an intervention between settings may be as informative – e.g. with respect to understanding the mechanisms behind the effects – as their similarities, and that they should be studied rather than being treated as a complexity to be overcome.

Recently the effectiveness of a novel intervention – structured patient-clinician communication – was studied across six European community mental healthcare settings, in the DIALOG trial [7]. This showed that two-monthly, computer-assisted discussions between the patient and clinician of the patient's satisfaction with different domains of life, current treatment, and needs for additional or different help, had a positive influence on the patient's quality of life, unmet needs for care and treatment satisfaction. In the report by Priebe et al. [7] the six sites in which the trial was conducted, were treated as a random sample of all possible community mental healthcare settings that treat the target group of patients. Thus, study site was considered a random variable, that was treated as a 'nuisance' variable to be controlled for in the analysis, rather than being studied for its influence on the effectiveness of the intervention.

The DIALOG intervention was intended to foster a 'partnership model of care' between patients and their clinicians, and to encourage patients to take an active role in care planning [8]. However, preference to participate in medical decision making is not universal across cultures [9, 10], and has been found to depend on age, gender, education, and social class [11, 12]. Therefore, universal effectiveness of the DIALOG intervention may not be assumed, but should be tested.

■ Aims of the study

We aim to test whether the effectiveness of the DIALOG intervention varies across mental healthcare settings in different countries, and to explore whether the effectiveness is associated with characteristics of the patient population served and the mental healthcare provided. The objective is to identify favourable and less favourable settings for the implementation of structured patient-clinician communication in community mental healthcare.

Method

■ Study design

The present study is part of the DIALOG trial, which consisted of a cluster randomized controlled trial in community mental health services in six European countries. Eligible were services that provided comprehensive, outpatient care for people with schizophrenia or related psychotic disorders, and that operated a keyworker system in which every patient has a designated clinician. Keyworkers were randomly assigned to either the intervention of structured patient-clinician

communication or treatment as usual. The effect of the intervention was evaluated over a 1-year period, by pre and post interviews with the patients. Details of the randomization procedure and the eligibility criteria for keyworkers and patients have been provided by Priebe et al. [7]. The study was approved by relevant ethics committees in the six countries, and written informed consent was obtained from all keyworkers and patients.

■ Intervention

Keyworkers in the control group continued with standard treatment with their participating patients. In the intervention group keyworkers added the experimental intervention to standard treatment. The intervention consisted of a computer mediated procedure that the keyworker administered every two months in routine meetings with participating patients. The procedure specified that keyworkers asked their patients to rate their satisfaction with 11 domains of life or treatment, followed by the question whether patients wanted any additional or different help in the given domain. Patients' answers were entered directly onto a (hand-held) computer. This enabled keyworkers and patients to immediately display and evaluate a response on a domain in the context of the responses on all other domains and in comparison with ratings at previous meetings. The intervention was designed to alter patient-keyworker interactions, so that the patient's views of their life and treatment and their needs for care would become a central point for the dialogue between patient and clinician and inform all treatment discussions. Recently the intervention has been incorporated in a routine evaluation method in first episode psychosis services in London [13].

■ Outcomes

Primary outcome was the patient's subjective quality of life at the 12 months follow-up assessment, controlling for the score at baseline. Quality of life was assessed with the Manchester Short Assessment of Quality of Life (MANSA) [14], in which patients rate their satisfaction with life in general and different life domains on 7-point scales ranging form 'couldn't be worse' to 'couldn't be better'. The mean score on all satisfaction ratings is taken as the indicator for subjective quality of life.

Secondary outcomes were number of unmet needs for care and patient satisfaction with treatment. Needs for care were measured with the Camberwell Assessment of Need Short Appraisal Schedule, patient version (CANSAS) [15, 16], which assesses health and social needs across 22 domains, as perceived by the patient. For each domain it distinguishes between 'no need', 'met need' and 'unmet need'. Patient's satisfaction with treatment was assessed on the Client Satisfaction Questionnaire (SCQ-8) [17], which consists of eight items rated from 1 to 4, with higher scores indicating greater treatment satisfaction. The total number of unmet needs for care and the sum score of satisfaction ratings at 12 months were studied as secondary outcomes, controlling for baseline scores.

The DIALOG intervention was hypothesized to increase subjective quality of life and satisfaction with treatment, and to reduce the number of unmet needs for care [7]. In addition, the influence of the intervention on psychiatric symptomatology was explored, but no effect was anticipated [7]. Symptomatology was assessed at baseline and 12 months follow-up with the Positive and Negative Syndrome Scale interview (PANSS) [18], which assesses positive, negative and general symptoms of schizophrenia on 7-point scales, with higher scores indicating more severe symptoms.

The total scores on the three subscales at 12 months were taken as separate outcome measures of psychiatric symptomatology, controlling again for baseline scores.

■ Mental healthcare settings

The DIALOG trial was conducted in community mental healthcare services in Granada (Spain), Groningen (the Netherlands), London (United Kingdom), Lund (Sweden), Mannheim (Germany), and Zürich (Switzerland), covering urban and mixed urban-rural areas. The number of participating teams per centre varied between two (Lund) and six (London).

In the exploratory analysis of correlates of difference in effectiveness of the DIALOG intervention between centres, centre characteristics with respect to patient group served and mental healthcare provided, will be studied. The patient group characteristics include (1) mean age, (2) gender distribution, (3) main diagnostic categories, (4) number of years in mental healthcare, (5) number of admissions to mental health clinics, and (6) level of functioning of the patient group. The mental healthcare characteristics consist of (7) mean caseload of keyworkers, (8) number of years in current job of keyworker, (9) number of face to face contacts per month per patient, (10) duration of these contacts, (11) duration of all care provided to a patient per month, and (12) number of meetings during the follow-up period in which the DIALOG intervention was administered in the intervention group.

The demographic characteristics of the patients, the number of years since first contact with mental healthcare and the number of hospital admissions (the above centre characteristic 1, 2, 4 and 5) were taken from the baseline patient interview of the DIALOG trial. Psychiatric diagnosis (centre characteristic 3) was obtained through a standardized and computer-based method using operationalized criteria

(OPCRIT) [19], which were checked in the patient's medical record. Eligible for the DIALOG trial were patients with a primary diagnosis of schizophrenia or related psychotic disorder (ICD-10 F20–F29) [7], who were grouped for the present study into the categories schizophrenia (F20.0–F20.5), schizoaffective disorders (F25), and other psychotic disorders (rest). The mean level of functioning of the patient group (centre characteristic 6) was assessed by the mean baseline scores on quality of life, number of unmet needs for care, satisfaction with treatment, and symptomatology of the patients participating in the DIALOG trial. These variables were not combined, but were analyzed as separate indicators of the level of functioning of the patient group served.

Characteristics of the mental healthcare provided in the centres were obtained from interviews with the keyworkers who participated in the DIALOG trial. At baseline the keyworkers were asked about their total case load size and number of years in the current job (centre characteristics 7 and 8). The number and duration of face to face contacts per patient in the previous two months and the total duration of care per patient (centre characteristics 9 to 11) were assessed for the DIALOG patients, in an interview with their keyworker, 8 months after the patient's baseline assessment. Finally, the (hand-held) computers used in the DIALOG intervention registered the number of times the intervention was administered during the follow up period in the intervention group (characteristic 12).

It should be noted that the above centre characteristics (with the exception of characteristics 7 and 8) only refer to the patients included in the DIALOG trial. This enables comparison between the study centres. But on the other hand, it does not show that all participating community mental health centres served a broader

population of severely mental ill patients, not just the patients with schizophrenia or related psychotic disorders who were eligible for the DIALOG trial.

■ Analysis

Differences between centres in the effectiveness of the DIALOG intervention are tested per outcome measure by linear mixed effects analysis, with baseline score for that measure, length of follow-up, treatment allocation, study centre and interaction between treatment allocation and study centre as fixed effects, and keyworker as random effect. Length of follow-up was also taken into account by Priebe et al. [7], because it is a potentially confounding covariate, that might have introduced post-randomization variance. Keyworker is included in the analysis as a random effect, to adjust for the effect of clustering of patients within keyworkers. Effects are tested at a significance level of .05. Standardized effect sizes and their 95% confidence intervals will be presented for statistically significant effects, in the form of adjusted mean differences between factor levels, standardized by the within subjects standard deviation.

Differences between centres in patient group and mental healthcare characteristics will be tested by oneway analysis of variance, at a .05 significance level, and subsequently by pairwise comparisons between centres, using the Bonferroni correction for multiple testing. Significant differences will be discussed and explored for their associations with any main centre effect or interaction between centre and treatment allocation.

Results

■ Participants

Participants in the DIALOG trial consisted of 507 patients of 134 keyworkers. At the 12 months follow-up assessment, 451 patients were reinterviewed (89% follow-up). A detailed description of participant flow from recruitment to data analysis has been presented by Priebe et al. [7].

■ Centre differences

Table 1 here

Table 1 shows the characteristics of the participating centres in the DIALOG trial, with respect to patient group served and mental healthcare provided. The centres differ on all characteristics studied, except on the age and gender distributions of their patient populations. In Groningen and Zürich fewer patients are diagnosed as having schizophrenia than in the other centres, and more as having a psychotic disorder other than schizophrenia or a schizoaffective disorder. The patients in Granada and London have a relatively brief history in mental healthcare, with fewer hospital admissions, while the patients in Mannheim and Lund had a larger number of hospital admissions.

The comparison of patient functioning at the baseline assessment of the DIALOG trial shows that patients in Mannheim and Zürich experience a relatively high quality of life, and that in Mannheim the number of unmet needs for care is low. In contrast, patients in London and Granada have comparatively more unmet needs for care. Nevertheless, treatment satisfaction is highest in Granada, and lowest in Groningen. Patients in London and Groningen experience the most positive, negative and general symptoms, and the patients in Lund and Granada the least.

Outpatient mental healthcare for the patients with severe mental illness studied, is characterized in Zürich and Groningen by keyworkers with relatively high caseloads, who are not in their current position for very long. The latter is also true for keyworkers in London. The amount of treatment time per patient is greatest in Mannheim and Lund. In Mannheim this is because keyworkers have very frequent contacts with their patients, in Lund because the contacts are relatively long. The latter is also true for patient contacts in Groningen. Treatment time per patient is least in Granada and London, where the patient-keyworker contacts are relatively brief. In Granada also the number of contacts is low. Here, most patients only see their keyworker once every two months. This may explain why the patients in Granada had the lowest number of contacts over the follow-up period in which the DIALOG intervention was administered.

■ Differences in effectiveness of the DIALOG intervention

Table 2 here

Differences between mental healthcare centres in the effectiveness of the DIALOG intervention are found for the outcomes unmet needs for care and general symptoms (Table 2). In addition, marginally significant interaction effects are found for positive and negative symptoms. The effects of the intervention on quality of life and treatment satisfaction, on the other hand, are uniform across centres. For treatment satisfaction also a centre effect is found, which means that – apart from the difference between the experimental and control group – also within these groups consistent differences between centres exist.

■ **Effect sizes**

Table 3 here

Table 3 presents the standardized sizes of the effects found. The uniform effects of the DIALOG intervention on quality of life (0.20; 95% CI: 0.01 – 0.39) and treatment satisfaction (0.27; 0.06 – 0.47) are small, which is consistent with the original study report by Priebe et al. [7]. However, the present study shows that the DIALOG intervention does not have a uniform effect on unmet needs for care, but that this effect depends on the centre in which the intervention is implemented. A large reduction in unmet needs is seen in London (-0.83; -1.29 – -0.36), and Granada (-0.60; - 1.19 – -0.02), while in the other centres no clear effect on unmet needs is found. In London there is also a large reduction in general symptoms (-0.87; -1.39 – -0.34), which – based on marginally significant interactions – is also seen for positive and negative symptoms in London (-0.87; -1.36 – -0.39, and -0.78; -1.31 – -0.26, respectively), but not in the other centres. These other centres show no effect of the DIALOG intervention on symptoms, as reported by Priebe et al. [7] for the study as a whole.

In addition to the intervention effects, centre effects are found on treatment satisfaction and positive and negative symptoms. On top of the uniform intervention effect on treatment satisfaction, patients in Granada – both in the experimental and control group – show a more favourable development over the follow-up period than the patients in the other centres ($p<.01$ on all pairwise comparisons). And when the marginally significant interactions between intervention and centre on positive and negative symptoms are disregarded: (1) patients in Granada, Groningen and Lund are found to experience a greater decrease in positive symptoms than patients in London, as is true for patients in Lund compared to patients in Mannheim and Zürich, and (2) patients in Granada and Lund experience a greater decrease in negative symptoms

than patients in London, Mannheim and Zürich, as is true for patients in Groningen compared to patients in Zürich ($p<.05$ on all pairwise comparisons), irrespective of the study group they were in.

■ Association between effectiveness and centre characteristics

Apart from the uniform effectiveness of the DIALOG intervention on quality of life and treatment satisfaction, the intervention proved to be effective on symptomatology in London and on number of unmet needs for care in London and Granada. Table 1 shows that of all centres, the patients in London experienced the most positive, negative, and general symptoms at baseline, as well as the most unmet needs for care, with the patients in Granada being second on unmet needs for care. This suggests that the effectiveness of the DIALOG intervention on symptomatology and unmet needs for care may be associated with the baseline level of functioning on these aspects, in such a way that the intervention is more effective in patient groups with more symptoms, or more unmet needs for care. On the patient group level, the correlation between the mean level of functioning at baseline in a centre (as reported in table 1) and the effect size of the intervention in that centre on that aspect of functioning (as reported in table 3) is -0.46 for positive symptoms, -0.32 for negative symptoms, -0.61 for general symptoms, and -0.92 for number of unmet needs for care (n=6). All these correlations indicate a stronger effectiveness of the intervention (i.e. a greater reduction in symptoms or unmet needs for care) in centres with patient groups that function more poorly at baseline (i.e. that have more symptoms or more unmet needs for care). On the individual patient level – in linear mixed effects models that do not take the centre into account – significant interactions between the baseline level of functioning and the intervention effect on level of functioning at follow-up are found

for positive symptoms (F=4.69; p=.03), general symptoms (F=4.89; p=.03), and unmet needs for care (F=4.53; p=.03), but not for negative symptoms (F=0.18; p=.67). Again, these interactions are all in the direction of a greater intervention effect for patients with a poorer level of baseline functioning.

Besides their relatively high number of psychiatric symptoms at baseline and unmet needs for care, the patient groups in London and Granada also stand out for their somewhat shorter history in mental healthcare and fewer hospital admissions, than the patients in the other centres. In addition, the care the patients in London and Granada receive from their keyworkers, is comparatively limited in duration. As for the baseline level of functioning, these latter patient and care characteristics are also correlated on a patient group level with the outcomes that showed non-uniform effectiveness of the intervention between centres (range .26–.88; n=6). All of these correlations indicate more effectiveness of the intervention (i.e. a greater reduction in symptoms or unmet needs for care) in centres with patients who – on average – have a shorter history in mental healthcare and fewer hospital admissions, or in which the keyworkers have less time per patient for care. But on the individual patient level, a significant influence of the patient or care characteristic on intervention effectiveness was found in only on one of the twelve interactions tested: a greater reduction in unmet needs for care is seen in patients with a shorter history in mental healthcare (F=3.24; p=.07). The present study, therefore, provides more extensive empirical support for the assertion that the effectiveness of the DIALOG intervention on unmet needs for care and symptomatology is related to the baseline level of functioning of the patients on these outcomes, than for the idea that it would be related to the number of years the patients are in mental healthcare, the number of times they have been

admitted to hospital, or the amount of time their keyworkers are able to spend on their care.

Discussion

The present study shows that the effectiveness of the DIALOG intervention is not uniform across mental healthcare settings. It has a uniform effect on quality of life and patient satisfaction with treatment, as reported by Priebe et al. [7]. But on unmet needs for care and symptomatology its effect differs between mental healthcare settings. The intervention is most effective in settings with patient populations that function poorly on these outcomes.

An association between baseline level of functioning and patient outcome of the DIALOG intervention was also reported by Priebe et al. [7]. They found stronger effects on quality of life and unmet needs for care, when patients who were already positive about their quality of life and had less than two unmet needs for care at baseline, were excluded from the analyses. This was interpreted as an indication for a ceiling effect for baseline level of quality of life, respectively a floor effect for baseline number of unmet needs for care.

Hansson et al. [20] also studied the relationship between patient characteristics and the effectiveness of the DIALOG intervention. They found that no characteristic was related to the intervention effect on all patient outcomes. But on specific outcomes the intervention proved to be more effective for patients who were either older, in competitive employment, had a shorter duration of illness, or were more satisfied at baseline with their relationship with the keyworker.

The analyses by Priebe et al. [7] and Hansson et al. [20] showed that – on an individual patient level – the effectiveness of the DIALOG intervention depends on the patient's characteristics and baseline level of functioning. In the present analysis these influences were studied at a patient group level. In the centres in which the DIALOG intervention proved most effective (namely London and Granada), patients had comparatively high symptom levels (London), more unmet needs for care, a shorter history in mental healthcare and fewer hospital admissions (London and Granada). These findings are consistent with those of Priebe et al. [7] and Hansson et al. [20], in particular with the findings on the influence of baseline level of unmet needs for care [7] and duration of illness [20] on the effectiveness of the DIALOG intervention. Hanson et al [20] suggest that the intervention could be most beneficial to patients in a more acute phase of illness, because it may be harder for patients with a more chronic and longstanding illness to change their way of communicating with their clinician.

Does this mean that the DIALOG intervention should only be used in particular community mental healthcare patients – with particular characteristics or baseline levels of functioning – or that it should only be implemented in centres that serve many of these patients? We suggest not. Although the intervention did not reduce symptom levels and number of unmet needs for care in all centres (possibly due to a floor effect for unmet needs for care), it did improve treatment satisfaction and quality of life in all centres. Thus, the intervention appears to be uniformly beneficial to and appreciated by the patient groups, although it did not always improve their mental health to a measurable extent. The intended change in the patient-clinician relationship by the DIALOG intervention, towards a 'partnership model of care' and a

more active role of the patient in care planning [8], therefore seems to be valued across the different European cultures represented in the present study.

Alternatively, the differences between centres in the effectiveness of the DIALOG intervention may not be due to differences in patient population served, but to mental healthcare provided. London and Granada were also the centres with the least contact time between patient and keyworker. The DIALOG intervention may make a greater difference in care when the usual care is limited in time. For example, the intervention may increase the contact time with the keyworker, and this may make a greater difference in quality of care if the usual care is rather time constrained. But in the present study the effect of the DIALOG intervention on the quality of care was not evaluated. And the findings on the outcomes that were evaluated, namely aspects of patient functioning, do not point towards differences in care as the primary explanation for the differences in intervention effect observed.

Several limitations of the present study should be mentioned. First, it was undertaken post hoc, and variation in centre characteristics was therefore not systematically controlled. For example, the cultural differences between the participating centres were limited, as all were in western Europe. This reduces the power to detect differences in intervention effectiveness between centres, but as seen, the power was still adequate to show that the effectiveness is non-uniform, at least with respect to some outcomes. Second, the co-occurring characteristics of study centres – such as poor level of baseline functioning of patients, shorter illness duration, and limited contact time between patient and keyworker – compete as alternative explanations for the differences in effectiveness found, and circumstantial evidence is needed to weigh these explanations. A definitive answer can only be provided by testing the different explanations in new research. Finally, the integrity of

the implementation of the intervention was not controlled. For example, the intervention was administered less frequently in Granada than in other centres. And these differences in frequency and way of administering the intervention may influence the effectiveness of the intervention across centres.

Despite the above limitations, the present study is one of only a few studies testing the generalizability of the effectiveness of a psychosocial intervention across community mental healthcare settings. Differences in effectiveness were found. Structuring patient-clinician communication, to foster a 'partnership model of care' and a more active role of the patient in care planning, was found to be most effective in patient populations with higher symptom levels, more unmet needs for care, and a shorter duration of illness, and in services with limited patient-keyworker contact time. Nevertheless, the intervention was beneficial in all settings, as seen by the uniform positive effects on patient satisfaction with treatment and quality of life. Together these findings underline that uniform effectiveness of psychosocial interventions across community mental healthcare settings may not be assumed, but should be tested, and that this may be used for a better understanding of the mechanisms of community mental healthcare.

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Table 1 Mental health centre characteristics

	Granada	Groningen	London	Lund	Mannheim	Zürich	Difference F/Chi^2	p
Sample characteristics								
Patients participating in study	68	94	88	58	72	71		
Keyworkers	10	27	27	19	22	24		
Patient group characteristics								
Age, years [mean, (sd)]	39.6 (10.2)	41.9 (11.5)	42.3 (13.9)	42.4 (10.6)	43.5 (9.4)	44.2 (11.1)	1.35	.24
Gender [% female]	30.9%	26.6%	35.2%	31.0%	30.6%	39.4%	3.61	.61
Diagnosis								
Schizophrenia	79.4%	59.6%	71.6%	82.8%	73.6%	52.1%		
Schizoaffective disorder	11.8%	8.5%	20.5%	8.6%	19.4%	18.3%	48.74	<.001
Other psychotic disorder	8.8%	31.9%	8.0%	8.6%	6.9%	29.6%		
Years in mental healthcare	11.52 (7.29)	18.13 (9.94)	13.02 (10.89)	17.79 (10.94)	19.13 (9.21)	15.97 (9.95)	7.10	<.001
Hospital admissions	2.14 (2.87)	4.81 (4.86)	3.07 (2.69)	8.33 (11.88)	9.33 (10.28)	4.69 (4.29)	12.10	<.001
Baseline functioning								
Quality of life	4.72 (0.82)	4.57 (0.72)	4.50 (0.82)	4.70 (0.96)	4.98 (0.80)	4.92 (0.94)	4.05	<.01
Treatment satisfaction	27.56 (3.87)	24.18 (4.42)	25.24 (4.37)	25.07 (3.60)	26.01 (3.44)	26.90 (3.77)	7.60	<.001
Number of unmet needs	3.93 (2.70)	2.92 (2.60)	4.55 (3.48)	2.02 (2.17)	0.96 (1.42)	1.83 (2.16)	21.47	<.001
Positive symptoms	14.18 (5.44)	15.69 (5.76)	16.15 (6.14)	12.36 (4.96)	14.89 (6.24)	14.87 (5.34)	3.71	<.01
Negative symptoms	14.21 (5.57)	18.26 (6.38)	18.44 (6.74)	14.64 (6.45)	16.99 (7.41)	15.83 (6.34)	5.76	<.001
General symptoms	26.59 (7.75)	36.31 (8.65)	36.58 (9.77)	26.69 (8.14)	33.21 (10.27)	31.75 (8.81)	17.90	<.001
Care characteristics								
Caseload of keyworker[a]	-	24.58 (9.60)	18.77 (7.38)	14.37 (8.40)	12.70 (12.51)	27.80 (13.37)	8.30	<.001
Years keyworker in current job[b]	12.22 (4.97)	5.42 (4.09)	4.74 (5.73)	10.95 (8.67)	11.43 (6.63)	4.65 (4.66)	6.96	<.001
Face to face patient contacts								
Median number of contacts last two months[c]	1 (1)	3 (3)	3 (3)	6 (5)	10 (18)	4 (7)	44.16[c]	<.001
Duration per contact in minutes [mean, (sd)]	27.91 (8.59)	46.26 (20.68)	25.59 (16.59)	41.82 (17.85)	32.59 (20.36)	32.72 (15.76)	15.31	<.001
Median duration of patient care per month[c]	30.0 (36.3)	95.0 (117.5)	50.0 (81.3)	112.5 (167.5)	196.5 (255.0)	75.0 (100.0)	33.70[c]	<.001
Number of DIALOG interventions[d]	3.76 (1.44)	4.69 (1.31)	5.04 (1.51)	6.40 (1.33)	6.66 (0.69)	6.65 (0.69)	36.15	<.001

a N= 0; 26; 22; 19; 20; 24 respectively, due to missing data

b N= 9; 26; 23; 19; 20; 24 respectively, due to missing data

c Median plus interquartile range and difference test for base-e logarithm of characteristic, because of skewness of distribution

d For intervention group only

Table 2 Intervention and mental health centre effects on outcome[a]

Outcome	Intervention effect		Centre effect		Interaction of Intervention and Centre	
	F	p	F	p	F	p
Quality of life	4.19[b]	.04	0.98	.43	0.51	.77
Treatment satisfaction	6.77[c]	.01	5.11[c]	<.001	0.22	.96
Unmet needs	3.39	.07	6.95	<.001	3.06	.01
Positive symptoms	1.18	.28	3.58[d]	<.01	2.24	.06
Negative symptoms	0.48	.49	4.41[d]	<.01	1.91	.10
General symptoms	0.01	.92	3.36	<.01	2.71	.03

a Full factorial model unless specified otherwise
b In model with intervention effect only, because best fitting model
c In model with centre and intervention effects only, because best fitting model
d In model with centre effect only, because best fitting model

Table 3 Standardized sizes of intervention and mental health centre effects

Outcome (per Centre)	Intervention effect		p	Centre effect		p	Intervention effect per Centre		p
	Effect Size	(95% CI)		Effect Size	(95% CI)		Effect Size	(95% CI)	
Quality of life	0.20	(0.01 – 0.39)	.04						
Treatment satisfaction	0.27	(0.06 – 0.47)	.01						
Granada				0[ab]					
Groningen				-1.00	(-1.42 – -0.58)	<.001			
London				-0.76	(-1.17 – -0.35)	<.001			
Lund				-0.79	(-1.23 – -0.36)	<.01			
Mannheim				-0.71	(-1.10 – -0.32)	<.01			
Zürich				-0.93	(-1.36 – -0.50)	<.001			
Unmet needs									
Granada							-0.60	(-1.19 – -0.02)	.04
Groningen							-0.28	(-0.73 – 0.17)	.23
London							-0.83	(-1.29 – -0.36)	<.01
Lund							0.36	(-0.22 – 0.93)	.23
Mannheim							0.18	(-0.33 – 0.69)	.49
Zürich							0.00	(-0.52 – 0.52)	.99
Positive symptoms									
Granada				0[a]			*0.06*	*(-0.56 – 0.69)*	*.84*
Groningen				0.11	(-0.35 – 0.57)[c]		*-0.03*	*(-0.51 – 0.45)*	*.90*
London				0.50	(0.04 – 0.95)[c]		*-0.87*	*(-1.36 – -0.39)*	*<.01*
Lund				-0.22	(-0.71 – 0.28)[c]		*-0.07*	*(-0.68 – 0.53)*	*.81*
Mannheim				0.37	(-0.07 – 0.81)[c]		*0.07*	*(-0.47 – 0.61)*	*.80*
Zürich				0.44	(-0.05 – 0.92)[c]		*0.11*	*(-0.44 – 0.66)*	*.68*
Negative symptoms									
Granada				0[a]			*-0.28*	*(-0.99 – 0.42)*	*.43*
Groningen				0.40	(-0.11 – 0.90)[d]	.12	*0.15*	*(-0.37 – 0.66)*	*.58*
London				0.59	(0.09 – 1.08)[d]	.02	*-0.78*	*(-1.31 – -0.26)*	*<.01*
Lund				0.03	(-0.51 – 0.56)[d]	.92	*0.21*	*(-0.45 – 0.86)*	*.53*
Mannheim				0.63	(0.15 – 1.12)[d]	.01	*0.07*	*(-0.52 – 0.66)*	*.81*
Zürich				0.89	(0.37 – 1.42)[d]	<.01	*0.13*	*(-0.47 – 0.73)*	*.67*
General symptoms									
Granada							0.07	(-0.63 – 0.77)	.83
Groningen							0.01	(-0.50 – 0.53)	.96
London							-0.87	(-1.39 – -0.34)	<.01
Lund							0.42	(-0.23 – 1.08)	.20
Mannheim							0.32	(-0.26 – 0.91)	.27
Zürich							-0.04	(-0.64 – 0.55)	.89

a Reference category
b Granada higher than all other centres (p<.01, pairwise), no other differences between centres
c Granada, Groningen and Lund lower than London, and Lund also lower than Mannheim and Zürich (p<.05, pairwise)
d Granada and Lund lower than London, Mannheim and Zürich, and Groningen lower than Zürich (p<.05, pairwise)