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ORIGINAL ARTICLE

Inpatient treatment of conduct disorders in childhood and adolescence – A retrospective analysis of case numbers and treatment duration

Bubbenzer S^{1,2,3}, Gaber TJ^{1,2,3}, Baurmann D^{1,2,3}, Helmbold K^{1,2,3}, Wöckel L^{1,4}, Zepf FD^{1,2,3}

Abstract:

Objective: Conduct disorders (CD) are among the most frequently diagnosed disorders in child and adolescent psychiatry. However, to date, a thorough analysis of clinical case numbers and treatment duration in children and adolescents is missing.

Method: Data provided by the German Federal Health Monitoring System were analyzed for the period from 2000-2007 with respect to case numbers, treatment duration and different subtypes of disorders related to the CD spectrum.

Results: The number of inpatients (children/adolescents under the age of 19) with CD increased significantly between 2000 and 2007 from approximately 70/100.000 in 2000 to 110/100.000 in 2007. This development is contrasted by a general decrease in treatment duration during the same period.

Conclusions: Data from the present investigation provide preliminary evidence that the inpatient case numbers of patients with CD have increased. However, an overall decline in treatment duration was observed. Future research is needed to further investigate the prevalence rate of CD.

Keywords: Conduct disorder, case numbers, treatment duration

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Introduction

Conduct disorder (CD) is one of the most frequently diagnosed disorders in contemporary child and adolescent psychiatry. CD is characterized by a variety of symptoms related to impulsivity and aggression. Bullying and being harmful to people and animals, lying, delinquency, setting fires and school absenteeism are among the symptoms that are used to define CD (F91) in the ICD-10 [1]. In clinical settings, CD is frequently accompanied by other co-morbid psychiatric conditions. Approximately 30-50% of patients with CD present with depressive symptoms [2-4], and 42.7-93.0% also suffer from co-morbid attention-deficit/hyperactivity disorder (ADHD), classified as hyperkinetic disorder [F90] in the ICD-10) [3, 5].

Because of the high co-morbidity between CD, ADHD and depression, these disorders have received a combined classification in the ICD-10. Hyperkinetic conduct disorder (F90.1)

Bubbenzer S^{1,2,3}, Gaber TJ^{1,2,3}, Baurmann D^{1,2,3},
Helmbold K^{1,2,3}, Wöckel L^{1,4}, Zepf FD^{1,2,3}

¹Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, RWTH Aachen University, Aachen/Germany

²Jülich Research Centre, Jülich/Germany

³JARA Translational Brain Medicine, Aachen & Jülich/Germany,

⁴Center of Child and Adolescent Psychiatry and Psychotherapy, Clenia Littenheid AG, Littenheid/Switzerland

Correspondence author:
Prof. Dr. med. Florian Daniel Zepf, MD

Translational Neuroscience in Psychiatry and Neurology
Clinical Neurofeedback Program, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, RWTH Aachen University/JARA Translational Brain Medicine, Neuenhofer Weg 21, 52074 Aachen, Germany
Tel : +49.241.80.89171 & Fax: +49.241.80.3385504
E-mail: fzepf@ukaachen.de

describes CD and co-varying ADHD symptoms, whereas a further classification refers to depressive CD (F92.0). In the following, the disorders F90.1 and F92 (F92.0-F92.9) will be referred to as combined conduct disorders.

Because of the afore-mentioned variability in symptoms related to CD, treatment is often complex, and it is hard to quantify symptom reduction in patients with CD because the initial pattern of behaviors is heterogeneous. As a consequence, the clinical course of CD is often characterized by chronic behavioral and emotional problems [6-8]. The onset of CD symptoms before the age of 11 correlates with criminal acts and delinquency, as well as severe mental disorders in later adulthood, such as antisocial personality disorder [8-12]. Because treatment of CD is often long and requires rather intensive interventional strategies, the diagnosis and prevalence of CD also raises new challenges for both health care systems and societies, specifically as it relates to the symptom of delinquency [13]. To date, there is very little data concerning the exact prevalence of CD, which is surprising given the above-mentioned challenges posed by this disorder to Western societies. Published prevalence rates from different epidemiological studies show rather heterogeneous results (prevalence rates ranging from between 2 and 12% in children and adolescents), which might be due to the use of differing diagnostic criteria and varying study methodologies and approaches. As a consequence, the existing data cannot be directly compared [14-16]. In addition, much of the most recent data on this matter was published about ten years ago and is likely not to accurately reflect current prevalence rates. Only one study from the United States, which was recently published, delivered new data; it showed a prevalence of 2.1% for CD in children and adolescents aged 8-15 years [17]. However, these data cannot be compared with prevalence rates observed in other European countries.

There is little published data concerning the development of CD in patient populations who

require mental health services, specifically with regard to the actual number of inpatients with CD and the associated treatment duration. In the present work, we present data provided by the German Federal Health Monitoring System (GFHMS, Statistisches Bundesamt, Wiesbaden/Germany) for the years 2000-2007 to report on the development of case numbers and inpatient treatment duration related to the diagnostic spectrum of CD. The present work provides a descriptive analysis to address the following questions:

1. What was the number of reported inpatient cases of CD over time during the observation period (2000-2007)?
2. Was there a relationship between the reported inpatient cases of CD over time and treatment duration?

Material and methods

Data

The GFHMS receives data on all ICD-10 derived discharge diagnoses of inpatients from all civilian hospitals in Germany annually. The data are provided anonymously, are grouped by gender and age and provide information concerning treatment duration. There were no missing values, as the GFHMS receives all discharge diagnoses from all civilian hospitals annually. Data on outpatient or day-care treatment were not available. The data analyzed represent all cases for the period 2000-2007 in terms of a complete study/total investigation of inpatient cases. Because the data of the present investigation are open to the public and were analyzed anonymously, a waiver for publishing these data from the local ethics committee was not required. All cases with a discharge diagnosis on the CD spectrum (F90.1 = hyperkinetic CD, F91.0 = CD in the family context, F91.1 = unsocialized CD, F91.2 = socialized CD, F91.3 = oppositional defiant disorder, F91.8 = other CD, F.91.9 = CD not

specified, F92.0 = depressive CD, F92.8 = other mixed disorders of conduct and emotions, F92.9 = mixed disorders of conduct and emotions, not specified) were included into analysis, resulting in a total case number of 124.250, reflecting a total of 5.139.130 inpatient treatment days. The data were provided in specific age groups (under 1 year, 1-4 years, 5-9 years, etc.), which is why the age range in the present study is 0-19 years. The raw data were provided by the GFHMS. The analysis of the data provided represents the work of the authors.

Analysis of data:

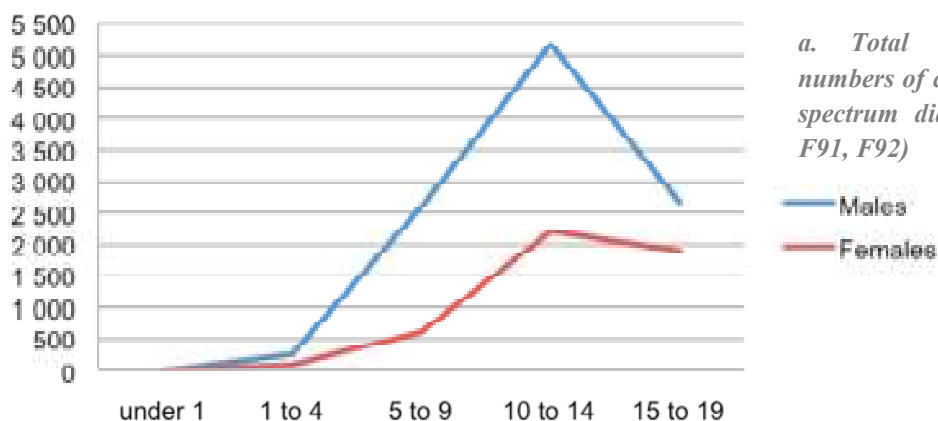
Data analysis was performed using the PASW software package (SPSS, Chicago). To investigate changes in case numbers and treatment duration in the observed period, several linear regression analyses were performed. The case numbers were set in relationship to the actual number of citizens in Germany for the respective year and age group. The data on treatment duration were compared with the treatment duration of all other psychiatric diagnoses (ICD-10 F-diagnoses) in childhood and adolescence in the mentioned

period. Additional Chi-square statistics, odds-ratios (OR) and percentages were calculated using Excel tools. Because of the explorative nature of the present study significant p-values were not subjected to alpha-adjustment.

Results

Analysis of case numbers:

Between 2000 and 2007, a total of 124250 child and adolescent inpatient cases related to the CD spectrum were registered. Of these 124250 cases, 33908 (27.3% of all cases, of which 71% were males) had received the discharge diagnosis F91 (F91.0-F91.9), 28667 cases (23.1%, of which 90% were males) received the diagnosis F90.1, and 61675 (49.6%, of which 66% were males) were discharged with a combined CD (F92.0-F92.9). The case numbers increased with age until adolescence. Approximately 50% of all cases were between 10 and 14 years of age (80% between 10 and 19 years), and the percentage of cases under the age of 5 was rather low (Fig. 1).



a. Total inpatient case numbers of conduct disorder spectrum diagnoses (F90.1, F91, F92)

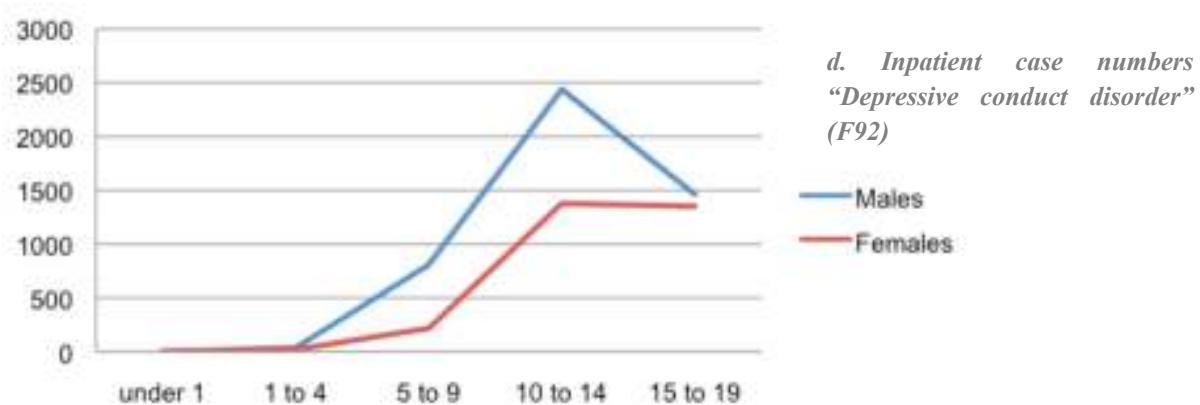
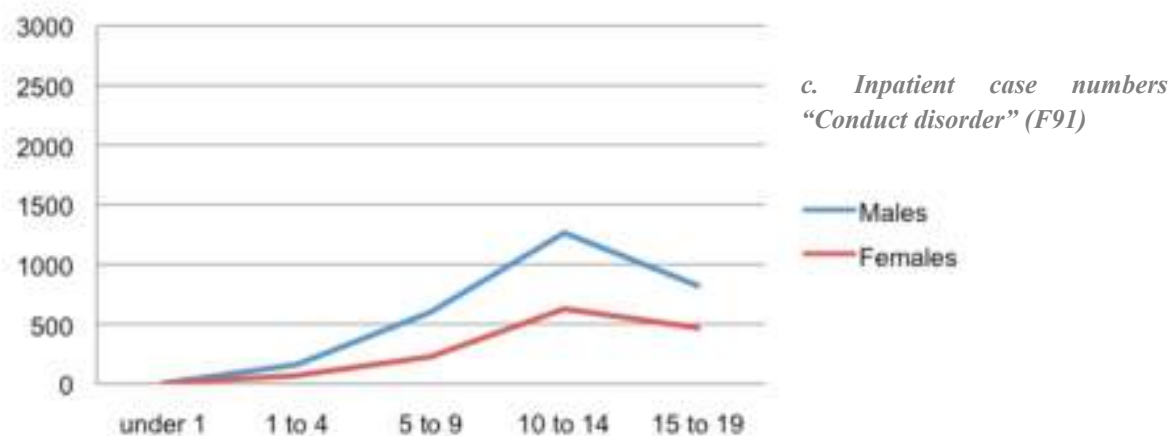
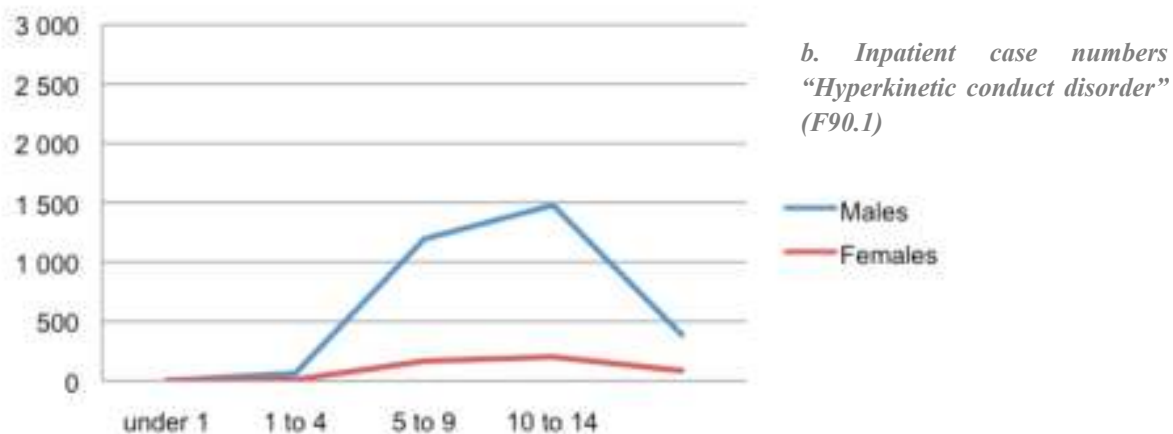


Figure 1a-d. Mean inpatient case numbers for different age groups (yrs.). Data are grouped by conduct disorder (CD) spectrum diagnoses, F90.1 = Hyperkinetic conduct disorder; F91 = Conduct disorder (F91.0-F91.9); F92 = Mixed disorders of conduct and emotions (F92.0-F92.9).

Development of case numbers between 2000 and 2007:

An analysis of the cumulative inpatient case numbers indicated a significant increase in cases related to CD spectrum diagnoses for the observed period. The total number of inpatients with a CD spectrum diagnosis increased from 6391 in 2000 to 8939 in 2007 ($R^2=0.965$; $p<0.001$; $b_1=367.202$ / see Tab. 1 and Fig. 2). This development was also observed when

comparing inpatient case numbers in relationship to the total population of the respective age group. In 2000 approximately 70 cases per 100.000 children/adolescents received a CD spectrum diagnosis. In 2007 110 cases with a CD spectrum diagnosis were registered per 100.000 children/adolescents ($\chi^2=1518.03$; $p<0.001$; $OR=1.5615$ / $R^2=0.979$; $p<0.001$; $b_1=5.57$ / see Fig. 2).

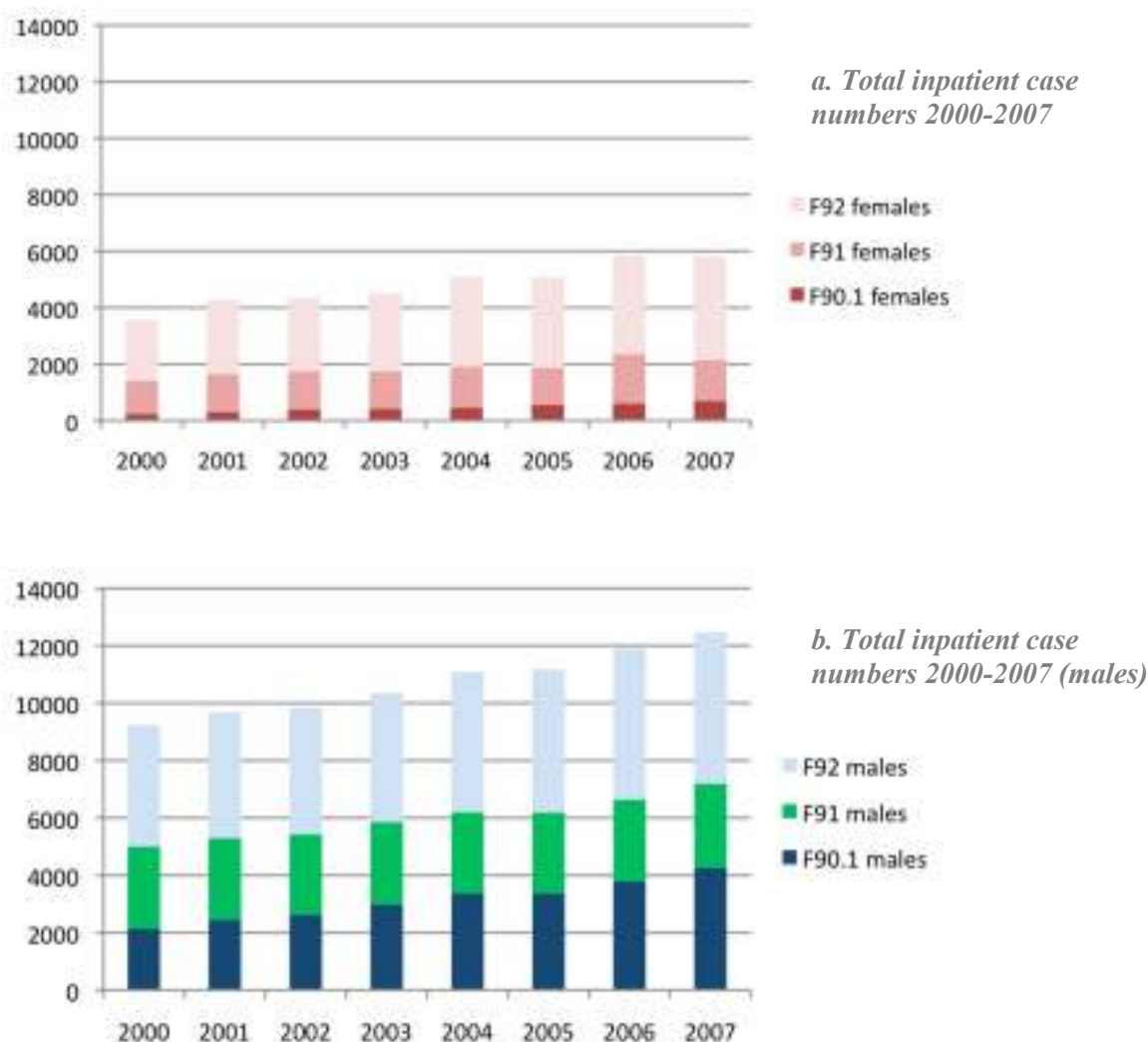


Figure 2a/b. Depicted is a linear increase in inpatient case numbers related to the diagnostic spectrum of conduct disorders (CD) in females (Fig. 2a, $R^2=0.942$; $p<0.001$; $b_1=313.560$) and males (Fig. 2b, $R^2=0.980$; $p<0.001$; $b_1=465.96$).

Table 1. Presented are the case numbers for disorders related to the conduct disorder (CD) spectrum for the observed period 2000-2007. F90.1 = Hyperkinetic CD, F91 = CD (F91.0-F91.9), F92 = Mixed disorders of conduct and emotions (F92.0-F92.9).

Diagnosis	Gender	2000	2001	2002	2003	2004	2005	2006	2007
F90.1	males	2131	2452	2627	2984	3370	3366	3788	4266
	females	238	305	394	422	453	559	610	702
F91	males	2868	2842	2799	2863	2827	2814	2847	2923
	females	1168	1342	1351	1317	1455	1305	1745	1442
F92	males	4235	4394	4407	4507	4885	4991	5261	5274
	females	2156	2644	2590	2770	3191	3206	3499	3665
Total		6391	7038	6997	7277	8076	8197	8760	8939

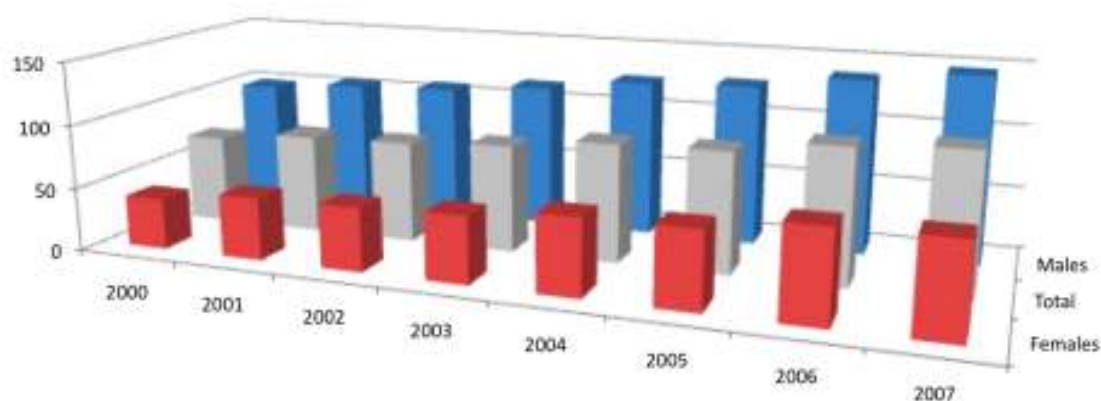


Figure 3. Inpatient case numbers related to conduct disorder (CD) spectrum diagnoses per 100.000 children/adolescents, grouped by gender and total cases (Chi square statistics and linear regression showed significant results, total number of cases [grey]: $\chi^2=1518.03$; $p<0.001$; $OR=1,5615$; $R^2=0.979$; $p<0.001$; $b_1=5.57$ / males [blue]: $\chi^2=814.44$; $p<0.001$; $OR=1.48$; $R^2=0.980$; $p<0.001$; $b_1=6.67$ / females [red]: $\chi^2=758.29$; $p<0.001$; $OR=1.78$; $R^2=0.958$; $p<0.001$; $b_1=4.417$

About 70% of inpatient cases were males, and in line with this the main increase in case numbers was observed in boys (see Fig. 3). For both genders combined conduct disorders (F90.1, F92.0-F92.9) showed a significant increase (see Tab. 2). The case numbers for the classification F91 (isolated CD with no co-morbidities) remained relatively constant (see Tab. 2). The increase of combined conduct disorders (F90.1, F92.0-F92.9) was compared with the progression of inpatient case numbers of all psychiatric

disorders (ICD-10 F-diagnoses), which showed an increase ($R^2=0.863$; $p<0.01$; $b_1=3272.05$, see Tab. 3). Case numbers related to the category hyperkinetic CD (F90.1) for both genders showed a stronger increase when compared with the overall increase in psychiatric case numbers. In girls, the classification F92 showed a similar progression (see Tab. 4). Only the case numbers related to F91 in males showed a modest decline (see Tab. 4).

Table 2. Presented are the results (regression analysis) for the development of case numbers of conduct disorder (CD) spectrum diagnoses, observed period was 2000-2007. F90.1 = Hyperkinetic CD, F91 = CD (F91.0-F91.9), F92 = Mixed disorders of conduct and emotions (F92.0-F92.9)

	Gender	R ²	p-value	b ₁
F90.1	males	0.979	0.000	288.429
	females	0.983	0.000	63.083
F91	males	0.102	0.442	4.988
	females	0.464	0.063	46.821
F92	males	0.952	0.000	163.548
	females	0.957	0.000	203.655

Table 3. Presented are the inpatient case numbers of all psychiatric disorders (ICD-10 F-diagnoses). Results of analysis for the development of case numbers from 2000-2007 (linear regression): males: R² = 0.952; p<0.001; b₁=1602.048 / females: R²=0.728; p<0.01; b₁=1670.0 / total: R²=0.863; p<0.01; b₁=3272.048

	2000	2001	2002	2003	2004	2005	2006	2007
Males	46851	50577	51676	51824	54603	56176	56247	59700
Females	36329	45537	47389	46973	48834	48985	49516	52577
Total	83180	96114	99065	98797	103437	105161	105763	112277

Analysis of treatment duration:

A total number of 124250 cases receiving a total amount of 5139130 days of inpatient treatment were registered, with a mean treatment duration of approximately 42 days. Combined CD and the category F92 in particular were associated with longer treatment duration when compared with cases with a diagnosis indexed by the F91 category. Moreover, treatment duration was approximately seven days longer for males when compared with females (see Tab. 5)

Development of mean treatment duration between 2000 and 2007:

A decline in the mean treatment duration of inpatients was observed for the observation

period. The cumulative number of days of inpatient treatment increased, whereas the mean treatment duration per case showed a significant decline. In 2000, patients with CD received a mean of 41.76 days of treatment, whereas in 2007, only 36.76 days for treatment were registered (R²=0.936; p<0.001; b₁=-0.831, see Tab. 5 and Fig. 4). Inpatient treatment duration related to the diagnostic categories F90.1 and F91 in females remained relatively constant. Mean treatment duration for all other categories showed a significant decline (see Tab. 6). Mean inpatient treatment duration related to CD was also compared with the mean treatment duration for all other psychiatric diagnoses in childhood/adolescence (all ICD-10 F-diagnoses). The mean values were standardized with respect to the data obtained in 2000 (see Fig. 5). The

observed reduction in treatment duration in male patients with CD showed no major differences when compared with the overall trend. However, the decline in mean duration of inpatient

treatment for females was below the overall trend and showed a tendency toward a stronger decline when compared with all other psychiatric diagnoses.

Table 4. Presented are the results of regression analyses and Chi Square (χ^2) comparisons for case numbers of the conduct disorder (CD) spectrum in relationship to all other psychiatric disorders (ICD-10 F-diagnoses), age-range 0-19 years, observed period was 2000-2007. F90.1 = Hyperkinetic CD, F91 = CD (F91.0-F91.9), F92 = Mixed disorders of conduct and emotions (F92.0-F92.9)

	Gender	R ²	p-value (regression analysis)	B ₁	χ^2	p-value (χ^2)	Odds-ratio
F90.1	males	0.963	0.000	0.004	313.79	<0.001	1.615
	females	0.971	0.000	0.001	133.91	<0.001	2.3304
F91	males	0.875	0.001	-0.002	76.69	<0.001	0.7895
	females	0.007	0.844	0.000	0.66	0.416	0.9681
F92	males	0.136	0.368	0.000	1.36	0.244	0.9751
	females	0.758	0.005	0.002	120.10	<0.001	1.3559

Table 5. Presented is the mean treatment duration per inpatient with a conduct disorder (CD) spectrum diagnosis. F90.1 = Hyperkinetic CD, F91 = CD (F91.0-F91.9), F92 = Mixed disorders of conduct and emotions (F92.0-F92.9)

	Gender	2000	2001	2002	2003	2004	2005	2006	2007
F90.1	males	47.39	48.42	47.82	47.53	45.36	44.51	44.72	44.10
	females	40.15	49.15	43.12	42.48	44.75	41.10	39.50	38.49
F91	males	35.17	35.18	34.40	33.74	31.46	31.52	31.22	29.93
	females	29.99	29.93	30.29	28.23	27.33	28.76	28.08	28.83
F92	males	53.05	51.84	49.68	51.22	48.39	46.10	44.73	43.75
	females	44.82	41.52	40.51	41.83	38.83	38.69	36.90	35.48

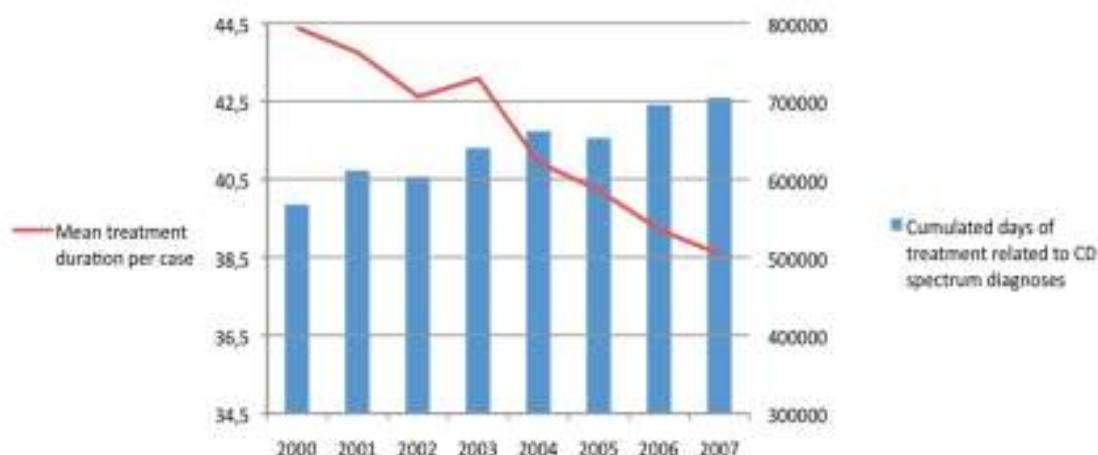


Figure 4. Depicted is the contrast between the cumulated days of inpatient treatment for all conduct disorder (CD) spectrum diagnoses and the mean treatment duration per case for the period 2000-2007.

Table 6. Presented are the results of a regression analysis on the mean treatment duration per inpatient with conduct disorder (CD), observed period was 2000-2007. F90.1 = Hyperkinetic CD, F91 = CD (F91.0-F91.9), F92 = Mixed disorders of conduct and emotions (F92.0-F92.9)

Diagnosis	Gender	R ²	p-value	B ₁
F90.1	males	0.820	0.002	-0.639
	females	0.294	0.165	-0.750
F91	males	0.936	0.000	-0.802
	females	0.400	0.093	-0.272
F92	males	0.934	0.000	-1.360
	females	0.902	0.000	-1.154

Discussion

The present work describes the progression of inpatient case numbers and associated treatment duration related to the CD diagnostic spectrum in Germany for the period 2000-2007 on a descriptive level. Data analysis showed an increase in inpatient case numbers related to the CD spectrum for the observed period in children and adolescents. An increase in case numbers related to combined conduct disorders seemed to be partially responsible for this progression. CD with no additional co-morbidities showed relatively constant case numbers in both genders.

Inpatient case numbers for F90.1 (both genders) and F92 (in girls) showed an increase.

These developments were contrasted by an overall decline in the mean treatment duration per case. The decline in mean treatment duration in females is noteworthy, particularly because treatment duration in females showed a stronger decline when compared with all other psychiatric disorders in childhood and adolescence. This development is of relevance, as females with CD already had a shorter mean treatment duration when compared with males of the same age group (approximately 7 days less).

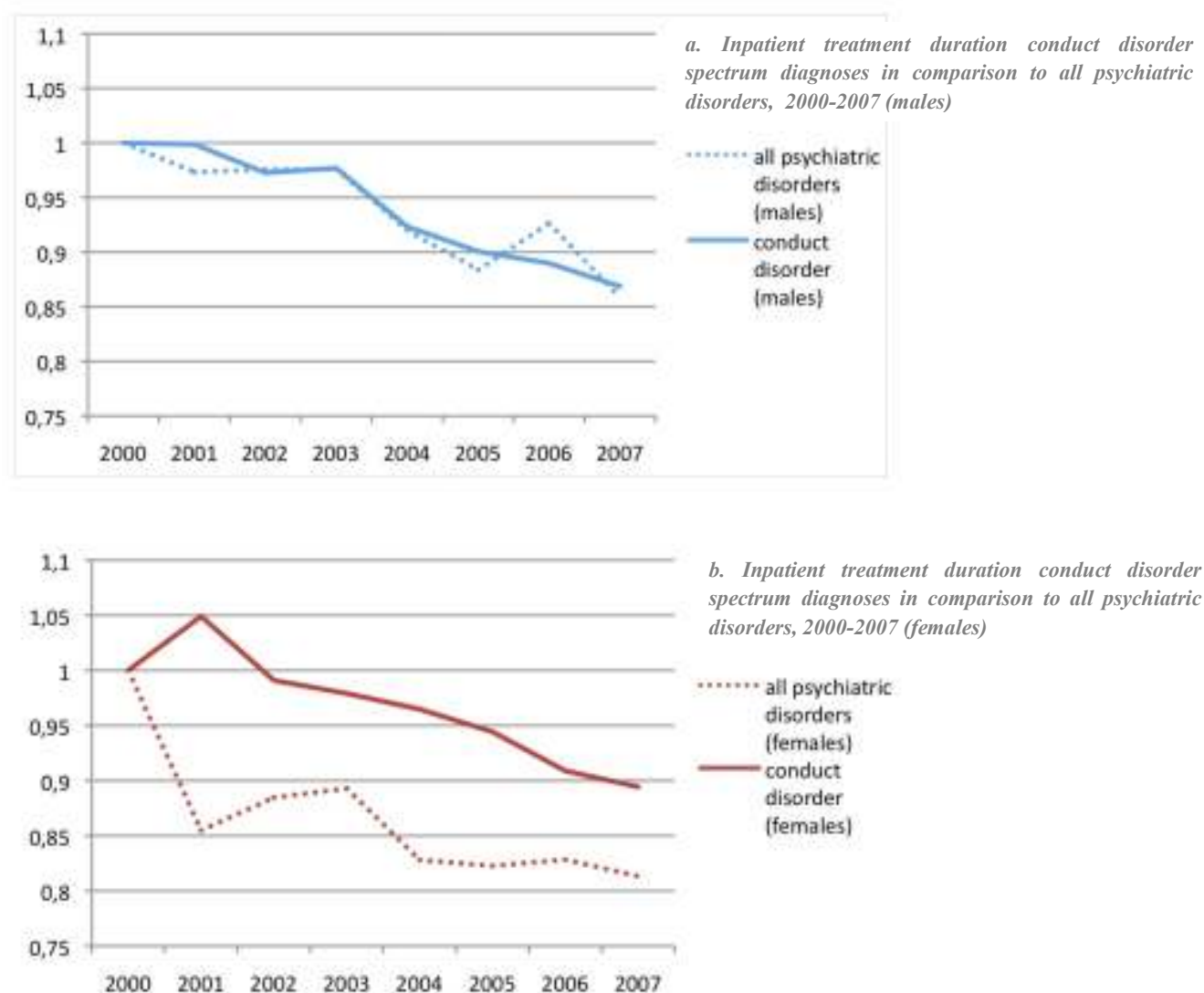


Figure 5a/b. Depicted is the contrast between the mean inpatient treatment duration of all psychiatric diagnoses (ICD-10 F-diagnoses) and treatment duration for disorders related to the conduct disorder (CD) spectrum for both genders.

Evidence from epidemiological studies suggests that boys are more frequently affected by CD (ratio 3:1 to 5:1). The present data are in line with such findings, showing that about 70% of inpatient cases were males. The fact that treatment duration was significantly longer in males stands somewhat in contrast to findings showing that females do not show a better response to treatment [9, 18, 19], and that symptom severity in girls must be considered to be as severe as in boys [7, 9, 20, 21]. Future

studies should address the question of whether changes in case numbers subjected to ongoing care through youth services might have influenced the relationships we found in this study.

Conclusions on actual prevalence rates related to CD spectrum diagnoses cannot be drawn from the present investigation. A few limitations must be considered when interpreting the present data. Apart from the retrospective design, the lack of outpatient case numbers and data on day-care

treatment, as well as the lack of data from non-civilian hospitals must be noted. Data by Merikangas et al. [17] showed that only 46.4% of patients with CD (aged between 8 and 15 years) sought treatment, and inpatient treatment only represents one of several treatment options. A further study estimated the number of patients undergoing treatment to be even lower (only about 25%) [22]. Following this study, the cases monitored by the GFHMS are likely to only represent a proportion of the total case numbers related to the CD spectrum in Germany. A further limitation is the fact that the present data do not provide information on multiple inpatient treatments for each case/patient. However, this bias must be considered to have an equal influence on case numbers for each year of assessment. Increasing rates of re-admissions were shown to be associated with a decline in treatment duration [23, 24]. In a sample of psychiatric patients (aged up to 18 years), Wickizer et al. [24] detected an increased risk for re-admission (about 6.9%) after treatment duration was reduced to approximately 9.8 days. In contrast to this finding, Case et al. [25] argue that a decline in inpatient treatment days is associated with treatment strategies primarily focusing on psychopharmacologic agents.

In summary, the present data showed an overall increase in inpatient case numbers related to CD, and the observed decline in treatment duration is unlikely to be the only factor influencing such developments. A major advantage of the present study is the fact that it is an analysis with no missing values. Further studies involving outpatients as well as case numbers related to day-care treatment are necessary to assess epidemiological developments related to CD in children and adolescents.

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Declaration of interests

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Conflict of interest/Disclosure: FDZ was the recipient of an unrestricted award donated by the American Psychiatric Association (APA), the American Psychiatric Institute for Research and Education (APIRE), and Astra Zeneca (“Young Minds in Psychiatry Award”). He has also received research support from the Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie, BMWi), the German Society for Social Pediatrics and Adolescent Medicine (Deutsche Gesellschaft für Sozialpädiatrie und Jugendmedizin, DGSPJ), and from the Paul and Ursula Klein Foundation, which is unrelated to the present investigation. He was the recipient of a travel stipend donated by the GlaxoSmithKline Foundation and an unrestricted educational grant donated by Shire pharmaceuticals. LW has received research support from the Dannon Institute Nutrition for Health (Institut Danone Ernährung für Gesundheit, e.V.), which is unrelated to the present study. The other authors have nothing to disclose.

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