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Original article

Direct medical mental health care costs of schizophrenia in France, Germany and the United Kingdom – Findings from the European Schizophrenia Cohort (EuroSC)

Dirk Heider [a,*,1], Sebastian Bernert [a,1], Hans-Helmut König [a], Herbert Matschinger [b], Theresa Hogh [a], Traolach S. Brugha [c], Paul E. Bebbington [d], Michel Azorin [e], Matthias C. Angermeyer [f], Mondher Toumi [g]

[a] *Health Economic Research Unit, Department of Psychiatry, University of Leipzig, Germany*
[b] *Department of Psychiatry, University of Leipzig, Germany*
[c] *Section of Social and Epidemiological Psychiatry, University of Leicester, UK*
[d] *Department of Mental Health Sciences, Royal Free and University College Medical School, London, UK*
[e] *Department of Psychiatry, CHU Sainte Marguerite, Marseilles, France*
[f] *Center for Public Mental Health, Gösing am Wagram, Austria*
[g] *Université de Lyon I, Lyon, France*

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Abstract

Objectives. – To quantify and compare the resource consumption and direct costs of medical mental health care of patients suffering from schizophrenia in France, Germany and the United Kingdom.

Methods. – In the European Cohort Study of Schizophrenia, a naturalistic two-year follow-up study, patients were recruited in France (N = 288), Germany (N = 618), and the United Kingdom (N = 302). Data about the use of services and medication were collected. Unit cost data were obtained and transformed into United States Dollar Purchasing Power Parities (USD-PPP). Mean service use and costs were estimated using between-effects regression models.

Results. – In the French/German/UK sample estimated means for a six-month period were respectively 5.7, 7.5 and 6.4 inpatient days, and 11.0, 1.3, and 0.7 day-clinic days. After controlling for age, sex, number of former hospitalizations and psychopathology (CGI score), mean costs were 3700/2815/3352 USD-PPP.

Conclusions. – Service use and estimated costs varied considerably between countries. The greatest differences were related to day-clinic use. The use of services was not consistently higher in one country than in the others. Estimated costs did not necessarily reflect the quantity of service use, since unit costs for individual types of service varied considerably between countries.
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Keywords: Schizophrenia; Cost of illness; Health care utilization; Service use; Longitudinal study

1. Introduction

Schizophrenia is a severe and chronic mental disease which often leads to an enormous social and financial burden for patients, their families and society. Compared to depression and anxiety disorders schizophrenia is a disorder of relatively low prevalence, with a lifetime risk of 1%. Nevertheless, the care for this disorder consumes 1.6–2.6% of the total health

* Corresponding author. Tel.: +49 341 97 24566; fax: +49 341 97 24569.
E-mail address: heidd@medizin.uni-leipzig.de (D. Heider).
[1] Both authors contributed equally to this work.

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care costs in Western developed countries [3,15]. The largest share of these costs is devoted to inpatient treatment. Recently, the share of extramural care has been increasing over time due to a shift from hospital care in most Western European countries [15]. Given the great financial burden, the costs related to service provision may provide clues for improving the cost-effectiveness of patient care. The European Schizophrenia Cohort (EuroSC) study provides such data for three European countries: France, Germany and the United Kingdom [4].

Previous studies carried out in the UK suggested annual direct costs of treating someone with schizophrenia at between 2138 GBP [7] based on cost estimations for the year 1990/91 and 38,361 GBP [17] based on 2004/05 cost estimations. Both studies estimated direct health care costs and some indirect costs (e.g. productivity loss) by including rather different elements of costs. In Germany, Salize and Rossler [24] estimated the total direct costs in 1994 of a patient with schizophrenia at 27,566 DM, while Kissling et al. [13] calculated the average annual direct and indirect costs for schizophrenia patients treated predominantly by outpatient services, at 33,000 DM in 1995. For someone requiring hospital treatment, the annual costs increase to 126,000 DM. In France, Rouillon et al. [21] estimated the total costs of schizophrenia to be 12.4 billion FF in 1992. In this study, direct costs for mental health treatment and indirect costs were included. Indirect cost estimations included allowances paid to the patient such as disability pension or handicapped adult allowance.

Unfortunately, these studies are based on different methods of sampling of patients, of assessing of resource consumption, and of cost estimation. Comparison of costs among the three countries is therefore difficult. Only two European studies have addressed these differences in order to make cost estimates more consistent and comparable. The most recent, the Schizophrenia Outpatient Health Outcomes Study (SOHO), investigated resource use by patients using antipsychotic medication in 10 European countries [11]. However, direct and indirect health care costs estimates have not yet been published from the SOHO study. The cross-sectional international EPSILON study [5,14] has provided direct health care costs. However, of the five participating European countries of the EPSILON study, only the UK is part of the EuroSC study as well.

The aim of this paper is twofold: First, to quantify the resource consumption of medical mental health care and medication in France, Germany, and the UK for patients suffering from schizophrenia and, secondly, to estimate the direct costs of this respective resource consumption from a payer perspective. Estimation of resource consumption and costs is one of the primary goals of EuroSC. In this respect, EuroSC has advantages over other international studies. The longitudinal nature of the study, with five assessments over two years, is likely to increase the reliability of cost estimates. The sampling frames in the participating countries were chosen to suit the national organization of mental health care and the participants were selected to provide a representative sample of the patients treated in secondary psychiatric services in each catchment area [4].

2. Subjects and methods

2.1. Subjects

The EuroSC is a naturalistic two-year follow-up study of schizophrenia patients in France (N = 288), Germany (N = 618) and the UK (N = 302). In each country, catchment areas were chosen that were socio-demographically distinct and had different styles of service delivery. They allowed a reasonable characterization of each country, although samples were not formally representative of patients in the respective countries. A description of the study's rationales and methods has been presented by Bebbington et al. [4].

2.2. Study sites

In France, participants were recruited from 3 centres: Lille (Northern France), Lyon and Clermont-Ferrand (Central France) and Marseille and Toulon (Southern France). In the UK, the two centres of Islington, an inner-city area of London, and the county of Leicestershire (excluding the city of Leicester) were chosen. In Germany, the study took place in four catchment areas: Leipzig and Altenburg in former East Germany, and the districts of Hemer and Heilbronn in former West Germany.

2.3. Sampling

In each centre, a sample of patients suffering from schizophrenia was identified and assessed. Altogether 1208 people aged 18–64 were interviewed at six-month intervals for a total of two years between 1998 and 2002. Sample attrition resulted in 1024 participants taking part in the second interview, 962 in the third, 861 in the fourth, and 810 in the final interview. Participants were selected to provide a representative sample of the patients treated in secondary psychiatric services in each catchment area. People currently living on the streets were excluded from the study, as well as people who had been hospitalised for the previous 12 months, or were planning to move out of the area. The centres and sampling procedures were chosen to suit the national organization of mental health care and the information systems that could be used for the study. In all the French centres and in London (Islington), sampling was achieved by establishing a list of all mental patients in the areas, using information from the mental health services, and then sampling at random from those identified. Patients were randomly sampled from the whole local list in Islington, while sampling was stratified in France. In Germany and in Leicestershire, lists of all potential participants in each catchment area were compiled, and eligible people were included in the sample.

2.4. Instruments

An extensive battery of instruments was used for data collection in EuroSC (for a complete overview, see Bebbington et al. [4]). In the following, we describe only those

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instruments used to collect the information presented in the present paper. Depending on local requirements and interests, there were some variations between centres in the instruments used. Assessments were made every six months based on individual interviews with the patients.

Socio-demographic characteristics and the course of the illness were assessed with the Past History and Socio-demographic Description Schedule (PHSD, WHO). This was adapted for use in the study. The instrument was used in the WHO Collaborative Study on the Assessment and Reduction of Psychiatric Disability, and our adaptation was based on the third draft of 1977.

Information about the use of services was collected using the standardized Client Service Receipt Interview (CSRI) [6] and the Malin System. The CSRI was used to collect information on service use during the preceding six-month period from patients or patients' key-workers, if possible. It covered hospital-based services, day-clinic activities, outpatient physician services, and medications used by the patient. For each service, information was collected on the type of service, and the frequency of attendance. The Malin system was developed in France, and its philosophy is very close to that of the CSRI. However, it also records information on the type of intervention provided to the patient. A questionnaire was constructed for use in the French centres to cover the requirements of both CSRI and Malin.

The severity of mental illness was assessed with the Clinical Global Impression (CGI) scale, a single item scale rated by the interviewer on a seven-point Likert scale ranging from 1 ''normal'' to 7 ''most extreme ill''.

2.5. Unit cost estimates

Unit costs' information for medical services and medication in France, Germany, and the UK was sought through current cost of illness and economic studies, as well as other available country-specific cost databases. We included in the analyses, only costs for resource consumption of direct medical mental health care assessed with comparable methods. The following types of resource use were included in our cost analysis: Inpatient days in psychiatric hospitals, day-clinic days in psychiatric day clinics, visits to general practitioners, psychiatrists, psychologists and other physician specialists, and psychotropic medication.

In France, unit costs for outpatient visits were based on the Tarif Conventionnel – a national database for health information [8]. Unit costs for inpatient and day-clinic treatment were based on expert information in hospital reimbursement issues from the Ministry of Health in France. Medication prices were taken from an internet source for reimbursable medication based on actual prices [1]. This database was accessed online in October 2007.

In Germany, unit costs for inpatient days and for outpatient services were taken from a publication by Krauth et al. [16]. Cost estimates are based on data sources for the years 1999 and 2000. Day-clinic costs were not available in this publication. In order to get a cost estimate we conducted a small internet and telephone survey among day clinics in different German regions. We were able to get information from 14 different day clinics to estimate the average amount to be paid for one day. Medication costs were taken from the Rote Liste 2007 [22]. The Rote Liste (Red List) lists approximately 35,000 drugs approved in Germany and throughout Europe. It provides physicians with information on prices, active ingredients, application limitations, possible side effects, etc. The online version can be accessed by registered doctors and pharmacists.

In the UK all unit costs for health service use were based on the publication by Netten et al. [18] estimating costs for the year 2000/01. Medication costs were taken from the most recent British National Formulary [23] from March 2007.

2.6. Conversion to current and common currencies

All available unit costs were adjusted for inflation or deflation, respectively, using the consumer price index given by the OECD. All costs were adjusted to the year 2000, the midpoint of the data collection period in all three countries. After adjusting to the consumer price, all unit costs were converted to Euro and, to US Dollar purchasing power parities (USD-PPP). USD-PPP are currency conversion rates that both convert to a common currency and equalize the purchasing power of different currencies. In other words, they eliminate the differences in price levels between countries in the process of conversion [19].

2.7. Statistical analysis

Mean service use and costs over the five time points were estimated using between-effects regression models for every type of surveyed resource use not taking into account the temporal order of the repetitions. Since the number of observations (T_i) is different for each patient WLS (weighted least squares) estimation was applied. Thereby T_i served as an analytic weight [2], and it was taken into account that a greater number of completed follow-ups per respondent imply higher validity of the estimated mean costs. The model is derived from a random effects model:

$$y_{it} = \alpha + x_{it}\beta + \nu_i + \varepsilon_{it}$$

for $i = 1,\ldots,n$ and, for each i, $t = 1,\ldots,T_i$ of which T_i occasions are actually observed. It is defined as:

$$\overline{y}_i = \alpha + \overline{x}_i\beta + \nu_i + \overline{\varepsilon}_i$$

where $\overline{y}_i = \sum_{t=1}^{T_i} y_{it}/T_i$ and $\overline{x}_i$ is defined similarly [25]. Analyses were carried out using STATA 10 [26].

In order to test for country effects, effect coding was chosen in preference to the more popular dummy coding. By introducing a new reference category, this form of contrasting allows one to test the deviation of each country from the average costs or service use of the three countries observed, the so-called grand mean. To alleviate reading of the results the predicted costs for each country were calculated by building the sum from the grand mean (indicated by the

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constant of the respective regression model) and the regression coefficient for the respective country. This procedure was applied to regression models for each type of costs (Tables 5 and 6), once for the total sample and once only for users of health service. Therefore the significances in Tables 5 and 6 refer to the significances of the underlying regression coefficients.

The approach can be retraced by looking at Tables 3 and 4. The country specific means of service use in Table 3 are identical with the sum of the Grand Mean and the regression coefficient of the corresponding cells in Table 4. Thereby it becomes clear that the grand mean is the ''mean of the means'' across the three countries which is different from the total mean in Table 3. Table 6 presents cost estimates for services and medication for the total sample adjusted for sex, age, CGI score and former hospital admissions. The control variables were entered into the regression models centered by their mean to allow a meaningful interpretation of the regression models constants (grand mean). In order to deal with the fact that the distribution of the data was highly skewed, non-parametric bootstrapping (4000 replications) for all estimated regression models (Tables 4–6) was applied [9,20]. Compared to alternative approaches such as log-transformed OLS regression models, bootstrapping has the advantage that the regression coefficients can be interpreted in their original metric and that the results tend to be more stable which holds at least in small samples sizes [12].

3. Results

3.1. Socio-demographics

Socio-demographic characteristics and some schizophrenia symptoms at baseline are shown in Table 1. The mean age in the three countries differed significantly but by less than 2 years, ranging from 39.6 years in France to 41.5 years in Germany. The German sample comprised significantly fewer male (56.8%) and single patients (54.2%). The proportion of employed people was significantly higher in Germany (30.0%) than in the other two countries. The number of former hospital admissions was highest in France (6.45) followed by the UK (5.81) and Germany (4.58). CGI scores indicating the severity of the illness at the first interview of the study were highest in Germany (4.39) and lowest in UK (2.70).

Table 1
Socio-demographic patient characteristics and schizophrenia severity at baseline.

Variable	France (N = 288)	Germany (N = 618)	United Kingdom (N = 302)
Gender: N (%)			
Male	200 (69.7)	348 (56.8)	195 (64.6)
Female	87 (30.3)	265 (43.2)	107 (35.4)
Age: mean (SD)	39.6 (10.3)	41.5 (10.8)	41.1 (11.7)
Years of education: mean (SD)	10.1 (3.0)	9.7 (1.7)	10.8 (1.7)
Employment: N (%)	33 (11.5)	185 (30.0)	39 (13.4)
Marital status: N (%)			
Single	206 (71.8)	335 (54.2)	203 (67.2)
Married/living with partner	44 (15.3)	157 (25.4)	53 (17.6)
Divorced/living separated/widowed	37 (12.9)	126 (20.4)	46 (15.2)
Living situation: N (%)			
Alone	103 (36.0)	205 (33.2)	109 (36.2)
With spouse	26 (9.1)	96 (15.5)	29 (9.6)
With relatives	134 (46.9)	182 (29.5)	95 (31.6)
Other	23 (8.0)	135 (21.8)	68 (22.6)
Number of hospitalizations: mean (SD)	6.45 (5.99)	5.81 (5.59)	4.58 (5.16)
CGI: mean (SD)	3.87 (1.42)	4.39 (1.05)	2.70 (1.39)

3.2. Unit costs

The unit costs in Euro and USD-PPP for resource use assessed in the EuroSC study are reported in Table 2. Costs for outpatient services varied considerably between countries, while costs for inpatient treatment only showed minor deviations between countries. The greatest difference concerned visits to psychiatrists. In the UK, a visit is reported to cost 94.34 EUR (91.27 USD-PPP), whereas in Germany, the cost is 14.50 EUR (14.79 USD-PPP). In France, visits to psychiatrists cost 32.85 EUR (36.55 USD-PPP).

3.3. Service use

In Table 3, the consumption of different services is presented for the complete national samples and for the sample of service users, i.e. giving an estimate only for those patients who have used a specific service. The average number of observations per respondent (T_i) was 4.0 for all estimations based on complete national samples and within a range of 1.7 (inpatient days) and 3.5 (psychiatrist) for all estimations based on samples of service users. The service use estimates refer to the period of six months preceding the interview. Table 4 presents the differences (regression coefficients) in the countries from the grand mean for every category of service use. The largest differences in resource consumption were reported for day-clinic use, whether related to all respondents or to users of day clinics. In France, the mean estimate of days spent at a day clinic was highest (all patients: 10.96; service users: 62.35), considerably fewer days of day-clinic treatment being used in Germany (1.27; 36.02) and the UK (0.73; 26.13). In all countries, the reported estimated day-clinic days showed a significant difference from the grand mean (Table 4): France

Table 2
Unit costs in EUR and USD-PPP for the year 2000, by country.

Service	Unit	France		Germany		United Kingdom	
		EUR	USD-PPP	EUR	USD-PPP	EUR	USD-PPP
Inpatient	Day	242.93	264.06	260.00	265.31	251.03	242.86
Day clinic	Day	121.47	132.03	146.89	149.89	111.57	107.94
Psychiatrist	Visit	32.85	36.55	14.50	14.79	94.34	91.27
Psychologist	Visit	38.31	42.63	44.86	45.77	52.50	50.79
General practitioner	Visit	16.76	18.65	15.13	15.44	40.66	39.33
Other physicians	Visit	22.03	24.51	19.57	19.97	39.28	38.00

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Table 3
Raw average use of services in total sample and health service users during a six-month period, by country.

Service: unit	All respondents				User of health services							
	France (N = 288)	Germany (N = 618)	United Kingdom (N = 302)	Total (N = 1208)	France		Germany		United Kingdom		Total	
	Mean (SD) [Range]	Mean (SD) [Range]	Mean (SD) [Range]	Mean (SD) [Range]	N	Mean (SD) [Range]	N	Mean (SD) [Range]	N	Mean (SD) [Range]	N	Mean (SD) [Range]
Inpatient: number of days	5.72 (21.16) [0–192]	7.48 (22.32) [0–194]	6.41 (26.70) [0–389]	6.82 (23.37) [0–389]	54	39.10 (41.98) [1–192]	128	44.46 (36.30) [1–194]	44	55.36 (58.83) [1–389]	226	45.66 (43.39) [1–389]
Day clinic: number of days	10.96 (30.05) [0–183]	1.27 (9.07) [0–162]	0.73 (5.86) [0–72]	3.15 (16.03) [0–183]	49	62.35 (44.00) [1–183]	31	36.02 (33.06) [1–162]	8	26.14 (23.99) [1–72]	88	50.27 (41.65) [1–183]
Psychiatrist: number of visits	5.04 (4.93) [0–54]	3.60 (4.35) [0–63]	1.60 (2.98) [0–48]	3.61 (4.33) [0–63]	229	6.05 (4.80) [1–54]	532	4.06 (4.41) [1–63]	238	2.59 (3.43) [1–48]	999	4.18 (4.46) [1–63]
Psychologist: number of visits	0.60 (3.28) [0–39]	0.13 (1.50) [0–60]	0.31 (2.27) [0–26]	0.28 (2.20) [0–60]	11	11.47 (9.10) [1–39]	14	5.58 (8.12) [1–60]	10	8.87 (8.56) [1–26]	35	8.50 (8.88) [1–60]
General practitioner: number of visits	1.50 (4.52) [0–93]	1.17 (2.19) [0–36]	2.20 (3.63) [0–29]	1.52 (3.24) [0–93]	39	4.89 (7.09) [1–93]	254	2.65 (2.64) [1–36]	159	3.67 (4.07) [1–29]	452	3.33 (4.13) [1–93]
Other physicians: number of visits	1.32 (5.86) [0–56]	0.71 (1.99) [0–41]	0.41 (2.56) [0–72]	0.76 (3.34) [0–72]	16	8.46 (12.65) [1–56]	146	2.52 (3.08) [1–41	33	2.80 (6.20) [1–72]	195	3.46 (6.44) [1–72]

(6.64; 20.85), Germany (−3.05; −5.48), UK (−3.59; −15.37). Inpatient treatment days showed smaller variations. In Germany the mean number of treatment days in hospital was highest (7.48; 44.47), followed by the UK (6.41; 55.36) and then France (5.72; 39.10). The greatest variations in outpatient treatment were reported for visits to psychiatrists. In France visits to psychiatrists were most numerous (5.04; 6.05), followed by Germany (3.61; 4.06) and then the UK (1.61; 2.59).

3.4. Costs of service use and medication use

In Table 5, the costs of the resource consumption including medication are presented in EUR and USD-PPP, for the complete country samples and for the samples of health care users. The costs of service use and medication refer to the period of six months preceding the interviews. As with resource consumption, the greatest differences were found for the costs of day-clinic use in the total sample, all estimated costs being significantly different from the grand mean. In France cost estimates for day-clinic use were almost seven times higher than in Germany, and 16 times higher than in the UK. Costs of psychiatrist and psychologist use were also particularly high in France and in the UK, whereas in Germany these services accounted for much lower costs. The costs for use of GPs were highest in UK and lowest in Germany while the costs for other physicians were highest in France and lowest in Germany. Costs for medication use were highest in Germany, followed by France, being lowest in the UK.

Total costs for the complete sample varied from a high of 3842 USD-PPP in France to a low of 2468 USD-PPP in the UK. In the total cost category, differences between total country samples and user samples almost vanish since the user sample comprises all who have used at least one service within the preceding six months, that is, almost the complete sample.

Table 4
Regression models for use of services in total sample and health service users during a six-month period by country.

Service: unit	All respondents				User of health services			
	France (N = 288)	Germany (N = 618)	United Kingdom (N = 302)	Constant (grand mean) (N = 1208)	France	Germany	United Kingdom	Constant (grand mean)
	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)
Inpatient: number of days	−0.82 (0.69)	0.94 (0.58)	−0.13 (0.77)	6.54 (0.48)	−7.21 (3.26)*	−1.84 (2.68)	9.05 (4.20)*	46.31 (2.44)
Day clinic: number of days	6.64 (1.04)***	−3.05 (0.54)***	−3.59 (0.54)***	4.32 (0.53)	20.85 (3.63)***	−5.48 (3.09)	−15.37 (3.38)***	41.5 (2.40)
Psychiatrist: number of visits	1.62 (0.17)***	0.19 (0.13)	−1.81 (0.11)***	3.42 (0.10)	1.82 (0.17)***	−0.17 (0.14)	−1.64 (0.14)***	4.23 (0.11)
Psychologist: number of visits	0.25 (0.11)*	−0.21 (0.06)***	−0.04 (0.08)	0.35 (0.06)	2.83 (1.30)*	−3.06 (1.07)**	0.23 (1.32)	8.64 (0.87)
General Practitioner: number of visits	−0.13 (0.17)	−0.45 (0.10)***	0.58 (0.14)***	1.62 (0.10)	1.16 (0.43)**	−1.08 (0.23)***	−0.07 (0.27)	3.74 (0.23)
Other physicians: number of visits	0.51 (0.20)**	−0.10 (0.11)	−0.40 (0.11)***	0.81 (0.10)	3.87 (1.01)***	−2.07 (0.53)***	−1.79 (0.58)**	4.59 (0.52)

*p < 0.05; **p < 0.01; ***p < 0.001; indicates whether there is a significant difference from grand mean.

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Table 5
Estimated mean costs of services and medication in total sample and health service users during a six-month period, by country in EUR and USD-PPP.

Service	All respondents				User of health services			
	France (N = 288)	Germany (N = 618)	United Kingdom (N = 302)	Grand mean (N = 1208)	France	Germany	United Kingdom	Grand mean
	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]	Mean costs in EUR (S.E.) [Mean costs in USD-PPP (S.E.)]
Inpatient	1390 (170) [1511 (179)]	1945 (147)* [1984 (149)]*	1609 (194) [1557 (192)]	1648 (119) [1684 (121)]	10039 (857)* [10912 (895)]	11766 (725) [12006 (732)]	14303 (1095)* [13838 (1074)]	12036 (644) [12252 (648)]
Day clinic	1331 (126)*** [1447 (137)]***	186 (67)*** [190 (72)]***	81 (66)*** [79 (71)]***	533 (64) [572 (70)]	7549 (476)*** [8204 (505)]***	5437 (445) [5547 (458)]	2872 (433)*** [2778 (434)]***	5286 (315) [5510 (325)]
Psychiatrist	165 (6)*** [180 (6)]***	52 (4)*** [54 (5)]***	151 (7)*** [147 (7)]**	123 (4) [127 (4)]	195 (7)*** [212 (7)]***	59 (6)*** [59 (6)]***	247 (11)*** [239 (10)]***	167 (6) [170 (6)]
Psychologist	23 (4) [25 (5)]*	6 (3)*** [7 (3)]***	16 (4) [16 (4)]	15 (3) [16 (3)]	445 (55) [483 (58)]	258 (50)** [263 (50)]**	457 (61) [442 (60)]	387 (39) [396 (40)]
General practitioner	25 (3)*** [27 (4)]***	18 (3)*** [18 (3)]***	89 (5)*** [87 (5)]***	44 (3) [44 (3)]	86 (9) [94 (10)]	40 (5)*** [40 (6)]***	147 (8)*** [142 (8)]***	91 (5) [92 (6)]
Other physicians	29 (4)* [31 (5)]*	14 (2)* [14 (3)]*	16 (3) [15 (3)]	20 (2) [20 (3)]	174 (23)** [189 (25)]**	50 (13)*** [51 (14)]***	115 (18) [111 (18)]	113 (13) [117 (14)]
Medication	570 (22)* [620 (23)]	703 (19)*** [717 (20)]***	587 (20) [568 (20)]***	620 (14) [635 (15)]	564 (22)*** [613 (24)]	750 (20)*** [765 (21)]***	616 (22) [596 (22)]**	643 (15) [658 (16)]
Total	3534 (218)* [3842 (232)]***	2924 (168) [2984 (173)]	2551 (215)* [2468 (214)]**	3003 (142) [3098 (146)]	3674 (234)* [3993 (248)]**	3054 (186) [3116 (191)]	2729 (238) [2640 (237)]**	3152 (160) [3250 (164)]

*p < 0.05; **p < 0.01; ***p < 0.001; indicates whether there is a significant difference from grand mean.

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Table 6
Estimated mean costs of services and medication in total sample during a six-month period in EUR and USD-PPP controlled for age, sex, number of hospitalizations, and CGI score, by country.

Service	France (N = 260)	Germany (N = 550)	United Kingdom (N = 280)	Grand Mean (N = 1090)
	Mean costs in EUR (S.E.)	Mean costs in EUR (S.E.)	Mean costs in EUR (S.E.)	Mean costs in EUR (S.E.)
	[Mean costs in USD-PPP (S.E.)]	[Mean costs in USD-PPP (S.E.)]	[Mean costs in USD-PPP (S.E.)]	[Mean costs in USD-PPP (S.E.)]
Inpatient	1273 (187)**	1787 (174)	2374 (232)*	1811 (139)
	[1399 (195)]*	[1822 (177)]	[2333 (227)]*	[1851 (141)]
Day clinic	1349 (131)***	197 (76)***	107 (84)***	551 (68)
	[1466 (142)]***	[201 (81)]***	[106 (89)]***	[591 (73)]
Psychiatrist	159 (6)***	48 (5)***	162 (9)***	123 (4)
	[173 (6)]***	[49 (5)]***	[156 (8)]***	[126 (4)]
Psychologist	25 (5)	6 (3)**	17 (4)	16 (3)
	[27 (5)]*	[7 (3)]**	[17 (4)]	[17 (3)
General practitioner	25 (4)***	17 (3)***	89 (5)***	44 (3)
	[28 (4)]***	[18 (3)]***	[87 (5)]***	[44 (3)]
Other physicians	26 (4)	14 (3)	17 (4)	19 (2)
	[29 (5)]	[15 (3)]*	[16 (4)]	[20 (3)]
Medication	531 (22)***	690 (22)**	657 (24)	626 (15)
	[578 (23)]**	[704 (22)]**	[638 (24)]	[640 (15)]
Total	3388 (231)	2759 (194)*	3423 (259)	3190 (158)
	[3700 (244)]	[2815 (198)]*	[3352 (257)]	[3289 (162)]

*p < 0.05; **p < 0.01; ***p < 0.001; indicates whether there is a significant difference from grand mean.

3.5. Costs of resource consumption controlled for covariates

In Table 6 cost estimates for services and medication within a six-month period for the total country samples are presented adjusted for sex, age, CGI score and former hospital admissions. The greatest differences between unadjusted and adjusted costs estimations were found for inpatient treatment. In the UK, costs for inpatient increased from 1557 USD-PPP to 2333 USD-PPP after adjustment. For outpatient treatment and day-clinic treatment, only minor differences from the unadjusted cost estimates were found. Medication costs were also essentially the same after adjustment.

The biggest differences in adjusted cost estimates occurred for day-clinic use, ranging from 1466 USD-PPP in France to 106 USD-PPP in the UK. Hospital inpatient costs varied from 2333 USD-PPP in the UK to 1399 USD-PPP in France, with Germany falling between. Cost for outpatient treatment by psychiatrists varied from 173 USD-PPP in France to 49 USD-PPP in Germany. Costs for the use of psychologists were also variable, ranging from 27 USD-PPP in France to 7 USD-PPP in Germany. The use of GPs accounts for 87 USD-PPP in the UK, but only 18 USD-PPP in Germany. Medication costs were more consistent. The total adjusted costs for direct mental health care were 3700 USD-PPP in France, 3352 USD-PPP in the UK and 2815 USD-PPP in Germany for the six-month period preceding the interviews.

4. Discussion

Resource consumption and costs for resource consumption varied considerably between countries. However, the rates of resource consumption were not consistently higher in any one country, i.e. they did not follow the same pattern across services used in the three countries. Thus, France had the highest rates of day-clinic use, whereas rates for inpatient use were lower than in Germany and the UK. This finding may indicate a shift in France from inpatient treatment towards day-clinic treatment. In fact, since 1991 the number of beds in hospital has decreased and the number of day-clinic beds has increased in France [27]. However, GPs and other physicians were less used in France. In 2000, the mean duration of a stay in a French day clinic was 58 days [27], close to our own estimate (62 days). The marked differences between day-clinic use in the EuroSC countries certainly warrant further examination.

The costs of service use reflect both the quantity of services used and the differences in unit costs between countries. Unit costs vary, since the constituent elements are different in the participating countries. For example, the high unit cost estimate for UK psychiatrists results from the fact that in the NHS psychiatrists are mostly based at hospitals, leading to high overhead costs included in this unit cost estimate. In France and Germany charges for service use do not include comparable amounts of capital and overhead costs which results in lower unit costs. Moreover, the different duration of visits to outpatient services is a source of different unit costs. In Germany, contacts with psychiatrists are considerably shorter than in the UK. These differences in unit costs sometimes led to high costs for service use, even though the number of services used was comparatively low. For example, in the UK, visits to psychiatrists were infrequent (1.61), but, given the high costs per visit, the overall cost for this particular service was greater than in Germany, where the resource consumption was higher but far less costly.

Cost estimations controlling for covariates (age, gender, CGI, former hospital admissions) significantly increased the inpatient treatment costs in the UK, by about 50%. This

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difference as a result of adjustment can be explained by the differences in the included covariates across the threes countries. Biggest differences were found in the CGI score with the lowest score in the UK. Lower scores indicate better health of respondents in the UK which is strongly associated with lower service use and costs. Therefore, adjusting for the CGI adds costs to the UK patients. In the other two countries, costs for inpatient treatment dropped after adjustment, but by less than 10%. The costs' estimates for other elements of the service were relatively unaffected by adjustment.

The comparison of the estimated costs with earlier studies in France, Germany and the UK is limited to direct mental health care costs. In Germany the estimated annual direct health care costs provided by Salize and Rossler (27,566 DM–14,094 Euro) are over two times the estimates in our study which, extrapolated to a 12 month period would be 5518 Euro. This difference is probably explained by the different services included to estimate costs. Salize and Rossler [24] also included costs for sheltered accommodation, which accounted for 38% of the overall costs. Moreover, the rate of rehospitalization within the study period was much greater than in the EuroSC study. In the UK, the total annual adjusted costs for a patient in the EuroSC, at 6704 USD-PPP, are greater than the cost estimate provided by Drummond and Davies (3560 USD) but lower than the 19,289 USD estimated by Guest and Cookson [10]. With 7776 Euros our estimate of adjusted annual direct mental health costs for schizophrenia patients in France, was lower than the direct cost estimate of 8380 Euros made by Rouillon et al. [21]. These authors included care in intermediate facilities in the study, which accounted for 30.1% of the overall direct costs estimated.

The results reported in this manuscript should be interpreted in the light of specific limitations: The different sampling procedures may contribute to the variable resource consumption in the different countries. Unit cost information for the different services is still scarce in Europe, and elements forming the costs for services are seldom the same for all estimates. Therefore, when comparing cost estimates from different national surveys, one should bear in mind that differences might occur because of different study methodologies, such as differences in sampling frames, unit cost estimates, included types of costs and differences in statistical methods.

5. Conclusions

Service use and estimated costs varied considerably between the three participating countries. The greatest differences were found with respect to day-clinic use, where rates and costs in France were much higher than in the other two countries. Rates of use of the specific types of service were not consistent across the board in the individual countries; in other words, rates followed different patterns across services. Estimated costs did not uniformly reflect the quantity of service use, since unit costs for services varied considerably between countries. Although the estimated costs for the individual services also varied considerably, the total adjusted costs for all services were much closer in the three countries.

Our findings indicate that there is a great need for comparable unit costs in international studies in order to make cost estimations for direct mental health care more reliable and comparable. Nevertheless, it is noteworthy that the costs for hospitalization accounted for the largest share of the total costs in each of the countries examined. It is still not clear whether current hospitalization rates correspond to optimal outcomes for patients, or whether a shift to more community care would better meet the needs of schizophrenic patients and lead in addition to a decrease in costs of care. Such questions should be addressed in future studies.

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