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ORIGINAL ARTICLE

Psychiatric Treatment Outcomes of Preschool Children in a Family Day Hospital

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Abstract This study describes the treatment outcomes of preschoolers with severe mental health problems who were treated at the child psychiatric family day hospital for preschool children in Münster, Germany. The eclectic multi-modal treatment combines behavioral and psychodynamic techniques for both parents and children in various settings within an intermittent attendance structure provided by a multi-disciplinary team. This study evaluated 185 children with the Caregiver-Teacher Report Form (C-TRF/1.5–5), which was completed by therapists, and the Child Behavior Checklist (CBCL/1.5–5), which was completed by mothers, at admission and discharge. The mothers' ratings of their children were statistically adjusted for the distortion caused by their own psychopathology. After treatment, the patients showed significant improvement on the C-TRF/CBCL Total Problem score with an average Cohen's $d = -0.50$ based on therapists' ratings, $d = -0.97$ for the non-adjusted maternal ratings, and $d = -0.68$ for the adjusted maternal ratings. We conclude that specialized family day hospitals may successfully treat preschool psychiatric patients.

Keywords Preschool psychiatric family day hospital · Treatment outcome · CBCL · Distortion · Multi-informant

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Introduction

Psychiatric disorders and behavioral problems affect a considerable number of children and their families. Skovgaard et al. [1] and Briggs-Gowan et al. [2] described mental health problems within the first 2 years of life according to the International Classification of Diseases (ICD-10) and the Diagnostic Classification Zero to Three (DC 0–3). The reported prevalence rates were between 7.9 and 18 %, varying by method [3–5]. One explanation for these heterogeneous prevalence rates may be the variation in age-related diagnostic criteria and assessment methods used [6, 7]. However, the cited studies suggest that emotional and behavioral problems may occur even in the first years of life and may cause additional harm and maladjustment, including low academic achievement [8, 9]. A primary research question in this field is whether emotional and behavioral problems persist through childhood and whether early interventions are justified.

The results of longitudinal studies that begin in preschool suggest that, in many cases, mental health problems are not a transient phenomenon. Mathiesen and Sanson [10] examined the earliest years of life and conducted a study with 18-month-old children (N = 750); based on their findings, the authors were able to predict childhood behavioral problems at 30 months. Lavigne et al. [11] described the stability of a psychiatric disorder diagnosed at age two and persisting to ages 3–5. Caspi et al. [12] (N = 1,037) examined 3-year olds and predicted adult psychiatric disorders at 18 years of age. In a sample of 6-year olds (N = 814), Beyer et al. [13] described a consistent shift from internalizing symptoms at baseline toward a combination of internalizing and externalizing symptoms at follow-up over a 4-year period. Verhulst and van der Ende [14] studied children aged four to eleven

(N = 936) and reported that deviant children were more likely to show deviant behavior again 6 years later, with an odds ratio of nine [15]. These findings suggest that many young children with emotional or behavior symptoms will not "grow out" of their mental health problems.

Although mental health problems in children exist in both sexes, there are some gender differences that slowly develop over the preschool years. For example, externalizing behavioral problems are more common and more persistent in boys [16, 17]. Similarly, untreated internalizing behaviors in preschool girls are stable over time [18]. In a study of 3-year olds, Pihlakoski et al. [19] reported that externalizing problems in boys predicted externalizing and internalizing problems at age 12. For girls, on the other hand, internalizing behaviors at age 3 predicted internalizing behavior at age 12. Mood and anxiety disorders in girls and boys could be predicted 14 years after a preschool assessment ([20]; see also the follow-up 24 years later by Reef et al. [21]; see also Danzig et al. [22]). In summary, using the results of longitudinal studies, we can conclude that untreated behavioral problems are likely to be stable and persistent, irrespective of the time of the first assessment, assessment instruments, and time span between assessments. The underlying etiological mechanisms are not completely understood, but many young children with mental health problems will have problems later in childhood, adolescence, and even adulthood. These symptoms may produce considerable individual suffering and enormous personal, social, and financial healthcare costs if they are not detected and treated early.

Empirical studies of treatment with preschool-aged children range from short parent trainings to studies mainly focusing on long-term family-oriented multi-modal therapy, which may be offered in a day treatment setting or by child psychiatry inpatient services. High research standards have been achieved mainly for short parent training programs such as "Triple P" [23] and the "Incredible Years Parenting Program" [24]. However, those programs have been conceptualized for relatively healthy parents, i.e., those without parental psychiatric disorders, parent–child interaction problems, or severe marriage conflicts. Families with complex problem constellations may seek help in a partial hospitalization treatment setting, such as day treatment hospitals, which are relatively rare [25, 26]. The available studies on psychiatric day treatment or inpatient treatment often include mixed populations of children with a wide age range [27–30]. There are only a few studies on preschool samples that provide quantitative analyses with repeated application of standardized instruments, but the results on effectiveness of treatment are mixed [31–33].

Previous studies have not focused on the assessment of child symptoms by multiple informants (e.g., parent, teachers, and therapists), which is recommended [34, 35]. However, the analysis of low to moderate agreement between different raters [36] represents a methodological challenge. One reason for disagreement may be that parents with increased psychopathology overreport their child's psychopathology [37], but recent developments enable control for this influence statistically [38, 39]. This approach may not resolve all potential cross-informant influences but may point to some neglected issues in evaluating child psychiatric services.

In the previous subsection, we focused on a diagnostic issue in assessing child psychopathology that arises when the informant is a distressed mother. However, the fact that in our hospital the children are accompanied by a mother who herself is frequently distressed raises several other issues with respect to the interpretation of treatment effects. Specifically, mothers themselves will benefit from treatment, and this effect may be confounded with child treatment gains. However, we believe that the treatment benefits afforded to the child and mother are both multiply determined, and therefore, we would like to point to some plausible explanations in an explorative manner.

First, one may consider parental distress as an etiological factor for child behavioral and emotional problems. Therefore, we may expect that a reduction in maternal distress will also lead to a reduction in child behavioral and emotional problems. Therefore, in this study on child treatment benefits, we controlled for maternal psychopathology at the beginning of therapy, and we also controlled for a potential reduction in maternal psychopathology due to the therapy process.

The present paper evaluates the effectiveness of treatment at the Family Day Hospital for Preschool Children. We applied a multi-informant pre-post design with standardized instruments at admission and at discharge to evaluate the effects of therapy on child symptomatology. The analysis controls for a potential distortion bias, influences of duration of treatment, child age, child gender, maternal psychopathology at admission, and improvement in maternal psychopathology in an exploratory manner.

Methods

Procedures

The Family Day Hospital for Preschool Children (in short, Family Day Hospital) is a treatment unit of the child and adolescent psychiatry of the University Hospital in Münster, Germany, and is described in detail in Furniss et al. [40]. Briefly, the Family Day Hospital treats infants and preschool children with severe mental health problems, such as attachment and relationship disorders, affect regulation disorders, early emotional disorders, and developmental

disorders. The children participating in this study were referred by the outpatient department several months prior to admission. In the outpatient department, an experienced clinical expert assessed the clinical status of each child and caregiver and placed them on the waiting list. The hospital has a waiting period of approximately four and a half months. Within the first 3 weeks of admission to the Family Day Hospital, an initial standardized assessment was performed. This evaluation included a dimensional assessment of child psychiatric symptoms using the Child Behavior Checklist for ages 1.5–5 (CBCL/1.5–5) and the Caregiver-Teacher Report Form for children ages 1.5–5 (C-TRF/1.5–5). Therapists completed the C-TRF/1.5–5 at admission and at discharge. Mothers completed the CBCL/1.5–5 and the Symptom Checklist-90-Revised (SCL-90-R) at admission and at discharge. Questionnaires from fathers (<5 % of cases) were not included to maintain the more homogeneous sample of mothers. Only one child per family was included in this analysis to avoid confounding effects. This naturalistic study comprises 185 children who attended the Family Day Hospital between 2001 and 2011 with their mothers. The dropout rate at discharge was 12.0 %. In these cases, parents withdrew from the therapy, sought treatment outside of the Family Day Hospital, or left the study for other reasons. Nevertheless, a final standardized assessment of child psychopathology by a therapist (C-TRF/1.5–5) was obtained in many dropout cases. The average length of stay in the hospital was 51.08 treatment days.

Family Day Hospital in Münster

Treatment Description

The eclectic multi-modal treatment combines behavioral and psychodynamic techniques for both parents and children. For example, behavioral techniques comprise video self-modeling and video feedback of the parent–child interaction, coaching of the parent interacting with the child, and coaching of the child in peer interaction, in a variety of structured and unstructured daily activities such as mealtimes, playing, dressing, cleanliness education, and tidying up. Psychodynamic techniques comprise addressing the maternal mental representations of the child in parent group treatments, parent counseling, conjoint family therapies with siblings, and individual psychotherapy with parents. Additional functional therapies comprise psychomotor treatment that focuses on physical activities to improve sensory self-awareness, sensory integration, and motor skills. A full description of the treatment components is provided in Furniss et al. [40]. The team members included a senior psychiatric consultant, a child psychiatric intern, a developmental psychologist, an occupational therapist, a psychomotor therapist, a child psychotherapist-in-training, and nurses. Other environmental interventions and psychotropic medication were rarely provided (in less than 1 % of cases) because of the age of the children. A specific feature of the Family Day Hospital is the structure of intermittent weekly attendance of 2–3-day blocks (from Monday to Tuesday or from Wednesday to Friday). Thus, patients and their families experienced relatively short intervals of intensive therapeutic interventions, combined with longer intervals in natural settings, such as at home or kindergarten, where behavior changes could be tested.

The Role of Parents in Treatment

In the Family Day Hospital, each child is accompanied by at least one parent (in our sample, the mother) or other caregiver. Parents' have five roles in the psychiatric treatment of their children. The first parental role is to maintain the child's treatment compliance. Second, the parent provides diagnostic information about the child's behavior and internal states. Third, the parent can assist in therapy. Fourth, the parent's parenting in itself can be addressed, for example, to change it in a way that may better fit the child's individual temperament. Finally, parents who suffer from psychiatric disorders themselves may receive treatment but only when necessary to successfully treat the child (for example, symptoms that affect normal parenting responsibilities, attachment, or the parent–child relationship).

Sample

The Family Day Hospital is located in the city of Münster in Northern Germany. Münster had a population of approximately 254,000 residents at the time of data collection. The demographic features of the local population are described by Furniss et al. [41].

Children

Our study included 185 children: 130 boys (70.3 %) and 55 girls (29.7 %). The average age of the children was 4.33 years ($SD_{age} = 1.22$; age range = 1.5–5.9 years), and 93.5 % of the children were German. Most of the children lived with both parents (70.3 % of the sample compared with 81 % of the local population), and 44 children (23.8 % of the sample compared to 19 % of the local population) lived in a single-parent home. Seventy-one children did not have siblings (34.7 % of the sample compared with 16.8 % of the local population). The most common primary diagnoses were *emotional disorders with onset specific to childhood* (ICD 10 F93; $n = 96$) and

mixed disorders of conduct and emotion (ICD 10 F92; $n = 41$).

Mothers

The average age of the mothers was 32.56 years ($SD_{age} = 6.10$, age range = 19–54 years). Educational attainment was reported by 73.5 % of all mothers. From this sample, 30.9 % completed a maximum of nine years of secondary school (which comprises all types of school education beyond basic or elementary school). In addition, 39.7 % completed ten years of secondary school, and 24.3 % completed 12–13 years of school. For comparative purposes, the characteristics of the local population can be found in Furniss et al. [41]. A considerable proportion of the mothers (42.7 %) presented clinically relevant psychiatric symptoms (see below for the SCL-90-R).

Measures

CBCL and C-TRF

The mothers rated their children using the German versions of the CBCL/1.5–5 [42–44]. The CBCL is a widely used instrument for assessing behavioral and emotional symptoms in children of different ages [35]. The CBCL/1.5–5 consists of 100 items that are rated by parents on a three-point scale. The questionnaire yields T-scores for three broadband scales (Internalizing Symptoms, Externalizing Symptoms, and Total Problems) to describe behavioral and emotional problems that may be present in preschool children. The reliability and validity of the test has been tested internationally [45]. With our sample, all scales showed satisfactory internal consistency at admission (Internalizing Symptoms, $\alpha = 0.82$; Externalizing Symptoms, $\alpha = 0.88$; Total Problems, $\alpha = 0.91$) and at discharge (Internalizing Symptoms, $\alpha = 0.86$; Externalizing Symptoms, $\alpha = 0.92$; Total Problems, $\alpha = 0.93$).

Therapists also rated the children within the first 3 weeks of attendance, using the German version of the C-TRF/1.5–5. This assessment parallels the CBCL and allows teachers or other caregivers to rate symptoms. The C-TRF also showed satisfying internal consistency at admission (Internalizing Symptoms, $\alpha = 0.86$; Externalizing Symptoms, $\alpha = 0.92$; Total Problems, $\alpha = 0.93$) and at discharge (Internalizing Symptoms, $\alpha = 0.83$; Externalizing Symptoms, $\alpha = 0.88$; Total Problems, $\alpha = 0.92$). Given the results of the epidemiological studies cited in the introduction, we included the 'borderline' range [42] with the 'clinical range.' Consequently, in this study, scores from the 83rd percentile upward were considered clinically relevant, which implies a cut-off score of $T > 60$. This cut-off was also used in Rescorla et al. [46].

SCL-90-R

Mothers completed the 90-item SCL-90-R [47, 48] to assess psychopathology over the previous seven days using a five-point Likert scale (0 = *no problem* to 4 = *very serious*), and the results showed satisfactory internal consistency at admission with $\alpha = 0.96$ and at discharge with $\alpha = 0.96$. Current international studies recommend using the Global Severity Index (GSI) to assess general psychopathology [49, 50]. Participants who meet or exceed the GSI cut-off score of 0.77 are considered to exhibit clinically relevant psychiatric symptoms [48].

Statistical Analyses

Control for Distortion

There is considerable evidence that depressed adults show specific cognitive, perceptual, and affective biases [51] that may cause depressed mothers to overestimate their child's emotional and behavioral problems. This is known as the depression-distortion hypothesis. Müller and Furniss [38] tested this within a structural equation modeling three associations. First, a mother's rating is an indicator of her child's behavior problems (which was confirmed in our sample; see also Müller et al. [37]). Second, we tested whether a mother's rating of her child's behavior problem is an indicator of her own psychopathology (which was also confirmed for our sample). Finally, we tested the assumption that maternal psychopathology (assessed by the SCL-90-R and Beck Depression Inventory [52]) and child psychopathology (assessed by maternal, therapist, and teacher ratings) show substantial covariation (which was not confirmed in our sample). Therefore, a clinician cannot directly interpret a maternal rating as an indicator of her child's psychopathology. Consequently, we decided to develop adjustment formulas by a regression analysis to statistically control for the bias. The adjustment formulas were derived for each of the three scale scores (Total Problems, Internalizing, and Externalizing) via three adjustment equations that were specially developed for this purpose by Müller and Furniss [38] (Eq. 1) and Müller et al. [39] (Eqs. 2, 3).

$$\text{Total Problem Score adjustment} = (\text{GSI} * 10.01) + 4.50 \quad (1)$$

$$\text{Internalizing Score adjustment} = (\text{GSI} * 9.73) + 4.38 \quad (2)$$

$$\text{Externalizing Score adjustment} = (\text{GSI} * 7.16) + 3.22 \quad (3)$$

Treatment Outcome Test

Prior to the main analyses, the intercorrelation of these nine outcome measures, together with a measure of maternal psychopathology, were examined, which served as background information for the interpretation of subsequent results. We conducted a repeated measures analysis of variance and included effects due to treatment and gender as the main effects, as well as their interaction. This procedure was conducted for each of the nine outcome measures: total problem score, Externalizing, and Internalizing scale, each in three variations with the therapist as the informant, mother as the informant, and maternal rating controlled by the correction equations presented above. We report the means and standard deviations of the outcome scores at admission and discharge for each informant's ratings. Cohen's effect size d was calculated to quantify the magnitude of change, which was also expressed on the individual level by the RCI. The RCI score provides an illustrative descriptor of the proportion of significant improvement on the individual level [53]. Furthermore, we determined the relative frequency of clinical improvement from admission to discharge, according to the clinical cut-off criterion of the instrument. Note that we did not conduct separate analyses of treatment outcomes in several diagnostic categories because the numbers of cases were too small to perform a meaningful comparison.

Exploratory Analyses

We conducted exploratory analyses to identify possible influences on treatment outcomes. To this end, we calculated the difference in scores from admission to discharge. This improvement score was calculated from the Total Problem, Externalizing, and Internalizing scores obtained from mothers and therapists. The improvement score was used to measure treatment outcome. The influence of maternal psychopathology at admission, improvement in maternal psychopathology, duration of treatment in days, and child age were evaluated within a multiple regression analysis. Missing data (16.1 %) analyses were conducted and did not reveal any threats to the validity of the results. Statistical analyses were conducted using the Statistical Package for the Social Sciences, SPSS 22, IBM Corporation. The alpha level was set at $p < .01$ because of the total number of statistical tests and the sample size, which may render very small effects significant without being clinically relevant.

Results

Treatment Outcomes

Scale Intercorrelation from Admission to Discharge

Before we present the main results on treatment outcome, we will present the intercorrelation of the nine outcome scores for child psychopathology from admission to discharge and their correlations with a measure of maternal psychopathology in Table 1.

The results presented in Table 1 serve three purposes. First, the correlation presented in Table 1 in the first column illustrates how stable the ranking of psychopathology in the child and the mother is—aside from any shift in the level of symptom burden. The second purpose of the Table 1 is to illustrate the effects of the correction formulas [38, 39]. Mothers' ratings about child psychopathology were considerably correlated to the level of the self-reported maternal psychopathology, but the adjusted ratings were not. The third purpose of Table 1 is to provide background information for the interpretation of the subsequent analyses of variance and multiple regression.

Table 1 Intercorrelation between child and maternal outcome measures

			T2 Same scale	T1 Maternal psychopathology
T1	Therapist	Internalizing	.46*	.00
		Externalizing	.57*	−.01
		Total Problems	.33*	−.05
T1	Original maternal rating	Internalizing	.42*	.46*
		Externalizing	.47*	.28*
		Total Problems	.40*	.46*
T1	Adjusted maternal rating	Internalizing	.39*	−.04
		Externalizing	.45*	−.05
		Total Problems	.32*	−.07
T1	Maternal psychopathology	GSI	.50*	–

* $p < .05$

Table 2 Repeated measures of analysis of variance of outcomes for therapist ratings (a), original maternal ratings (b), and adjusted maternal ratings (c) of CBCL/1.5–5 of Internalizing, Externalizing, and Total Problem T-scores for children at admission and discharge (N = 185); changes in maternal distress level are presented in table (d)

	Admission	Discharge	MANOVA	Cohen		*RCI*
	M (SD)	*M (SD)*	*F (1.183)*	*p*	*d*	
(a) Therapist ratings						
Internalizing	60.47 (9.85)	55.93 (7.95)	31.06	.0001	−0.65	23.8
Externalizing	59.73 (8.70)	56.35 (8.33)	28.43	.0001	−0.43	30.8
Total problems	60.86 (7.45)	56.56 (7.04)	43.86	.0001	−0.51	41.1
(b) Original maternal ratings						
Internalizing	60.88 (9.30)	54.06 (10.24)†	67.78	.0001	−0.65	33.5
Externalizing	62.68 (10.41)†	52.69 (8.90)†	152.03	.0001	−1.00	55.7
Total problems	62.23 (9.05)	52.66 (9.44)†	142.64	.0001	−0.95	62.7
(c) Adjusted maternal ratings						
Internalizing	58.33 (8.26)†	54.97 (9.19)	23.71	.0001	−0.35	21.6
Externalizing	60.80 (10.02)	53.36 (8.68)†	90.78	.0001	−0.75	40.0
Total problems	59.60 (8.05)	53.60 (8.89)†	65.73	.0001	−0.61	44.9
(d) Maternal pathology						
GSI-SCL-90-R	.71 (.47)	.36 (.32)	97.16	.0001	−0.86	–

† Additional dependent t-test within a column between original or adjusted maternal rating and therapist scale scores with $p < .05$. *RCI* reliable change index, Percentage of patients with statistically significant improvements

Child and Maternal Changes in Scale Scores

Tables 2a, b, and c present the therapists', original maternal, and adjusted maternal ratings at admission and discharge. In addition, we present the means and standard deviations for maternal psychopathology at admission and discharge in Table 2d. Treatment outcomes were tested by repeated measures analysis of variance. All nine outcome variables showed a main treatment effect, but there was neither a gender effect nor a significant interaction, which were therefore omitted from further analysis. We described the main treatment effects on the group level in terms of Cohen's *d* and those on the individual level by the *RCI*.

Table 2a shows the T-scores from the C-TRF/1.5–5 for therapist ratings and for Internalizing, Externalizing, and Total Problem at admission, which differ only slightly from each other. At discharge, the mean scores were all significantly lower by approximately three to five points on a T-score scale. With respect to effect sizes, the ratings indicated a moderate improvement in all scores. The RCI magnitudes described statistically significant improvement on the individual level and indicated an improvement in overall psychopathology for approximately 41 % of all patients. For the syndrome scales, the RCI magnitudes were lower, which probably reflects a lower reliability caused by a smaller number of items.

Table 2b shows the original maternal ratings. At admission, the T-scores significantly exceeded the ratings of the therapists on the Externalizing scale (dependent *t* test; $t = 3.63$, $p < .001$). At discharge, all scale scores were in the range of the normal population and were significantly lower compared to the scores at admission. Maternal ratings exceeded therapists' ratings on the Internalizing ($t = -2.17$, $p = .031$), Externalizing ($t = -4.26$, $p < .001$), and Total Problem scale ($t = -4.44$, $p < .001$). With respect to effect sizes, maternal ratings indicated a moderate improvement in Internalizing problems and strong improvement for the Externalizing and Total Problem scores. The RCI magnitudes for the original maternal ratings exceeded those of therapists in the case of Externalizing scores by more than 25 %.

Table 2c presents the adjusted maternal ratings at admission, which were lower than the original maternal scale scores shown in Table 2b. The adjusted scale scores did not differ significantly from those of the therapists, except for the Internalizing scale ($t = -2.60$, $p = .010$). At discharge, the adjusted maternal scale scores differed from the therapists' scores with respect to the Externalizing ($t = -3.56$, $p < .001$) and Total Problem scores ($t = -3.54$, $p = .001$). The effect sizes were reduced by the adjustment; moreover, the RCI magnitude appeared in the range of the RCI magnitude of therapist ratings. Finally, Table 2d shows that maternal psychopathology decreased from admission to discharge by a considerable magnitude according to the Cohen's $d = -0.86$.

Overall, we observed a significant improvement in child symptoms from admission to discharge, irrespective of informant and scale, but the magnitude of change varied by

informant. In addition, Table 2c shows that the changes in maternal ratings from admission to discharge were robust in the face of adjustment in the case of distortion.

Clinical Improvement

In addition, as an alternative approach to aggregating the mean scores, we described the relative frequency of children who scored in the clinical range of the CBCL/1.5–5/C-TRF 1.5–5 Total Problems Scales. These data are presented in 2 × 2 tables (admission vs. discharge and clinical vs. non-clinical). Table 3 shows the results for the (a) therapists' ratings, (b) original maternal ratings, and (c) adjusted maternal ratings.

According to the ratings of the therapists, more than half of the children (57 %) had clinically significant symptoms at admission, and one-third of the children still had clinically significant symptoms at discharge. According to the original maternal ratings, approximately 64 % of children showed clinically significant symptoms at admission, and 22 % of the children still showed clinically significant symptoms at discharge. The adjusted maternal ratings in Table 3c resembled the ratings of the therapists at admission. However, the adjusted maternal ratings indicated that more children scored in the 'normal' range than according to the therapists' rating.

Table 3 Treatment effectiveness according to the children's clinical level at admission and discharge for (a) therapists' ratings, (b) original maternal scores, and (c) adjusted maternal ratings (in percent; $N = 185$)

	Child clinical level classification		
	At discharge		
	Normal	Clinical	Total
(a) Therapist ratings			
At admission			
Normal	33.0	9.7	42.7
Clinical	32.4	24.9	57.3
Total	65.4	34.6	100.0
(b) Original maternal ratings			
At admission			
Normal	31.9	3.8	35.7
Clinical	46.5	17.8	64.3
Total	78.4	21.6	100.0
(c) Distortion adjusted maternal ratings			
At admission			
Normal	35.1	9.2	44.3
Clinical	40.0	15.7	55.7
Total	75.1	24.9	100.0

Covariates of Child Therapy Outcomes

Several conditions for treatment outcome are examined next in an explorative manner. For example, influences may be related to attributes of the children, such as age at the beginning of treatment or pre-treatment scores. Furthermore, maternal psychopathology and the mothers' improvement in therapy may be sources of influence. Finally, the duration of the treatment may explain a proportion of the variation in treatment outcome. These factors were analyzed by a multiple regression, and the results are presented in Tables 4a (Therapist rating), 4b (Original maternal rating), and 4c (Adjusted maternal ratings) for the Internalizing, Externalizing, and Total Problem score, respectively.

Table 4a presents the beta coefficients for predicting the treatment benefits of therapists' rating. The pre-treatment scores had the greatest impact on the treatment benefit for the Internalizing, Externalizing, and Total Problem scores. The positive beta coefficient indicates that children with a greater pre-treatment symptom burden showed a greater reduction in symptom level. Neither maternal psychopathology nor maternal improvement were related to treatment gains in children. Furthermore, neither child age nor the duration of treatment contributes to predicting a better or worse outcome.

Table 4b presents the treatment benefits based on the original maternal ratings. With respect to the potential influencing factors, the pre-treatment scores again had the greatest influence on treatment outcome. In contrast to therapist ratings, maternal psychopathology significantly predicted changes in the Internalizing and Total Problem scores. In other words, a self-reported high maternal psychopathology was associated with a smaller treatment benefit for the children. However, a reduction in a mother's psychopathology was positively associated with treatment gains for her child. Note that these associations may be inflated by the method factor of the same informant and an additional impact due to distortion, which was ruled out for the following results on adjusted maternal scores.

Table 4c presents predictors of therapy success based on adjusted maternal ratings. As with all other informant conditions, the pre-treatment scores play the most important role as a predictor of therapy success. Again, maternal psychopathology is a negative predictor for child improvement and is relatively robust against the adjustment. However, maternal improvement appears to no longer be associated with a treatment benefit for the children.

Discussion

Family Day Hospitals represent a rarely available mental health service in Germany [40], whereas epidemiological

Table 4 Results of a regression analysis predicting improvement in Total Problem, Internalizing, and Externalizing Scales Scores in CBCL/1.5–5

Informant	B	SE B	ß	t	*p*	R^{2-} adj
(a) Therapist						
Internalizing						.44
Intercept	−35.28	3.83		−9.21	<.001	
Pre-treatment score	0.63	0.05	0.66	11.84	<.001	
Maternal psychopathology	2.43	1.66	0.12	1.47	.144	
Maternal improvement	0.45	1.85	0.02	0.25	.806	
Child age	−0.01	0.04	−0.02	−0.29	.772	
Treatment days	0.01	0.02	0.03	0.49	.628	
Externalizing						.23
Intercept	−22.17	4.12		−5.38	<.001	
Pre-treatment score	0.44	0.06	0.48	7.34	<.001	
Maternal psychopathology	2.60	1.61	0.16	1.61	.108	
Maternal improvement	−2.30	1.79	−0.12	−1.29	.200	
Child age	−0.05	0.04	−0.09	−1.39	.168	
Treatment days	0.01	0.02	0.03	0.49	.628	
Total Problems						.37
Intercept	−38.08	4.56		−8.35	<.001	
Pre-treatment score	0.68	0.07	0.59	10.00	<.001	
Maternal psychopathology	1.61	1.56	0.09	1.03	.305	
Maternal improvement	0.15	1.73	0.01	0.09	.932	
Child age	−0.04	0.03	−0.07	−1.07	.285	
Treatment days	0.03	0.02	0.10	1.67	.096	
(b) Original maternal ratings						
Internalizing						.37
Intercept	−27.05	4.63		−5.84	<.001	
Pre-treatment score	0.58	0.08	0.50	7.36	<.001	
Maternal psychopathology	−9.93	2.12	−0.45	−4.69	<.001	
Maternal improvement	14.46	2.21	0.58	6.56	<.001	
Child age	0.05	0.04	0.07	1.09	.279	
Treatment days	−0.03	0.03	−0.07	−1.19	.237	
Externalizing						.41
Intercept	−31.17	4.00		−7.80	<.001	
Pre-treatment score	0.58	0.06	0.61	10.08	<.001	
Maternal psychopathology	−3.82	1.84	−0.18	−2.08	.039	
Maternal improvement	4.55	2.01	0.19	2.26	.025	
Child age	0.08	0.04	0.11	1.91	.058	
Treatment days	0.03	0.02	0.08	1.41	.161	
Total Problems						.32
Intercept	−31.30	4.83		−6.48	<.001	
Pre-treatment score	0.62	0.08	0.56	7.85	<.001	
Maternal psychopathology	−5.91	2.11	−0.28	−2.80	.006	
Maternal improvement	7.39	2.19	0.31	3.37	.001	
Child age	0.09	0.04	0.13	2.03	.044	
Treatment days	−0.02	0.03	−0.04	−0.68	.498	
(c) Adjusted maternal rating						
Internalizing						.25
Intercept	−27.05	4.63		−5.84	<.001	
Pre-treatment score	0.58	0.08	0.55	7.36	<.001	

Table 4 continued

Informant	B	SE B	ß	t	*p*	R^{2-} adj
Maternal psychopathology	−9.93	2.12	−0.49	−4.69	<.001	
Maternal improvement	4.73	2.21	0.21	2.15	.033	
Child age	0.05	0.04	0.07	1.09	.279	
Treatment days	−0.03	0.03	−0.08	−1.19	.237	
Externalizing						.40
Intercept	−31.17	4.00		−7.80	<.001	
Pre-treatment score	0.58	0.06	0.62	10.08	<.001	
Maternal psychopathology	−3.82	1.84	−0.18	−2.08	.039	
Maternal improvement	−2.60	2.01	−0.11	−1.30	.197	
Child age	0.08	0.04	0.11	1.91	.058	
Treatment days	0.03	0.02	0.08	1.41	.161	
Total Problems						.29
Intercept	−31.30	4.83		−6.48	<.001	
Pre-treatment score	0.62	0.08	0.57	7.85	<.001	
Maternal psychopathology	−5.91	2.11	−0.28	−2.80	.006	
Maternal improvement	−2.63	2.19	−0.11	−1.20	.233	
Child age	0.09	0.04	0.13	2.03	.044	
Treatment days	−0.02	0.03	−0.04	−0.68	.498	

studies indicate a considerable need for specialized treatment for children with emotional and behavioral symptoms at preschool age. A special attribute of preschool psychiatric patients is that they are accompanied by a mother who herself is considerably stressed or suffers from her own psychiatric disorder. This is reflected in our admission criteria [40], which focus on child psychopathology, maternal psychopathology, and the mother–child interaction. This study used standardized broadband measures as indicators for therapy outcome. However, it is important to note that in clinical practice, therapists consider diverse additional factors (e.g., child development, child functioning, child–parent relationship) when determining the need for treatment and when evaluating treatment outcome. At admission, our sample showed increased Total Problem, Internalizing, and Externalizing scores (Table 2a), although there was no clear preponderance of emotional (Internalizing) or behavioral (Externalizing) problems. However, the sample also included children whose clinical impression was insufficiently described by broadband measures. The standard deviations of emotional and behavioral problems indicated a broad variety of symptom magnitudes, which reflected the heterogeneity of psychiatric problems in our sample. It is also notable that the mothers show increased scores for psychopathology, which was remarkably not associated with child symptom levels based on therapists' ratings (see Table 1). This finding highlights that the admission criteria consider child and also maternal symptoms in defining this preschool population and associated treatment.

Our primary findings indicate that the multimodal treatment in the Family Day Hospital was effective. The differences between admission and discharge were significant at a group level and, for a considerable portion of patients, also statistically significant at an individual level (see Tables 2a, b, 3a, b, c). Overall, the majority of children showed a moderate decrease in the Total Problem score, indicated by the effect size $d = -0.51$. The RCI value differs partially from Cohen's d, but note that RCI is also influenced by the smaller number of items in the scale and the related reliability additionally affecting the probability of identifying significant improvement on the individual level. According to therapists' ratings, children in our hospital showed decreased Internalizing and Externalizing scores after treatment. The improvement in Externalizing symptoms was slightly less than the improvement in Internalizing symptoms (see effect sizes in Table 2a, b). Compared with those observed in clinic-based studies of multimodal preschool day treatment programs, our effect sizes exceed the reported range of effect size from $d = -0.12$ to $d = -0.40$ [25]. Nevertheless, in our study, a substantial proportion of children (approximately 35 % based on therapists' ratings, 22 % based on the original maternal ratings, and 25 % based on the adjusted maternal ratings) continued to show symptoms at the clinical level after treatment (see Table 3a, b, c). This particular group appears to need more specific or more prolonged interventions, which may be offered more readily in an outpatient setting after treatment in the Family Day Hospital. Finally, we did not detect gender differences, neither at

admission nor at discharge, a finding that is consistent with that of Mayes et al. [54].

Could the observed changes in symptoms be caused by regression to the mean, spontaneous remission, or maturation during hospitalization? Regression to the mean and spontaneous remission may probably not explain the observed differences between admission and discharge because most of the children were referred by the outpatient department several months prior to admission. Therefore, we can assume that the scale scores at admission, after the waiting time, represent relatively stable clinical symptoms that will not suddenly disappear during the time of treatment. This stability of emotional and behavioral differences between the children is also reflected in Table 1. In addition, and as stated in the introduction, emotional and behavior symptoms in children generally remain stable or worsen over time, rather than diminish [10–12]. Moreover, the time of the treatment appears to be too short to explain changes by maturation. Lastly, our results were based on the ratings of two observers, which reduced the effect of measurement error and regression to the mean. However, the treatment benefits could still be attributed to other factors, such as the expectations of therapists and mothers, which could also influence outcomes.

We expected that treatment benefits for children would be multiply determined, and the exploratory analyses examined potential conditions of treatment benefit (see Tables 4a, b, c), including pre-treatment scores, maternal psychopathology at admission, improvement in maternal psychopathology, child age, and duration of treatment. The severity of child psychopathology at admission has the greatest association with treatment benefit for all outcome measures and independent of the informant. This finding suggests that children with more severe pathology benefited most from therapy. When therapy outcome was based on therapists' ratings, no other covariate predicted therapy outcome, not maternal psychopathology, maternal improvement, age of the children, or duration of treatment (see Table 4). It may be surprising that an improvement in maternal psychopathology did not account for improvements in symptoms in children according to therapists' ratings because other research has described a reduction in maternal psychopathology associated with a reduction in child psychopathology [55, 56]. It appears that, based on therapists' ratings, the Family Day Hospital treatment may reduce psychopathology in mothers and children, although independently of each other. One might be puzzled about these results, which seem incongruent with a general 'family effect', namely the independence of improvements in mothers' and children's symptom level. Note that several reasons may account for this independence. For example, we can assume that mothers' symptoms have various causes, which have not been effectively addressed by the treatment, but maternal behavior may have nevertheless changed with benefits for the children. Another speculative explanation could be that the mothers especially benefit from the treatment, but the reasons for their child's symptoms were not substantially addressed. Many treatment mechanisms may influence the outcome of the mothers or the children, but empirically, we do not necessarily observe a positive association between mothers' and children's treatment benefits.

When the therapy outcome of the children was based on maternal ratings, the observed changes in mothers were related to their own self-reported psychopathology and their improvement though therapy. Previously, the association of maternal psychopathology and maternal improvement exceeded the significance level for Internalizing and Total problems, whereas for the Externalizing problems, the probability indicated at least a tendency. However, all coefficients point in the same direction and are therefore discussed together and interpreted as a general effect. The self-reported maternal psychopathology at admission was significantly associated with a smaller treatment benefit for the children the mothers' own report (Table 4b). Therefore, a high pre-treatment score for maternal psychopathology appears to represent a barrier to child improvement from the mothers' perspective. In the case of treatment benefits for the mother, for example, maternal improvement, a positive association is observed with the progress of the mother's child from her own perspective. Both findings are robust against a distortion adjustment, which reduces the child symptom level at admission (see Table 2c). Both empirical findings point to the importance of maternal psychopathology by interpreting the benefits of treatment in terms of maternal ratings because if an increased maternal psychopathology is not diagnostically identified and remains untreated and unchanged, a maternal rating is of limited value for the evaluation of the child's psychopathology and treatment benefits. This finding also underscores the diagnostic and treatment concept of the Family Day Hospital of offering specialized treatment for the child and the mother. Maternal psychopathology is therefore not only important in adjusting for pre-treatment test scores but also for the perception and evaluation of treatment benefits. Mothers with an untreated psychopathology may seek further help in alternative mental health systems for their children.

There are also concerns when the mothers were treated successfully according to their own report. In Table 2b, the mean scores at discharge suggest that mothers provided, in general, lower psychopathology scores than did therapists, especially for Externalizing problems. This result in Table 2b cannot be explained by a distortion effect because the adjustment was marginal (in Table 2c), and the mothers

were no longer distressed. Note that the differences between mothers and therapists at admission (within the column) and discharge (within the column) are indicated by a "†" in Tables 2a, b, and c. Taking the therapist scores as the less biased criteria, it appears likely that the mothers overestimated the positive changes in their children, probably because they had experienced a reduction in their own distress and perhaps because they were then more capable of handling their child's problematic behaviors in a more flexible and effective manner. The mothers' more positive report of child outcomes, compared with therapists' ratings, may also reflect positive changes in the mothers' living conditions and relevant environment factors during treatment (e.g., discharge of daily job and housework duties, support in caring of siblings, positive changes in the partnership). Overall, the results suggest that maternal reports may be the result of numerous influences that are currently not completely understood.

Age and duration of treatment were among the covariates of child therapy outcomes. Age was not associated to a considerable extent with treatment outcomes and therefore did not exceed the alpha level of $p < .01$, a finding that is consistent with that of Mayes et al. [54]. Furthermore, we did not observe a significant association between the duration of treatment and treatment benefits. The missing association between the duration of treatment and outcome should not be misinterpreted as indicating that the duration of stay could be reduced to a minimum because treatment was provided for a sufficient duration to produce a remarkable reduction in symptoms.

Limitations arise from the study design, which did not include a control group. We considered alternative explanations for our results, such as spontaneous remission, maturation, and regression to the norm. We also attempted to compensate for the lack of a control group by implementing standardized instruments, which allowed for a comparison with normative values. Moreover, we attempted to compensate for the limitations arising from the study design by assessing the child symptom level by two informants, and additionally, we controlled for a potential bias in maternal ratings. However, the shortcoming of a missing control group could not be fully compensated for, and therefore, a careful interpretation of results is recommended. Finally, this study exclusively considered questionnaire data at admission and discharge, rather than observing the participants directly. Moreover, CBCL/C-TRF scores describe certain aspects of treatment effects, and therapists did not provide blinded ratings. Treatment benefits may be observed in other target symptoms, including relationship variables.

The mechanisms that may explain improvements in maternal and child psychopathology still require theoretical clarification. More tailored, prospective studies could help in understanding these relationships. Blanz and Schmidt [57] and Green et al. [58] argue that the highly intensive, coordinated, and multimodal interventions and the continuous attendance of parents and siblings may explain the effectiveness of psychiatric inpatient treatment for children. In fact, parental presence might be especially important in explaining the promising findings obtained for preschool children. Additional research is needed to disentangle the effects of various Family Day Hospital treatments and the effects of the milieu on child, parent, and family outcomes. Future studies should include variables to identify individual differences that predict treatment benefits. It would be clinically and theoretically interesting to examine whether treatment should focus on internalizing or externalizing symptoms or both. Moreover, short- and long-term follow-up evaluation studies are needed to confirm the sustainability of treatment effects, especially results regarding the persistence of child mental health symptoms in untreated patients and children who receive psychiatric inpatient treatment. Such studies ideally rely on a randomized control trial design. Finally, the distortion effect should be considered in future studies.

Specialized child psychiatric family day hospitals can treat preschool children with severe symptomatology who display a heterogeneous pattern of behaviors, including internalizing and externalizing problems. The eclectic multi-modal treatment in our hospital, which includes different settings and techniques within an intermittent attendance structure, appears to treat preschool psychiatric patients successfully. The children experienced significant improvement in the Internalizing, Externalizing, and Total Problem scores. The assessment of preschool psychiatric symptoms should be carried out using multi-informant ratings via standardized instruments and should include an assessment of parental psychopathology. Future studies should control for depression-related distortion, for example, with the help of our proposed adjustment formulas [38, 39].

Summary

Mental health problems in young children can severely impair functioning and tend to persist into later childhood. However, there have been few studies that have investigated the psychiatric treatment of children using standardized measures. This study describes the treatment outcomes of preschoolers with severe mental health problems who were treated at the Child Psychiatric Family Day Hospital for Preschool Children in Münster, Germany. The eclectic multi-modal treatment combines behavioral and psychodynamic techniques for both parents and children within an intermittent attendance structure provided by a

multi-disciplinary team. This study evaluated 185 children (130 boys and 55 girls) with the Caregiver-Teacher Report Form (C-TRF/1.5–5), which was completed by therapists, and the Child Behavior Checklist (CBCL/1.5–5), which was completed by mothers, at admission and discharge. The mothers' ratings of their children were statistically adjusted for the distortion caused by their own psychopathology. We focused in particular on the differences between the ratings completed by therapists and mothers. After treatment, the patients showed significant improvement in the C-TRF/CBCL Total Problem Score with an average Cohen's $d = -0.50$ based on therapists' ratings, $d = -0.97$ for the non-adjusted maternal ratings, and $d = -0.68$ for the adjusted maternal ratings. Based on the therapists' ratings, the pre-treatment score predicted treatment benefits for the children, but child age, gender, duration of treatment, and improvement in maternal psychopathology were not associated with a reduction in child psychopathology. We conclude that specialized family day hospitals may successfully treat preschool psychiatric patients.

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