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ORIGINAL PAPER

Factors influencing patients' recovery and the efficacy of a psychosocial post-discharge intervention: post hoc analysis of a randomized controlled trial

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Abstract
Purpose The aim of this post hoc analysis was to examine self-reported recovery following a post-discharge intervention and to focus on the moderators of this intervention programme.
Methods RCT using parallel group block randomisation, including 151 patients with ≤3 hospitalisations within the last 3 years, a GAF score ≤60, and aged 18–64 years, assessed at two psychiatric hospitals from Zurich, Switzerland, between September 2011 and February 2014. In the present study, the main outcome was the OQ-45 as assessed prior to discharge from the index hospitalisation and at 12-month follow-up. Participants received either the post-discharge intervention provided by a social worker or treatment as usual (TAU).
Results Patients in the intervention group showed substantially less recovery over the 12-month observation period than controls ($d = 0.44$). In the TAU group, 15.6 % remained clinically impaired at 12-month follow-up as opposed to 48.1 % in the intervention group ($p = 0.001$). Among participants in the intervention group, an interdisciplinary meeting of significant network members was associated with less recovery ($d = 0.46$). Involuntary index admission ($d = 0.42$) and high educational degree ($d = 0.52$) were significant moderators of the intervention. Both factors related to less recovery over time in the intervention group relative to TAU.
Conclusions According to the OQ-45, this psychosocial post-discharge intervention revealed an unintended negative effect on self-reported recovery over time. Specifically, the meeting of significant network members related to a moderate deteriorating effect, suggesting that the involvement of some carers, relatives, or friends may cause harm to the patient. Considering with reservation pending replication, these findings could have important implications for brief interventions targeted at patients' social networks.
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Trial registration ISRCTN58280620.

Keywords Randomized controlled trial · Recovery · Social support · Discharge intervention · Case management

Introduction

Pre- and post-discharge interventions aimed at reducing rehospitalisation rates as well as improving mental health and psychosocial functioning have recently gained broad interest in psychiatric research [1, 2]. However, findings are mixed and inconclusive, and various studies [e.g., 3–5] found no stringent benefits for these psychosocial interventions with respect to symptom remission or rehospitalisation rates, including our own [6]. Moreover, the meta-analyses of case management programmes similarly produced mixed results with respect to psychopathology and rehospitalisation rates and demonstrated that their overall effectiveness is at best rather modest, in particular when

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applied to low-frequency users [7, 8]. Hitherto engagement with health services proved to be the only consistently replicated positive outcome in case management programmes [9], which led authors to conclude that "case management is an intervention of questionable value, to the extent that it is doubtful whether it should be offered by community psychiatric services" [10]. Taken together these findings challenge the utility of some brief case management and discharge intervention programmes, especially in low-frequency users, and call for new programmes that conform to the principles of evidence-based medicine.

In a recent RCT, we, therefore, tested a post-discharge intervention which comprised social support and network coordination provided by an experienced social worker [6]. As detailed in our extended study protocol [11], the design of our transitional intervention was influenced by promising findings from the Brief Critical Time Intervention (B-CTI) with respect to post-discharge continuity of care [5] and a comprehensive review on social networks and mental health service use [12]. It was, therefore, assumed that a combination of transitional case management and social network coordination could significantly reduce rehospitalisation rates [11]. However, the intervention did not relate to rehospitalisation rates or clinical evaluation of psychopathology [6]. In contrast, with respect to subjective illness severity as assessed with the German adaptation of the OQ-45 [13], we found that the participants in the intervention group reported less recovery at 12-month follow-up than participants in the control group (for more information see Hengartner et al. [6]). This finding was particularly surprising insofar, as social relationships have been considered to be a key element of resource-oriented therapies [14]. To understand why and how such a detrimental effect could have occurred, we need to examine replicable factors that may impact on recovery per se as well as interact with psychosocial treatments.

As notified in the main evaluation of our post-discharge intervention [6], in the present post hoc analysis, we will, therefore, exclusively focus on the OQ-45. The main objectives of the present explorative work were thus twofold. First, we sought to determine specific factors that did relate to patients' recovery independent of our post-discharge intervention. Second, we tried to explore which factors interacted longitudinally with the intervention and which moderators contributed to its detrimental effect on subjective recovery.

Methods

Participants and design

This study was conducted as part of the Zurich Programme for the Sustainable Development of Mental Health Services (ZInEP; in German: "**Z**ürcher **I**mpulsprogramm zur **n**achhaltigen **E**ntwicklung der **P**sychiatrie"), a research and health care programme involving several psychiatric research divisions, and mental health services from the canton of Zurich, Switzerland. This RCT initially included 167 participants from the Winterhur—Zurich Unterland psychiatric catchment area, which is an urban/suburban area of high-level resources near the city of Zurich, Switzerland. The sample size was determined according to a priori calculations as detailed in von Wyl et al. [15], which assumed an expected medium effect size and a drop-out rate of 25 %. The participants were enrolled at two different psychiatric hospitals, that is, the Psychiatrie-Zentrum Hard in Embrach and the Klinik Schlosstal in Winterthur, which are both part of the umbrella organization Integrierte Psychiatrie Winterthur—Zürcher Unterland (IPW). The inclusion criteria were: (1) no more than three hospitalisations within the last 3 years (including the index hospitalisation), (2) a global assessment of functioning (GAF) score of 60 or lower, (3) cognitive ability to provide written informed consent, and (4) age between 18 and 64 years. Exclusion criteria were: (1) insufficient German language proficiency, (2) simultaneous support by another case manager, and (3) patient living in supportive housing. Of the 167 randomized participants, 151 patients (90.4 %) were included in the analysis. The 16 participants who were excluded from the analysis after the group allocation comprised cases that subsequently conflicted with the inclusion criteria (mainly because they received additional case management or were accommodated in supportive housing over the course of the study). The participants' flow is indicated in Fig. 1. Note that the whole intervention was carried out by two social workers who were unable to handle new cases during some periods due to lack of resources, holidays, or sick leave, which accounted for approximately 20–30 % of excluded patients. Approximately 60–70 % of the patients were excluded due to the violation of inclusion criteria (mainly, more than three hospitalisation during the past 3 years) or due to exclusion criteria (mostly living in supportive housing or insufficient German language proficiency). Data analysis was conducted according to the logic of the intention-to-treat [16]. The study was approved by the cantonal ethics committee of Zurich (reference number: KEK-ZH 2011-0175). The trial was registered in the International Standard Randomized Controlled Trial Number (ISRCTN) register (reference number: ISRCTN58280620) and the study protocol published and freely available online [15]. This report was drafted according to the CONSORT statement [17].

Randomisation and procedure

Participants were allocated randomly to either the intervention or control group with a stratified block

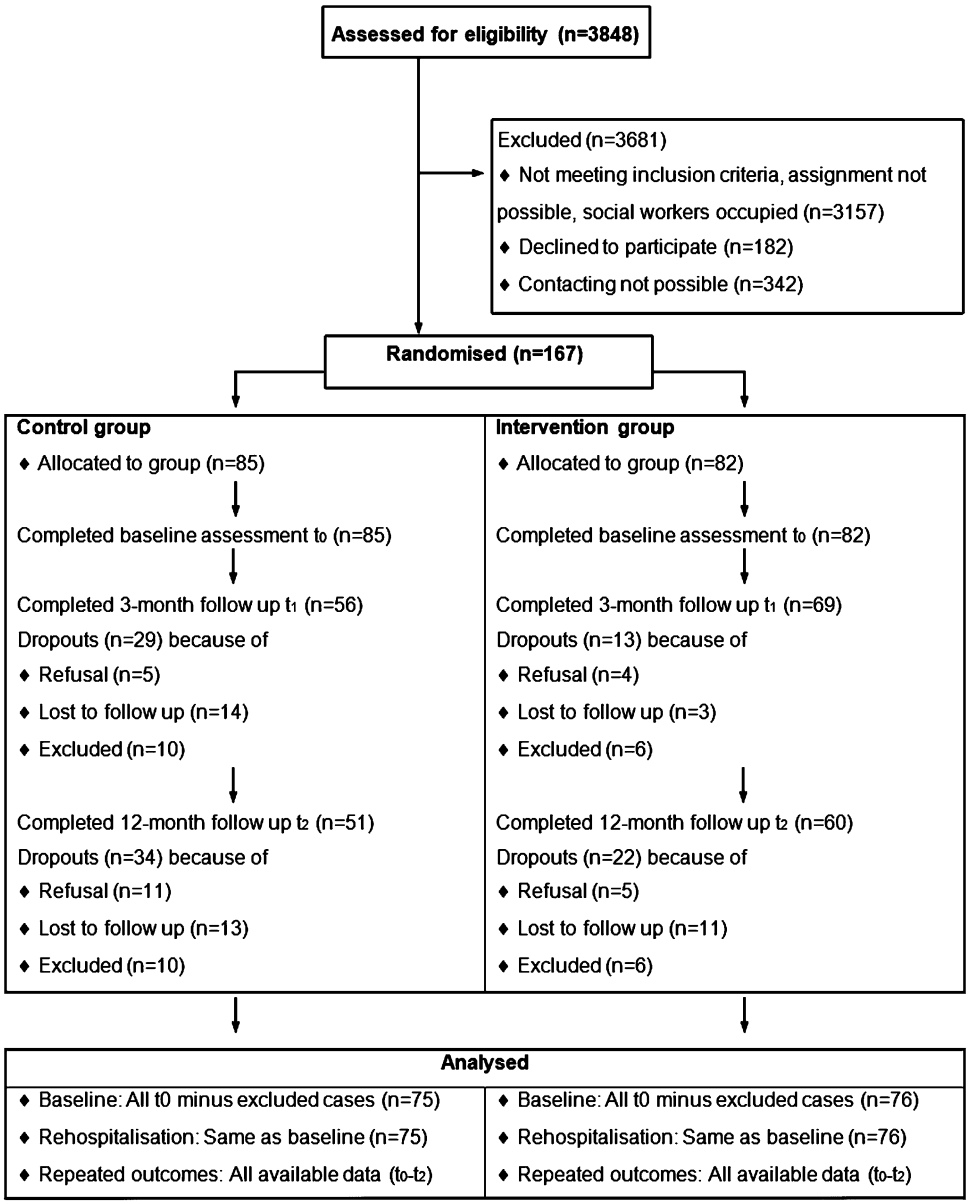

Fig. 1 Participant flow chart

randomisation for the psychiatric diagnoses according to ICD-10 [18]. The random allocation sequence was generated with Microsoft Excel and was implemented by a research associate who was not part of the study group. The intervention, named Post-Discharge Network Coordination Programme (PDNC-P), was developed in collaboration between the IPW and the Zurich University of Applied Sciences (ZHAW). The intervention programme aims to improve hospital discharge planning and to ease the transition from inpatient to outpatient care by coordinating a social support network [11]. The intervention was provided by two experienced social workers, to one of whom each patient from the intervention group was assigned. Each patient met his social worker prior to discharge and collaboratively agreed upon a close network of social support, a crisis plan, and the terms of programme termination. After discharge, a close person from the patient's social network was assigned to be network representative. In addition, mostly after discharge, the social workers were instructed to organize an interdisciplinary care review meeting that included the most important persons from the network (in some cases, the meeting took place before discharge). The social worker then visited the patient within the first week after discharge to support and monitor the patient's adjustment to outpatient care and daily life. After the first-week home visit, the social worker scheduled subsequent visits. The programme was tailored to meet the patient's personal needs, and the frequency of the visits was based on the patient's personal progress. The intervention was directly targeted at promoting recovery

through social relationships, which is a key element of resource-oriented therapies [14]. The intervention concluded once the terms of termination were reached or after a maximum of 3 months post-discharge from inpatient care (i.e., at t_1). Afterwards, the social support network continued to aid the patient without the social worker's assistance. For a detailed rationale of the intervention programme, see Hengartner et al. [11].

The control group received treatment as usual, which in Switzerland comprises the patient receiving assistance from a social worker during his or her inpatient stay only if prescribed by the treating physician. Any support by the hospital's social worker ends when the patient is discharged from hospital. However, after discharge, some patients still see social workers who are not affiliated with a psychiatric hospital, but instead with the social welfare office of a larger urban community or psychiatric outpatient services. Therefore, patients in the control group might also have seen a social worker during the intervention period, depending on their individual needs. The recruitment began in September 2011 and the last follow-up assessment of t_2 was carried out in April 2015. Both groups were assessed prior to discharge from the index hospitalisation (t_0), three months after discharge when the intervention terminated (t_1), and 12 months after discharge (t_2). Because this report focuses on the long-term recovery, we included only the 12-month follow-up.

Outcome measures

All instruments and measures applied in this study are extensively researched and widely applied in clinical practice and they have all shown good reliability and validity. Socio-demographic data were assessed with the Client Socio-Demographic and Service Receipt Inventory—European Version (CSSRI-EU) [19]. Diagnoses were made according to ICD-10 criteria [18] by the treating clinicians. Originally diagnoses were categorised as substance use disorders (SUD; F1), psychosis (F2), mood disorders (F3), and others. However, since 17 out of 21 disorders from the residual category comprised F4 diagnoses (anxiety, dissociative, stress-related, and somatoform disorders), we considered only those and excluded the other four patients from the analysis of diagnoses. Psychopathology and illness severity were assessed with the self-rating Outcome Questionnaire (OQ-45, German version) [13]. In longitudinal studies, the OQ-45 is widely used as a tool to measure illness recovery. Its total score is a global measure of psychopathological impairment and comprises items of symptom distress, social role impairment, and interpersonal functioning deficits. The total score has a possible range from 0 (no symptoms at all) to 180 (maximal symptom score). A significant change according to the reliable change index (RCI) was defined as a total score $\geq$14, whereas the cutoff for clinically significant impairment was specified with a total score $\geq$64 [20].

Statistical analysis

The distribution of various measures across groups at t_0 was analysed with independent samples Mann–Whitney U tests for continuous variables and with contingency tables and χ^2 tests for categorical variables. The cross-sectional analysis at hospital discharge (t_0) was conducted with generalised linear models (GLM). Owing to the slightly right-skewed distribution of the dependent variable (i.e., OQ-45) and after checking for the Akaike and the Bayesian information criteria, we fitted models with Gamma distribution and identity-link function. A robust Maximum Likelihood estimator was used to reduce the effects of outliers and influential observations. Generalised linear models with robust estimators have been recommended, because they perform better than the general linear models, especially when the restrictive assumptions of ANOVA or linear regression are not strictly met [21]. The longitudinal analysis was conducted with a series of generalized estimating equations (GEE) [22]. These models were introduced to fit regression analyses that account for within-subject correlation, which is an inherent part of longitudinal studies that rely on repeated measures. The OQ-45 total score was always defined as the dependent variable. Thus, a Gamma distribution with identity-link function and a robust estimator again best fitted our data. The intercept and slope factor were included in all analyses, which are a common procedure in longitudinal data modelling [23]. In longitudinal analyses, the intercept corresponds to the baseline value of the repeated measures and the slope corresponds to the linear growth rate of those measures (i.e., time-trend). In addition to adjust for the within-subject correlation, the slope factor was also modelled as an interaction effect with the predictor variables to examine changes in the outcome over time in relation to the predictor variables (e.g., treatment arm). These interaction terms always served as the principal effect size in our analyses. To examine potential moderators of the intervention, we additionally fitted interaction effects between treatment arm and predictor variables. These models also controlled for baseline (t_0) OQ-45 scores to focus exclusively on changes over time. Further details for each model are presented in the results section. Analyses were carried out with the SPSS version 23 for Windows.

Results

The baseline demographic and clinical characteristics at t_0 are shown in Table 1. There were no significant group differences. The OQ-45 total score ranged from 8.3 to

Table 1 Baseline descriptive statistics (t_0)

	Group		Test statistic	p
	Control ($n = 75$)	Intervention ($n = 76$)		
Age, years (SD)	41.0 (11.3)	42.1 (11.4)	$U = 2954.0$	0.699
Sex				
Men (%)	39 (49.4)	40 (50.6)	$\chi^2 = 0.0$ ($df = 1$)	0.938
Women (%)	36 (50.0)	36 (50.0)		
Marital status				
Single (%)	31 (49.2)	32 (50.8)	$\chi^2 = 0.4$ ($df = 2$)	0.809
Partnership/married (%)	18 (46.2)	21 (53.8)		
Sep./div./widowed (%)	26 (53.1)	23 (46.9)		
Education level				
Low (%)	16 (47.1)	18 (52.9)	$\chi^2 = 0.1$ ($df = 2$)	0.933
Moderate (%)	41 (50.0)	41 (50.0)		
High (%)	18 (51.4)	17 (48.6)		
Present hospitalisation				
First (%)	43 (50.6)	42 (49.4)	$\chi^2 = 4.1$ ($df = 2$)	0.126
Second (%)	18 (40.0)	27 (60.0)		
Third (%)	14 (66.7)	7 (33.3)		
Diagnosis				
ICD-10 F1 (%)	19 (51.4)	18 (48.6)	$\chi^2 = 0.8$ ($df = 3$)	0.838
ICD-10 F2 (%)	22 (53.7)	19 (46.3)		
ICD-10 F3 (%)	25 (48.1)	27 (51.9)		
ICD-10 F4 (%)	7 (41.2)	10 (58.8)		
OQ-45, Mean (SD)	74.02 (24.08)	73.66 (30.43)	$U = 2389.5$	0.918

143.7, with a mean and standard deviation of 73.8 and 27.4. With respect to the realization of two core elements of the programme in the intervention group, first, a social network representative was assigned in 41 of 76 patients (53.9 %), whereas, second, a meeting of the social network occurred in 27 of 76 patients (35.5 %).

Recovery according to the OQ-45 related to the intervention programme is illustrated in Fig. 2 (top). For it, we built a model that included treatment arm, time slope, and the interaction between treatment arm and time slope as the predictor variables. The interaction term revealed a statistically significant model effect (Wald $\chi^2 = 8.43$, $df = 1$, $p = 0.004$). Participants in the control group had a steeper decline, indicating that their subjective impairment improved more than in the intervention group (Cohen's $d = 0.44$). In the intervention group, the change in OQ-45 total score from t_0 to t_2 was only 12.5, which according to the RCI for the OQ-45 is below the threshold (defined as $\geq$14) of a clinically reliable change. In the control group, the decrease in OQ-45 total score over time was 24.9, which, in contrast, is a clinically reliable change. According to the cut-off value of $\geq$64 for clinically significant impairment, in the control group, 15.6 % remained significantly impaired at 12-month follow-up as opposed to 48.1 % in the intervention group (Fisher's exact test $p = 0.001$).

Next, we built two models, in the first entering network representative and in the second meeting of network members as predictor variables. These models were subjected to the intervention group only. The assignment of a network representative had no effect on the outcome (Wald $\chi^2 = 0.26$, $df = 1$, $p = 0.610$), whereas the meeting of the social network members before or shortly after discharge was significantly associated with less self-rated recovery over time (Wald $\chi^2 = 4.28$, $df = 1$, $p = 0.039$). While patients who had a network-meeting remained on average rather symptomatic and clinically impaired over time (no clinically reliable improvement), patients who had no network-meeting around discharge showed a relatively steep and clinically reliable decline in impairment and achieved on average a score below clinical impairment (see bottom of Fig. 2). The corresponding effect size was moderate (Cohen's $d = 0.46$).

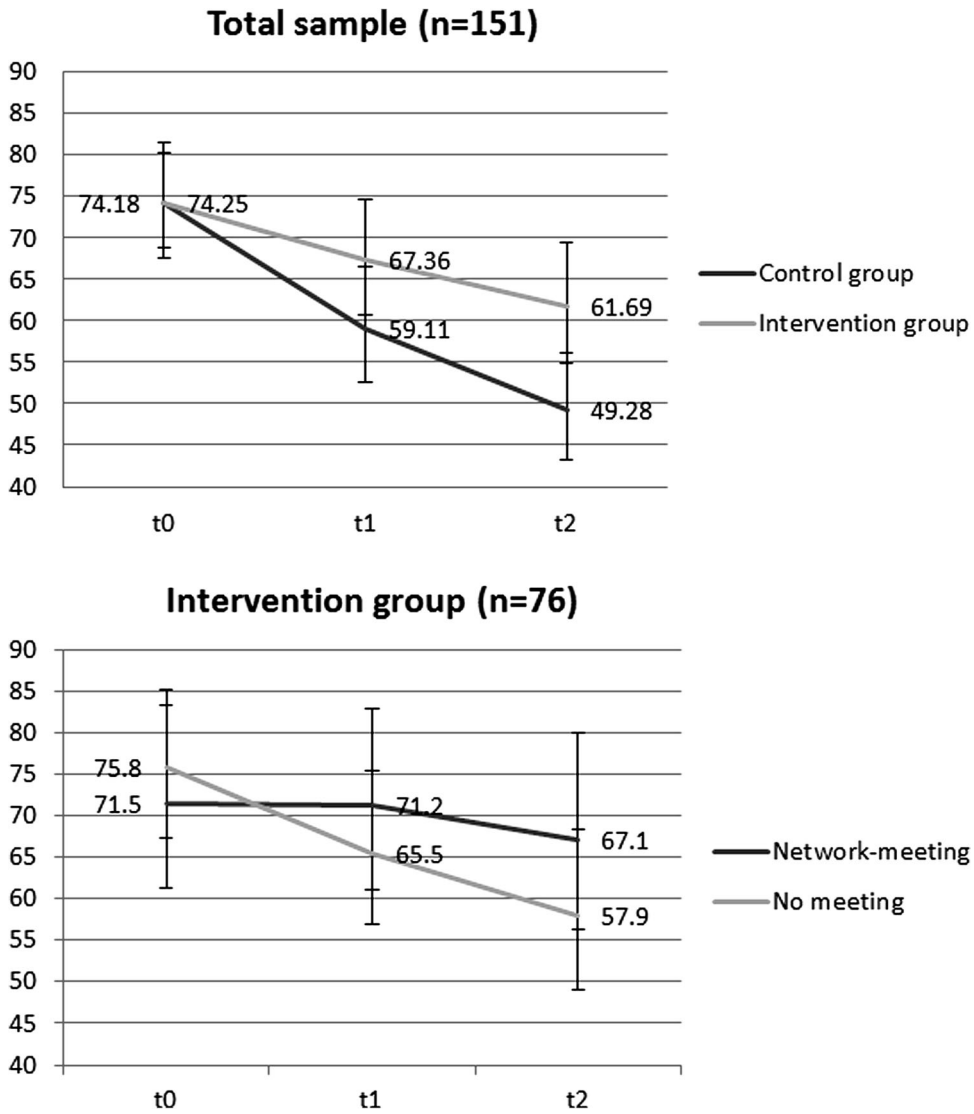

Fig. 2 Recovery according to changes in OQ-45 sum scores over time in relation to treatment arm (*top*) and to a core element of the intervention programme (*bottom*)

Our search for cross-sectional predictors at hospital discharge (t_0) yielded two significant effects according to a series of GLM (see Table 2). Here, we built a simple bivariate model for each predictor variable separately. First, with respect to diagnosis, we found that patients with an ICD-10 F4 diagnosis (anxiety, dissociative, stress-related, and somatoform disorders) reported significantly higher OQ-45 scores than patients with F1 (SUD) or F2 (schizophrenia and psychotic disorders), while patients with F3 (mood disorders) had intermediate scores (Wald $\chi^2 = 13.53$, $df = 3$, $p = 0.004$). Second, a significant effect (Wald $\chi^2 = 9.30$, $df = 1$, $p = 0.002$) also emerged for patients' sex, with women scoring higher on the OQ-45 than men at discharge ($d = 0.50$). Longitudinally, using a series of GEE for each predictor while adjusting for treatment arm, we found no significant effects. That is, changes in self-reported recovery from discharge to 12-month follow-up did not vary in relation to any of the predictor variables included in the analysis.

In a further series of GEE, we examined the interaction effects between treatment arm and predictor variables (see Table 3). These analyses reveal which psychosocial variables moderated the effects of the intervention over time while adjusting for baseline OQ-45 scores. Here, we found a significant association for involuntary index hospitalisation (Wald $\chi^2 = 7.37$, $df = 1$, $p = 0.007$), indicating that in patients with a regular admission, there was no difference in recovery between control and intervention group, whereas in patients with an involuntary admission, the intervention was related to significantly higher OQ-45 scores over time, thus less recovery, than TAU. The mean difference in OQ-45 scores over time between control and intervention group in relation to an involuntary admission was 12.16 points, which corresponds to an effect size of $d = 0.42$ (moderate effect). Another significant effect

Table 2 Effects of psychosocial predictor variables on self-reported recovery (OQ-45 total score)

Predictor	Analysis	Predictor category	Mean/*b*	95 % CI	*p*
Diagnosis	Cross-sectional	ICD-10 F4	89.65	77.60; 101.70	0.004
		ICD-10 F3	77.01	69.09; 84.93	
		ICD-10 F2	65.76	57.91; 73.60	
		ICD-10 F1	67.15	59.02; 75.27	
	Longitudinal	ICD-10 F4	−2.42	−21.47; 16.62	0.803
		ICD-10 F3	−4.24	−16.91; 8.43	0.512
		ICD-10 F2	−4.13	−16.13; 7.88	0.501
		ICD-10 F1	Ref.		
Involuntary index admission	Cross-sectional	Yes	68.49	58.29; 78.68	0.216
		No	75.64	70.68; 80.59	
	Longitudinal	Yes	1.21	−11.25; 13.67	0.849
		No	Ref.		
Number of index hospitalisation	Cross-sectional	Third	84.28	70.00; 98.55	0.288
		Second	72.36	64.78; 79.93	
		First	72.09	66.17; 78.02	
	Longitudinal	Third	8.00	−9.12; 25.12	0.360
		Second	4.07	−5.00; 13.15	0.379
		First	Ref.		
Education level	Cross-sectional	High	71.02	62.48; 79.56	0.145
		Moderate	70.92	65.42; 76.43	
		Low	83.48	71.88; 95.08	
	Longitudinal	High	1.36	−11.81; 14.53	0.839
		Moderate	1.47	−10.54; 13.48	0.810
		Low	Ref.		
Marital status	Cross-sectional	Sep./div./wid.	79.09	72.61; 85.58	0.187
		Married/partner	72.36	61.94; 82.79	
		Single	70.40	63.29; 77.52	
	Longitudinal	Sep./div./wid.	−8.34	−19.38; 2.71	0.139
		Married/partner	−2.87	−14.87; 9.14	0.640
		Single	Ref.		
Sex	Cross-sectional	Women	81.00	74.92; 87.08	0.002
		Men	67.36	61.05; 73.67	
	Longitudinal	Women	−4.10	−13.37; 5.18	0.386
		Men	Ref.		

Cross-sectional analysis (at discharge) reported with mean values and a test of model effects and longitudinal analysis (change from discharge to 12-month follow-up) reported with slope coefficients (*b*) and a test of parameter estimates

emerged for education level (Wald $\chi^2 = 12.48$, $df = 2$, $p = 0.002$), indicating that among persons with high educational degree, participants in the intervention group reported on average 15.1 point higher OQ-45 scores over time compared to TAU ($d = 0.52$).

Discussion

The aim of the present study was to examine predictors of illness severity at discharge from a psychiatric hospital as well as the moderators of a psychosocial post-discharge intervention and their impact on subsequent self-reported mental health recovery over a 12-month follow-up period. As first shown in an earlier report [6], our data suggest that this brief case management programme provided by a social worker may have a deteriorating effect on mental health and delay recovery in the long-term according to self-reported impairment assessed with the OQ-45. In the present study, we, therefore, comprehensively focused on this detrimental effect and explored potential moderators. The negative effect attributable to the intervention was substantial. At 12-month follow-up, participants in the intervention group reported impairments that were close to

Table 3 Longitudinal interaction effects between psychosocial predictor variables and treatment arm on self-reported recovery (change from discharge to 12-month follow-up in OQ-45 total score)

Predictor	Parameter	*b*	95 % CI	*p*
Diagnosis	ICD-10 F4 * intervention	−1.69	−18.83; 15.46	0.847
	ICD-10 F3 * intervention	−3.37	−17.27; 10.54	0.635
	ICD-10 F2 * intervention	−0.40	−8.80; 8.00	0.926
	ICD-10 F1 * intervention	Ref.		
Involuntary index admission	Yes * intervention	12.16	3.38; 20.94	0.007
	No * intervention	Ref.		
Number of index hospitalisation	Third * intervention	0.51	−11.57; 12.59	0.934
	Second * intervention	0.16	−10.60; 10.93	0.976
	First * intervention	Ref.		
Education level	High * intervention	15.08	6.16; 24.00	0.001
	Moderate * intervention	4.15	−6.92; 15.22	0.463
	Low * intervention	Ref.		
Marital status	Sep./div./wid. * intervention	5.72	−5.41; 16.85	0.314
	Married/partner * intervention	6.54	−5.80; 18.89	0.299
	Single * intervention	Ref.		
Gender	Women * intervention	0.61	−9.57; 10.78	0.907
	Men * intervention	Ref.		

half a standard deviation ($d = 0.44$) higher than in controls. A year after discharge almost every second patient (48.1 %) remained clinically significantly impaired in the intervention group, whereas in the control group, only one in seven (15.6 %) reported clinically significant impairments. Moreover, in the intervention group, the majority of patients did not reliably improve over the 12-month observation period according to the reliable change index.

We have previously suggested that a stable and functional social network may be prerequisite for this intervention to be effective [11]. However, on the other hand, it has also been shown that persons with severe mental disorders are socially only loosely integrated and lack social support [24–26]. It is, therefore, conceivable that a short-term social network intervention might produce turmoil in patients with instable social networks, which could account for the negative effect on self-reported mental health. In accordance with this notion, our data revealed that the interdisciplinary meeting of the social network was associated with a detrimental effect on subjective mental health. This is a striking and alarming finding and we believe that the careful re-examination of such clinical practice is warranted in future studies. Nevertheless, as long as these findings have not been replicated in other trials, implications and conclusions need to be considered with reservation. As stated above, in this respect, it also needs to be taken into account that this is a post hoc analysis of a specific outcome selected from a previous report due to its marked negative effect [6].

A critical review of the literature indicates that the overall efficacy of discharge interventions [1, 2] and case management programmes [7, 10] is at best modest. Moreover, it is known that psychosocial interventions can also cause unwanted and unexpected adverse (side) effects in a substantial portion of patients [27, 28]. However, that an intervention based on widely acknowledged social resources [12, 14] has a negative impact on recovery relative to treatment as usual is still surprising. Because this intervention was mainly socio-interpersonal, we need to consider detrimental effects that may emerge in the synergism of interpersonal human behaviour. For instance, interventions that are specifically targeted at the social network and interpersonal relationships may cause high expressed emotions in friends and relatives, which are known to worsen clinical outcomes and psychopathology in psychiatric patients [29]. Detrimental effects of adverse social support on psychopathology have, for instance, been stressed in the post-traumatic stress disorder literature [30]. In addition, a review of acute symptom deterioration during psychosocial interventions for SUD has shown that interpersonal factors such as confrontation and criticism, lack of bonding as well as stigma are particularly important [31]. The latter concept—stigma—has extensively been researched in psychiatry and clinical psychology in the last three decades. It has been shown that mental health stigma is a common phenomenon in the general population [32, 33] and that it relates to a variety of negative outcomes in persons with mental disorders [34, 35]. More specifically, in the present study, increased self-stigma and stigma-related stress might have been prompted through the involvement of the social network and produced a negative effect on well-being and mental health [36, 37]. Importantly, an involuntary index hospitalisation and a high educational degree appeared to negatively moderate the

effects of the intervention in the present study. That is, in both patients with involuntary hospitalisation and high educational degree, the intervention was associated with less long-term recovery than treatment as usual. Thus, as discussed above, it appears that some forms of social support and interpersonal involvement can detrimentally impact on mental health and functioning in specific psychiatric patients [29–31]. As we can only speculate about the exact nature of this relationship, we stress that intervention programmes targeted at the social network should carefully evaluate who and when someone from the social network should be involved. Further research is certainly required to explore the underlying pathomechanism.

Our analysis also showed that women scored significantly higher on the OQ-45 than men at discharge, indicating that women left the hospital with higher subjectively experienced impairment than men. This finding converges with a great body of evidence indicating that gender is an important factor in both public mental health and psychiatric practice [38]. Overall, women report more psychopathological symptoms and experience more mental disorders than men. In particular, women score higher on the trait of neuroticism [39, 40] and accordingly experience more internalizing disorders (i.e., depression, anxiety, stress-related, and somatoform disorders) [41–43]. These gender differences origin already in childhood and adolescence and may be attributed to early biological and environmental interactions [44]. Finally, the patient's diagnosis exerted a significant effect insofar as SUD, and psychotic disorders were related to considerably lower OQ-45 scores at discharge. This finding is presumably best explained by the reduced self-awareness of patients with SUD or psychosis. Clinical experience and research reports indicate that many patients with SUD and psychosis do not appraise their condition as burdensome and frequently they lack insight into their disorder [45–47].

Some limitations must be considered when interpreting the results of the present study. The generalisability of the results is limited insofar, as only low-frequency users were included (i.e., patients with no more than three hospitalisations within the last 3 years). We felt obliged to conceive the study in this way, because we had experienced that chronic high-frequency users were not suitable for this kind of intervention. Moreover, only 151 patients out of 3848 persons (4.0 %) who were initially assessed for eligibility were eventually included in the analysis. This is a general limitation inherent to most, if not all, research in this field. The systematic exclusion of most patients in RCT-research poses a serious problem to the relevance and validity of RCT findings for general mental health practice in the community [48]. Another limitation that needs to be addressed is the drop-out rate of 33.5 %. No measure of mental health and functioning at baseline (t_0) predicted the subsequent drop-out at t_1 or t_2. However, the analysis showed that the drop-out rate differed considerably between groups (40.0 % in the control group vs. 26.8 % in the intervention group). This is relevant insofar, as it has been argued that both harmful and successful interventions may yield higher drop-out rates [28]. Therefore, we cannot exclude a potential bias. In addition, it was not systematically assessed whether patients in the control group made contact with social workers after hospital discharge. However, as reported in the main evaluation of the programme [6], persons in the control group tended to make less outpatient visits during follow-up (10.5 vs. 13.7 mean visits), which is why we can rule out that they received more professional support from social workers than persons in the intervention group. Finally, personality was not assessed, though the previous research has demonstrated that personality traits are among the most important predictors of psychopathology, social functioning, and health care utilisation [49–51]. We thus recommend that future work on transitional interventions should include at least a brief personality inventory. Considering these limitations, our data suggest that this post-discharge intervention exerted an unexpected negative effect on subjective long-term recovery as assessed with repeated OQ-45 measures. Although this finding was undoubtedly undesirable, it may help to advance our understanding of psychosocial treatments and the effects that these interventions possibly could exert on psychopathology, functioning, and recovery. We suggest that caution is warranted upon decisions to hold a social network review meeting. Further examinations focusing on possible underlying pathomechanisms are necessary, and these findings need to be taken with reservation pending replication.

Compliance with ethical standards

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Conflict of interest There are no conflicts of interest.

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