RESEARCH REPORT

The effectiveness of child and adolescent psychiatric treatments in a naturalistic outpatient setting

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Data concerning the effectiveness of naturalistic treatments (treatment-as-usual) in child and adolescent psychiatric (CAP) services are scarce. The purpose of this prospective observational study was to examine the effectiveness of CAP treatments in a naturalistic outpatient setting. Three hundred six patients (attention-deficit/hyperactivity disorder, ADHD, n=94; conduct disorder, CD, n=57; anxiety disorder, AD, n=53; depressive disorder, DD, n=38; other diagnostic categories, n=64), from nine child and adolescent psychiatric practices in Germany, were evaluated. Treatment effects were compared between patients who received frequent treatment and patients who only participated in diagnostics and short interventions. Since randomization was not feasible, propensity score analysis methods were used. Regarding the total sample, no significant treatment effects were found. However, a subgroup analysis of the four most frequent disorders (ADHD, CD, AD, DD) showed small to moderate treatment effects in patients with ADHD and AD. In CD and DD subgroups, no significant treatment effects could be found. "Real-world" CAP outpatient treatment seems to produce significant effects for ADHD and AD, but not for CD and DD. Compared to efficacy studies, our results show that naturalistic treatment might be better than expected.

Key words: Adolescents, children, therapy, effectiveness, attention deficit/hyperactivity disorder, anxiety disorder, depressive disorder, conduct disorder

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There are four psychiatric disorders which are particularly frequent in children and adolescents (1,2): depressive disorder (DD) and anxiety disorder (AD) as internalizing disorders, and attention-deficit/hyperactivity disorder (ADHD) and conduct disorder (CD) as externalizing disorders (3-6). Efficacy studies demonstrate that a positive treatment response in children and adolescents in an outpatient setting is far more likely to occur in those being treated for ADHD and AD than in those being treated for DD and CD in the same setting (5-8).

In meta-analyses and systematic reviews, which essentially concentrate on efficacy studies, mean effect size estimations for the treatment of mental disorders in children and adolescents range from 0.7 to 0.8 (9-13). By contrast, the few reviews available on "usual care" studies report mean effect sizes of 0.0 (14-17). In a meta-analysis of direct comparisons, Weisz et al (18) showed evidence-based youth treatments to produce significantly better outcomes than the usual interventions employed in clinical care.

There are only a small number of effectiveness studies on children and adolescents. This might be explained by the fact that controlled studies are difficult to conduct in naturalistic settings. Therefore, in therapy evaluation studies, observational study designs are frequently used, which necessitate complex statistical calculations in order to analyze causal effects.

Studies examining the dose-effect relationship in youth mental health care are rare (e.g., 22-24). Due to the fact that the definition of "dose" and "response" as well as the methods applied differ from study to study, it is difficult to compare these studies (25,26). However, the results available for children and adolescents show a trend similar to findings in adults (27). There is evidence for a minimum number of eight

treatment sessions to obtain therapeutic effects (23), and the effects reached after 20 sessions do not seem to increase significantly during prolonged therapy (28).

Against the background of the above-described context, this study aimed to answer the following questions: a) how successful is therapy in child and adolescent psychiatric (CAP) practices, e.g. to what extent are effects, as described in other effectiveness studies, achieved? b) do children and adolescents with different disorders benefit similarly from CAP treatment or are there significant differences?

METHODS

Study design

The investigation was conducted between May 2004 and July 2006 in nine CAP practices in Germany. It was conceived as an observational study of naturalistic treatments (treatments as usual): a non-selected, consecutive patient sample (all new admissions to the participating CAP practices) was followed over a time span of 1 year. Data assessment was conducted in all cases, encompassing a standardized telephone interview with the main caregiver and questionnaires filled out by parents, patients (if >12 years) and therapists. Data assessment was carried out at three points of measurement: at time of referral (T1; within one week after the first diagnostic session in the practice), three months later (T2) and one year later (T3).

The study was approved by the institutional review board. Participants and their parents gave written informed consent.

Sample

A total of 1182 referred patients were enrolled in the study. At T1, 1029 caretakers (87% of all referred patients) could be contacted by telephone. Only those cases remained in the study. At T2, we conducted 927 interviews (90% of cases), and at T3, it was possible to conduct 800 telephone interviews (86% of cases). The drop-out rate from T1 to T3 was 22%.

Complete documentation data (diagnoses, treatment variables) from the responsible child psychiatrist were available in 727 of 800 cases at T3. For the analysis of Child Behavior Checklist (CBCL) data, we extracted from this sample all cases in which the parents had completed the CBCL (29-31) at both T1 and T3 ($n=306$; "CBCL sample").

Of the 306 patients in the CBCL sample, 186 were male (59.8%). The mean age was 8.8 ± 3.3 years, range 1-21. The CBCL sample encompassed the following four subgroups: ADHD (F90.0, F90.8, F90.9 according to ICD-10; 314.01, 314.00 according to DSM-IV-TR), $n=94$; CD (F91.0, F91.1, F91.2, F91.3, F91.8, F91.9, F43.24, F43.25, F90.10, F90.11, F92.0, F92.8, F92.9, F93.30, F94.2 according to ICD-10; 312.8, 312.9, 313.81, 309.3, 309.4, 313.89 according to DSM-IV-TR), $n=57$; DD (F32.0, F32.1, F32.2, F32.9, F33.1, F43.20, F43.21, F41.20, F43.22, F43.23 according to ICD-10; 296.21, 296.22, 296.23, 309.0, 296.32, 311, 309.28 according to DSM-IV-TR), $n=38$; AD (F40.1, F40.2, F41.0, F41.3, F41.9, F93.0, F93.1, F93.2, F93.8 according to ICD-10; 300.23, 300.00, 300.29, 300.01, 309.21 according to DSM-IV-TR), $n=53$; other diagnoses ($n=54$), no diagnosis ($n=10$).

Treatment

All practices that participated in the study employed personnel from different professions (child and adolescent psychiatrists, pediatricians, child and adolescent psychotherapists, etc.) in order to offer a broad variety of treatments (e.g., various forms of psychotherapy, including cognitive-behavioral, psychodynamic, systemic and family therapy; pharmacotherapy, dyslexia treatment, etc.). Due to this interdisciplinary orientation, it was possible to offer an individually tailored treatment package to each patient.

The therapy plans were based on the practice guidelines of the German Association of Child and Adolescent Psychiatry and Psychotherapy (33). In 58% of the cases, only a few diagnostic and/or consultation sessions were conducted, while 42% received more frequent treatment (>8 sessions). Twenty-six percent of all patients received psychopharmacotherapy. The number of diagnostic and therapeutic sessions within 12 months per child varied from 0 to 50 (mean 7.65 ± 7.00) and the number per parent varied from 0 to 40 (mean 4.37 ± 3.87). Extensive further information about sample characteristics and treatment is available elsewhere (34).

Data assessment

The data presented in this study are based on the CBCL (total score, German norms) and data collected from the standardized telephone interviews with the main caretaker at the time of referral (T1) and one year later (T3). The diagnoses were made by the attending child and adolescent psychiatrist or psychotherapist according to the Multiaxial System (MAS), which is based on the ICD-10.

Sociodemographic data, diagnoses and therapy data were recorded by the responsible child psychiatrist using the standardized "basic documentation form" (BADO). The BADO was first published in 1998 (35,36). The standardized telephone interview used to assess information from the parents has previously demonstrated good reliability and validity (37).

Statistical analysis

Due to the absence of a randomized control group, we subdivided the CBCL sample into two groups (high dose and low dose treatment groups), according to the total number of diagnostic and therapeutic sessions conducted. For this purpose, we performed a median split (median = 8 sessions; high dose = ≥ 9 sessions; low dose = ≤ 8 sessions). Seven cases were excluded from data analysis because of missing data. This procedure complies with the findings by Angold et al (23) and Howard et al (27). The treatment group assignment (high vs. low dose) was considered as the independent variable.

As dependent variable, we used CBCL total scores at T3 (post-test). For some analyses, we dichotomized the CBCL total score according to clinical symptoms ("normal" vs. "disturbed"). For this purpose, we used cut-off scores of 32/33 (corresponding to a T-score of 60 and 40, respectively).

Since patients were not randomized to low vs. high dose treatment groups, propensity analyses were used to parallelize the two groups and thus control influences on the dependent variable. The propensity score is by definition the conditional probability of being assigned to a treatment group based on given covariates (39,40). The propensity scores in this study were calculated using the logistic regression function of the SPSS 14.0 software (41). Based on experts' judgments, empirical evidence and theoretical considerations, the following covariates were regarded as relevant for propensity score analyses: axis I, III, IV, V and VI diagnoses of the MAS, children's gender, age, housing, school (grade, type) and social status; CBCL total, internalizing and externalizing score at T1. Because of missing socio-demographic data, 30 cases had to be excluded from propensity score data analysis, leaving a sample of 269 patients. Comparing the high dose and the low dose therapy groups with regard to the covariates considered, we primarily found differences concerning age, school (grade, type), gender, CBCL total score and axis I diagnosis at T1.

To evaluate the differences of CBCL between T1 and T3 in

the diagnostic subgroups without regard to treatment, t-tests for dependent samples were used. To compare the starting scores and CBCL score reduction between the diagnostic groups, analyses of variance with post-hoc tests were used. In this case, the Least Significant Differences (LSD) test – equal to the t-test which compares two means – was chosen as *a posteriori* test. To calculate the treatment effects, analyses of variance with repeated measurement were modeled. CBCL scores at T1 and T3 were dependent variables, treatment group was the interindividual influence factor and the interaction time x treatment group, which reflects differences in the CBCL course between the 2 groups, was regarded as treatment effect. The propensity score was used as covariate.

The effect size (ES) was calculated using Pre-Post-ES (corrected under consideration of pre-tests): $D_{corr} = d_{Post-test} - d_{Pre-test}$. All statistical analyses were conducted by means of SPSS 14.0.

RESULTS

Differences from T1 to T3 in the CBCL score

Table 1 and Figure 1 present the CBCL scores for the complete group (CBCL sample) as well as for the four diagnostic subgroups.

Table 1 Child Behavior Checklist (CBCL) total score (mean $\pm$ SD) for the total sample and subsamples at time of referral (T1) and one year follow-up (T3)

	T1	T3	p
Total sample (n=306)	40.8 $\pm$ 22.7	28.8 $\pm$ 20.1	<0.0005
Attention-deficit/hyperactivity disorder (n=94)	43.3 $\pm$ 21.7	32.4 $\pm$ 19.9	<0.0005
Conduct disorder (n=57)	50.4 $\pm$ 20.8	35.4 $\pm$ 19.9	<0.0005
Depressive disorder (n=38)	34.5 $\pm$ 19.4	23.4 $\pm$ 16.8	<0.0005
Anxiety disorder (n=53)	40.1 $\pm$ 26.7	28.1 $\pm$ 21.0	<0.0005

Figure 1 Changes in Child Behavior Checklist (CBCL) total score in the course of treatment in total sample and subsamples

For the total group and the subgroups, a significant reduction in CBCL scores can be observed during the course of therapy ($p \leq 0.0005$). A year after referral, 66% of the children and adolescents no longer showed clinically relevant symptoms (T-score ≤ 60). When comparing the different disorders, we noticed a worse initial level for ADHD and CD than for AD and DD. Furthermore, there were considerable improvements in CBCL scores from T1 to T3: 20% of patients with AD and ADHD, 25% of patients with DD, and 30% of patients with CD shifted from showing clinically relevant symptoms to normal behaviour. When calculating the pre-post effect size d^* according to Hasselblad and Hedges (42) in order to obtain a value which is directly comparable with the effect size d , we obtained the following results: $d^*=1.19$ for the total sample, $d^*=0.72$ for patients with ADHD, $d^*=1.00$ for patients in the DD subgroup and $d^*=1.96$ for patients with AD. For the CD subgroup, the effect size is $d^*\approx 1.85$ (approximate estimation, as one cell equals zero).

Analyses of variance with repeated measurement using propensity score calculation

Table 2 shows the results of the analysis of variance with repeated measurement with the CBCL total score as the dependent variable and the factors “time” (T1 vs. T3) and “group” (low dose vs. high dose treatment), using propensity score as covariate.

A significant main effect for the factor “time” can be observed only in the total sample, and not for the four subgroups. Main effects of the factor “group” would indicate that CBCL scores differ between low dose and high dose treatment groups. No main effect for the factor “group” became significant either in the total group or in the four subgroups. This is caused by the approximation of both treatment groups regarding the initial estimated values of the CBCL at T1. It shows that the inclusion of the propensity score “works” in the sense of controlling confounding variables and making the two groups comparable. Interaction effects between time point and treatment dose (indicating treatment effects) were not found for the total group and the CD and DD subgroups, but were found for the subgroups with ADHD and AD.

For the covariate “propensity score”, a significant main effect can be found for the total sample and the subgroups DD and AD. This result emphasizes the necessity of propensity score analysis for these samples: there are obvious group differences between the two treatment groups (low vs. high number of sessions) with reference to T1 starting levels of different questionnaires, socio-demographic factors and the MAS axes.

Figures 2-6 display the changes in the CBCL score during the course of treatment. The extent of reduction (main effect time), the differences between the treatment groups (main effect group) and the treatment effects (interaction time x group) are visualized in the figures. The dependence of the results on the particular disorder becomes evident when the figures are compared.

Table 2 Results of the analyses of variance using propensity score calculation: Child Behavior Checklist (CBCL) total score (mean $\pm$ SD) as dependent variable and “time” and “group” as independent factors

		Total sample (n=269)		Attention-deficit/ hyperactivity disorder (n=88)		Conduct disorder (n=50)		Depressive disorder (n=30)		Anxiety disorder (n=45)	
<i>Time, main effect</i>											
	T1	41.2±21.6	p=0.004	43.5±21.1	p=0.967	50.7±26.1	p=0.533	33.2±22.6	p=0.072	41.5±26.6	p=0.145
	T3	29.0±19.7		33.9±20.8		33.2±24.0		24.7±22.6		27.5±20.6	
<i>Group, main effect</i>											
	Low dose	35.9±20.5	p=0.535	40.3±18.2	p=0.451	42.5±20.0	p=0.869	27.7±14.5	p=0.745	36.6±22.9	p=0.563
	High dose	34.3±20.3		37.1±17.7		41.4±19.2		30.2±15.5		32.4±23.2	
<i>Interaction time X group = treatment effect</i>											
Low dose	T1	41.2±23.6	p=0.182	42.6±21.4	p=0.049	53.0±23.2	p=0.298	34.3±16.4	p=0.259	41.6±26.6	p=0.048
	T3	30.7±21.6		38.0±21.1		32.0±21.3		21.1±16.4		31.7±20.7	
High dose	T1	41.3±23.4		44.4±20.8		48.4±22.2		32.1±17.6		41.4±26.9	
	T3	27.3±21.4		29.8±20.4		34.4±20.4		28.4±17.6		23.4±21.0

Figure 2 Changes in Child Behavior Checklist (CBCL) total score in the course of treatment in total sample (n=269)

Figure 3 Changes in Child Behavior Checklist (CBCL) total score in the course of treatment in attention-deficit/hyperactivity disorder (n=88)

Figure 4 Changes in Child Behavior Checklist (CBCL) total score in the course of treatment in conduct disorder (n=50)

Figure 5 Changes in Child Behavior Checklist (CBCL) total score in the course of treatment in depressive disorder (n=30)

Figure 6 Changes in Child Behavior Checklist (CBCL) total score in the course of treatment in anxiety disorder (n=45)

The results show a significant treatment effect for children and adolescents with ADHD or AD: patients in the high dose treatment group had a significantly higher reduction of the CBCL total score than those in the low dose treatment group. This result did not apply to the whole study sample, as high dose treatment was not effective in patients with CD. Moreover, for children and adolescents with DD, a different trend could be observed (Figure 5). In this subgroup, two different groups can be identified: those with lasting depressive symptoms who do not improve under high dose therapy, and those with depressive symptoms who show symptom reduction after short interventions.

When converting these results (using means, standard deviations and sample sizes) into effect sizes, the values for the different subsamples were: total sample, $d_{\text{corr}}=0.16$; ADHD, $d_{\text{corr}}=0.48$; AD, $d_{\text{corr}}=0.39$; CD, $d_{\text{corr}}=-0.32$; and DD, $d_{\text{corr}}=-0.57$.

DISCUSSION

Results

For the total sample, this study does not reveal significant treatment effects in an outpatient CAP setting. However, in the ADHD and AD subgroups, significant small to moderate treatment effects are apparent. Patients with high dose therapy appear to profit more from therapy than those who receive only few treatment sessions. Moreover, patients in the subgroup with CD come off relatively poorly in general: both the treatment effects (comparing analysis of variance results) and the symptom severity at the beginning and end of treatment (comparing results of the normalized CBCL scores) underline this trend. In the subgroup with DD, it is not possible to validate a significant treatment effect: in depressive children and adolescents, there seems to be a high spontaneous remission rate in the low dose treatment group. Our results match the findings from efficacy studies, which

show that treatments for AD and ADHD display a better efficacy than treatments for DD and CD (7,8).

Methods

Although it is desirable for effectiveness studies to be conducted as randomized controlled trials, this aim is often unattainable. The design used in this study – in which we compared groups with high and low dose treatment – proved to be feasible for therapy evaluation studies in naturalistic settings; the low drop-out rate, the parental acceptance, and high participation rates are convincing. Calculating propensity scores under consideration of the relevant covariates proves to be extremely important in order to compensate for the lack of randomized group assignment. Nevertheless, the use of a single outcome criterion obviously implies some disadvantages: a large number of relevant reviews emphasize the necessity of applying outcome criteria from a wide range of different domains (e.g., symptoms, functional level, quality of life, long-term consequences), in order to characterize the patient's condition adequately (7,8).

Implications for research

There is a great range of questions relating to psychiatric and psychological treatments for children and adolescents that require continuous research (43). One of the greatest demands is that for more effectiveness studies demonstrating that empirically supported interventions can be utilized in everyday health care. Representative clinical observational studies certainly do not represent the gold standard, yet they can be considered as a reasonable alternative that is feasible in an outpatient setting, especially when methodological deficits in the study design can be controlled with adequate data analysis methods. Certainly, propensity score analysis has its limitations as well (44): apart from the problem with missing values, covariates that have not been assessed cannot be balanced and therefore remain as confounding factors.

In our present investigation, we simply related the dose of treatments (number of sessions within one year) to the outcome one year after referral. As yet, comparable naturalistic studies examining the dosage-effect relations in children and adolescents are not available, and it would be interesting to establish whether our results can be replicated. Another direction for refinement could lie in investigating the process of change by assessing data during treatment. This could lead to the development of a benchmarking system in order to assess the patient's individual therapy progress (according to therapy progress curves).

Implications for practice

Our results provide evidence for the effectiveness of “real-

world" outpatient CAP therapies in children and adolescents with ADHD or AD. In contrast, treatment effects for patients with DD and CD proved to be negative. The unfavorable results for DD might be due to the limited applicability of cognitive therapy methods and medication depending on patients' age and developmental stage (7,45). For the treatment of patients with CD, an outpatient treatment setting in a psychiatric practice is probably not sufficiently intensive and seems less suitable than the recently discussed alternative multimodal and family-oriented treatment approach (e.g., multisystemic treatment, MST).

Contrary to the results of previous effectiveness studies (14-17), our examination of therapy in a naturalistic setting shows apparent treatment effects (provided a certain dose of treatment is assured). However, two restrictions should be mentioned. Firstly, treatment effects cannot be shown for all disorders. This does not necessarily mean that these disorders without a proven effect cannot be sufficiently treated, but rather that it might not be the right setting (as in CD) or that so far no adequate specific treatment for children has been developed (as in DD). Secondly, although only small to moderate effects are validated, the treatments can contribute significantly to the prevention – or reduction – of negative long-term consequences (e.g., human and social costs). Even if the effects achieved in practice are not as high as the effects known from efficacy studies, this should not be seen as discouraging, but rather as an expression of real conditions: isolated disorders are rarely treated in practice; patients with comorbid conditions are more common.

CONCLUSION

Our study addressed the problem of limited evidence regarding the effectiveness of naturalistic treatments of psychiatric disorders in children and adolescents. Contrary to the results of previous effectiveness studies, it was possible to demonstrate significant effects of "real-world" treatments for ADHD and AD, but not for CD and DD. These results match the findings from efficacy studies and show that naturalistic treatment might be better than expected. As a practical implication, our study points out the necessity of further developing treatment approaches and settings for pediatric mental disorders.

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