



ORIGINAL ARTICLE

Psychiatric status among stepchildren and domestic and international adoptees in Denmark. A comparative nationwide register-based study

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Abstract

Aims: To investigate adoptees' psychiatric contact compared with non-adoptees and to clarify the related diagnoses. **Method:** Observational, nationwide, register-based study, where correlations between psychiatric, demographic and socioeconomic variables were analyzed for adoptees compared with non-adoptees. The study period is 1992–2008. The setting is Denmark, encompassing seven different types of adoptees registered from 1988 to 2005 ($n = 13,524$). The non-adoptees ($n = 839,989$) are matched on sex, age and residence. Various comparison models are designed: one with delayed entries (17 years) shows a 5.0% psychiatric contact prevalence for non-adoptees and 9.2% for adoptees (adjusted odds ratio: 2.91). Another design without delayed entries (2 years) shows a 2% prevalence for non-adoptees and 3.9% for adoptees (adjusted odds ratio 2.65). p -values < 0.0005 . **Results:** Only one type of adoptee: "registered partner's adoption of the other partner's child" has a lower risk than non-adoptees (odds ratio: 0.26). Comparison within the same birth region shows a significant increased risk for most adoption types. More adoptees than non-adoptees have more than *one* contact. Age at adoption is an additional risk factor for $> one$ year only. The most frequent diagnosis is "Inherent or acquired brain suffering" (ICD-10: F50 – F99). **Conclusions:** The results stress that "adoptee" is an independent risk factor for psychiatric contact for international as well as for Danish adoptees. Danish stepchildren have a higher risk than non-adopted Danish children, while "registered partner's child adopted by the other partner" have a lower risk than non-adopted Danish children.

Key Words: *Adoptees, psychiatric contacts and diagnoses*

Background

International research has identified higher morbidities among adoptees [1]; however, valid comparison criteria are discussed [2]. Regardless of the high Danish frequency in international adoption, the present study is the first nationwide quantitative register-based research. Denmark (DK) is, together with Sweden, Spain and Norway, the country with the largest number of international adoptions compared with live birth rates (DK 1%) [3]. At least every 60th household with two people is involved in adoption in Denmark. Since legal abortion was allowed in Denmark in 1973, the frequency of domestic adoptions has been decreasing, and today

an annual number of 15–20 anonymous adoptions are completed. The anonymous adoptions are most frequently undertaken just after 3 months. There are approximately 10 non-anonymous Danish-born adoptees per year. More common are stepchild adoptions (partner's adoption of partner's child): the number is constant around 200 per year [4]. A type of stepchildren is "Registered partner's adoption of the other partner's child", two parents same sex (in this study both parents are mothers). This type was legalized in Denmark in 1999, and 387 "registered partner's child" are included in the study.

Single parents and their children have always been considered a vulnerable group [5–6]. Nowadays, due to improved socioeconomic conditions, public health

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coverage and respect of single women's and their children's rights, an increasing number of singles become a "single parent by choice". From 1989 administrative rules and regulations have facilitated single women's possibilities of international adoptions, and 229 children of single adoptants are included in the present study. There were no adoptions by single fathers at the end of the inclusion date. With regard to the above mentioned issues, the study is of concern to public health.

Objective of the study

The aim of the research was to investigate adoptees' psychiatric contact compared with non-adoptees and to clarify the related diagnoses.

Methods and materials

Methodology

The research is a register-based nationwide, observational study.

New entries take place every year resulting in "delayed entries" compared with the first entries in 1988. "Delayed-entries" are situations where parts of the cohort enter at a later state than others.

This is important only for children born abroad, where health indicators, e.g. psychiatric contacts, are unknown before arrival to the host country. Delayed entries have no importance for the Danish-born cohort, because their psychiatric contacts, thanks to the Danish national identification record system, are recorded from birth, even before the adoption date.

In order to analyze possible differences in outputs with and without delayed entries and differences in domestic and foreign-born adoptees/non-adoptees, three different designs were devised

- Design 1: Psychiatric contacts from 1992 to 2008 with delayed entries (Table I)
- Design 2: Psychiatric contacts from 2006 to 2008 without delayed entries (Table II)
- Design 3: Psychiatric contacts 1992 to 2008: foreign-born adoptees compared with foreign-born non-adoptees (Table III)

Statistics

Non-adoptees' and seven adoption types' psychiatric contact prevalence (%) and diagnoses were calculated. The diagnoses follow the World Health Organization's ICD-10 classification [7] as specified in the national Psychiatric Central Registration.

Table I. Design 1: Adoptees' and non-adoptees' risk of psychiatric contact from 1992 to 2008 (except**).

	Psychiatric contact <i>n</i> = 43,032 Frequency 5.2% M: 22,523 (5.2%) F: 20,509 (4.8%)	Unadjusted odds ratio (OR _u) Adjusted odds ratio (OR _a) (95% CI) <i>p</i> values for all outputs < 0.0005 (except**)
All origins <i>n</i> = 853,513 Males (M): 430,048: 50.4% Females (F): 423,465: 49.6%		
Non-adoptees <i>n</i> = 839,989 M: 423,812 (50.5%) F: 416,177 (49.5%)	5.0% (41,792) M: 21,856 (5.2%) F: 19,936 (4.8%)	Reference = 1
Adoptees (all) <i>n</i> = 13,524 M: 6,236 (46.1%) F: 7,288 (53.9%)	9.2% (1,240) M: 667 (10.7%) K: 573 (7.9%)	OR _u 1.93 (1.82–2.05) OR _a 2.91 (2.70–3.13)
International adoptees to a nuclear family <i>n</i> = 9,241	8.6% (790)	OR _u 1.79 (1.66–1.92) OR _a 3.93 (3.52–4.39)
International adoptees to a single mother <i>n</i> = 229	6.6% (15)	OR _u 1.34 (0.79–2.26) OR _a 2.81 (1.62–4.85)
Danish adoptees ≤12 months <i>n</i> = 411	7.7% (32)	OR _u 1.61 (1.12–2.31) OR _a 2.41 (1.67–3.47)
Danish adoptees >12 months <i>n</i> = 171	21.3% (37)	OR _u 5.27 (3.66–7.59) OR _a 5.18 (3.54–7.56)
Danish-born stepchildren <i>n</i> = 2,503	11.9% (299)	OR _u 2.60 (2.30–2.93) OR _a 2.03 (1.80–2.30)
Foreign-born stepchildren <i>n</i> = 582	10.3% (60)	OR _u 2.20 (1.68–2.87) OR _a 2.52 (1.84–3.45)
**1999–2008: Registered partner's child adopted by the other partner. Same sex (two mothers) <i>N</i> = 387 (Danish-born)	1.8% (7)	OR _u 0.35 (0.16–0.73) <i>p</i> ** 0.005 OR _a 1.27 (0.60–2.70) <i>p</i> ** 0.534

*Adjusted odds ratios are adjusted for sex, age at data reception, origin, residence at adoption, family income before tax, parents' education and family status.

Table II. Design 2: Adoptees' and non-adoptees' risk of psychiatric contact from 2006 to 2008.

	Psychiatric contact <i>n</i> = 17,230 Frequency 2.02% M: 8,446 (49.0%) F: 8,784 (51.0%)	Unadjusted odds ratio (OR _u) Adjusted odds ratio* (OR _a) (95% CI) <i>p</i> values for all outputs < 0.0005 (except**)
All origins <i>n</i> = 853,513		
Non-adoptees <i>n</i> = 839,989	2% (16,701) M: 8,174 (1.9%) F: 8,527 (2.0%)	Reference = 1
Adoptees (all) <i>n</i> = 13,524	3.9% (529) M: 272 (4.4%) F: 257 (3.5%)	OR _u 2.01 (1.84–2.20) OR _a 2.67 (2.40–3.0)
International adoptees to a nuclear family <i>n</i> = 9,241	3.9% (364)	OR _u 2.02 (1.82–2.25) OR _a 3.78 (3.21–4.45)
International adoptees to a single mother <i>n</i> = 229	2.6% (6)	OR _u 1.33 (0.59–2.98) OR _a 2.10 (0.91–4.82)
Danish adoptees ≤12 months <i>n</i> = 411	3.6% (15)	OR _u 1.87 (1.12–3.13) OR _a 2.62 (1.56–4.40)
Danish adoptees >12 months <i>n</i> = 171	6.4% (11)	OR _u 3.39 (1.84–6.24) OR _a 3.01 (1.58–5.74)
Danish-born stepchildren <i>n</i> = 2,503	4.2% (106)	OR _u 1.88 (1.55–2.28) OR _a 1.76 (1.44–2.14)
Foreign-born stepchildren <i>n</i> = 582	4.6% (27)	OR _u 2.40 (1.63–3.53) OR _a 2.29 (1.43–3.65)
Registered partner's child adopted by the other partner. Same sex, two mothers <i>n</i> = 387 (Danish-born)	0.5% (2)	OR _u 0.26 (0.66–1.06) <i>p</i> ** = 0.060 OR _a 0.26 (0.66–1.06) <i>p</i> ** = 0.762

*Adjusted odds ratios are adjusted for sex, age at data reception, origin, residence at adoption, family income before tax, parents' education and family status.

Table III. Design 3: Foreign-born adoptees' risk of psychiatric contact compared with non-adoptees' risk from the same origin from 1992 to 2008.

Foreign-born <i>n</i> = 46,106 (Unknown origin: 648 Greenlandic origin: 1,294. Both not included in this table)	Adoptees (All types) Adjusted odds ratio (OR _a *)	International adoptees to a nuclear family Unadjusted odds ratio (OR _u)	International adoptees to a single mother OR _u	Foreign born stepchildren OR _u
Non-adoptees from each origin is reference	1	1	1	1
Nordic countries <i>n</i> = 5,232 Adoptees = 23	1.10 (0.25–4.87) <i>p</i> = 0.90	/	/	1.20 (0.27–5.40)
Western Europe <i>n</i> = 9,538 Adoptees = 469	6.63 (4.93–8.91) <i>p</i> < 0.0005	8.56 (6.16–11.89)	/	2.88 (1.54–5.38)
Eastern Europe <i>n</i> = 2,571 Adoptees = 649	9.60 (5.21–15.74) <i>p</i> < 0.0005	14.66 (7.48–28.71)	13.92 (2.91–66.72)	0.84 (0.11–6.53)
Africa <i>n</i> = 3,744 Adoptees = 420	3.03 (1.54–5.95) <i>p</i> < 0.0005	2.66 (1.19–5.97)	9.35 (1.60–54.35)	2.97 (0.98–9.04)
South America <i>n</i> = 3,025 Adoptees = 2,290	1.95 (1.23–3.09) <i>p</i> < 0.0005	1.92 (1.20–3.07)	7.27 (1.35–39.16)	1.08 (0.23–5.00)
North America and Australia <i>n</i> = 2,389 Adoptees = 20	4.96 (1.30–18.99) <i>p</i> = 0.01	6.59 (0.69–63.30)	/	4.69 (0.93–23.62)
Asia occidental <i>n</i> = 9,865 Adoptees = 1,783	1.85 (1.35–2.53) <i>p</i> < 0.0005	1.70 (1.24–2.34)	13.03 (1.80–94.67)	3.73 (0.99–14.09)
Asia South East <i>n</i> = 7,800 Adoptees = 3,931	1.15 (0.88–1.49) <i>p</i> = 0.32	1.03 (0.78–1.36)	0.52 (0.14–1.94)	1.66 (0.93–2.94)

*Adjusted odds ratio (OR_a) adjusted for sex, age at data reception, residence at adoption, family income before tax, parents' education and family status.

Multivariate analyses were performed using a logistic regression model to investigate the importance of possible confounders. Adjusted odds ratio (OR_a), unadjusted odds ratios (OR_u), 95% confidence intervals (95% CI) and p values were calculated. The processing is run by SPSS software through Statistics Denmark, with acceptance from the National Data Authorities. The Ethical Council was informed, but no specific authorization was necessary. Socio-demographic data was provided by Statistics Denmark and the psychiatric data material, including diagnoses, was provided by the Danish Psychiatric Central Registration.

Setting

The setting was Denmark, with a total population of 5,411,405 on 1 January 2005: the study population was $n = 853,513$ (15.8%). The inclusion criterion for the adoptees was age ≤ 10 years at the adoption date between 1 January 1988 and 31 December 2005. Thus, the study population was born between 1978 and 2005. The adoptees account for 1.6% (13,524) of the study population, of which 3,472 are Danish-born and 10,052 are foreign-born. The variable “adoptee” encompasses seven alternative types: international adoptee to a nuclear family, international adoptee to a single mother, Danish adoptee ≤ 12 months, Danish adoptee > 12 months, Danish-born stepchildren, foreign-born stepchildren and “registered partner’s adoption of the other partner’s child”.

The girls represent 53.9% of the adoptees. Four “Danish adoptees” were recategorized as “international adoptees”, because their ethnic origin is non-Danish. The four children have obviously been relinquished by the first adoptant family and handed over for a second adoption: administratively Danish adopted children, but originally international adopted.

The non-adopted children were matched on the adoptees’ age, sex and residence at the registration date. They were identified out of a total sample of all children born 1978–2005. The non-adoptees had a normal Danish representation of girls and boys (boys: 50.5%).

The population covers all Danish counties and includes children (adoptees and non-adoptees) born in Denmark and abroad. This selection allowed various comparisons to be set up between adoptees and non-adoptees from the same birth origin. Children from “recombined families” (two originally different families brought together by new partnerships/marriages between parents) were included only

when a family reconstruction had occurred after the inclusion.

The dependent variable

The study operates with a dichotomous dependent variable: “no psychiatric contact versus psychiatric contact” to psychiatric wards and hospitals from 1 January 1992 to 31 January 2008. Danish-born cases were recorded from birth and non-Danish-born cases were recorded from the date of acquiring a Danish civil registration number.

Independent variables

The independent variables are adoptee, age and sex, demographic and socioeconomic determinants. The latter were extracted on 1 January the year following the adoption date. For an adoption taking place in February 1988 the independent variables were extracted on 1 January 1989.

Details

Adoptee. Non-adoptees are reference in all analyses. The different *adoptee types* are outlined in the description of the study population.

Sex is included as confounder in all analyses.

Age is a double confounder: the adoption age and the calendar age at the psychiatric data reception (February 2008). All ages were included in spite of the fact that psychiatric “disease” most often appeared after age 3, but “inherent or acquired brain suffering” (ICD-10: F50 – F99) might show symptoms at an earlier stage. The calendar age is divided into the following groups: 0–5, 6–11, 12–17, 18–23, and ≥ 24 years.

Country of origin is grouped into Denmark (reference), Nordic countries, Eastern and Western Europe, Eastern and Western Asia, Africa, South and North America/Australia and unknown. Adoptees from Greenland are not included in this study, but in a similar Greenlandic study.

Residence at the registration date is grouped into three categories: the provinces, the capital area and large towns (three largest besides Copenhagen).

Family income is the family members’ aggregated before-tax incomes in the same household (Family: parents and siblings). The income is grouped into five categories: level 1: $< 150,000$; level 2: $\geq 150,000$ $< 300,000$; level 3: $\geq 300,000$ $< 500,000$; level 4: $\geq 500,000$; level 5: missing (missing represents mainly under-aged, not living with parents). The income is standardized to the 2005 price index.

The reference is the most frequent income: $\geq 500,000$ DKK/year.

Parents' education is grouped into primary school, high school, occupational education, short higher education, middle higher education and long higher education. The highest level of education is selected to represent both parents in nuclear families.

Family status indicates whether the child is living with both parents, living with single mother, living with "mother or father in new partnership or living with single father", and "not living with parents".

Results

Psychiatric contacts

The first design (1992–2008 including delayed entries) shows an overall psychiatric contact prevalence of 5.0% for the non-adoptees and 9.2% for adoptees (OR_u 1.93). OR_a increases to 2.91 in analyses allowing for potential confounding by sex, age, origin, residence at adoption, family income before tax, parents' education, family status and age at data reception (Table I). Danish adoptees >12 months have the highest psychiatric contact prevalence (OR_a 5.18), followed by "international adoptees to a nuclear family" (OR_a 3.93). Danish and foreign-born stepchildren show OR_a at 2.07 and 2.52. All results have a p value < 0.0005 .

The second design (2006–08 without delayed entries, Table II) shows an overall prevalence of 2% for the non-adoptees and 3.9% for adoptees (OR_u 2.01, OR_a 2.67).

The third design shows that foreign-born adoptees compared with non-adoptees from the same origin have a higher risk of psychiatric contact. The results are non-significant for children from South East Asia and for areas with a small amount of adoptees (Table III). Nevertheless, comparing adoptees from South East Asia with non-adoptees from Denmark adjusted OR show >70% higher risk for adoptees to two parents and for stepchildren.

Sex. Close to 54% of the adoptees versus 49.5% of the non-adoptees were girls, but adopted boys' contact frequency was highest: 10.7% in design 1 (1992–2008) versus 7.9% for the girls and 4.4% versus 3.5% in design 2 (2006–2008).

Age at adoption showed higher frequencies for children ≥ 2 years at the adoption date (Table V), but thereafter no important differences appear. Significant higher risks for Danish adoptees >12 months are identified in all analyses. Close to 70% of "Registered partner's child adopted by the other

partner" are ≤ 1 year at adoption and 40.6% (not shown) are ≤ 4 months at adoption.

Further analyses stress that adoptees more often than non-adoptees have more than one psychiatric contact; the exception is children adopted to single mothers, where one contact covers 66.7% of all contacts.

Socioeconomic status

The adjusted regressions analyses show a 20–30% reduced risk for psychiatric contact when parents have a higher socioeconomic status (not included in the published tables).

Diagnoses

The most frequent diagnosis at first psychiatric contact (1992–2008) was "Inherent or acquired brain suffering" (ICD-10: F50 – F99) (Table IV). These diagnoses represent 62.3% of the adoptees and 48.8% of the non-adoptees – in particular, children adopted by single adoptants and "registered partner's child" scored high results within ICD F50 – F99. However, the diagnosis was also high among non-adoptees "not living with parents" (60.7%), but lower among non-adoptees living with a single mother (47.8%). More adopted boys than girls had this diagnosis and more girls than boys were diagnosed with "Nervous and stress related diseases with nervous determined physical symptoms". More non-adopted girls than boys suffered from "affective mental disorders". This morbidity pattern corresponds to the normal findings within sex and psychiatric diagnoses.

Discussion

The multivariate analyses point out that adoption entails at least a double risk for a psychiatric contact. This is a fact for domestic as well as international adopted children. The results confirm international research of "adoptee" as an independent risk factor for adverse health outcomes in Western societies [1,8,9], but the results are in contradiction to findings among adoptees in Greenland [10]. In a traditional Greenlandic context adoption is a strategy for social equilibrium and adoptees are often raised in the community where they are born.

The strength of the present study is the important numbers of cases over a long period, the multiple comparison designs, the collection of all psychiatric data from the national register and the control of demographic and socioeconomic confounders.

Table IV. Adoptees and non-adoptees first diagnoses. Frequency (%). Design 1, 1992–2008 (except**).

Diagnoses at first contact <i>n</i> = 43,032	Non-adoptees (Male / Female) <i>n</i> = 41,792	Adoptees (Male / Female) <i>n</i> = 1,240	International		Domestic adoptees		Domestic adoptees		Foreign-born stepchildren <i>n</i> = 60	Danish-born stepchildren <i>n</i> = 299	Registered partners' child adopted by the other partner, same sex, two mothers. <i>n</i> = 7
			adoptees to two parents <i>n</i> = 790	adoptees to single mothers <i>n</i> = 15	≤12 months at adoption date <i>n</i> = 32	>12 months at adoption date <i>n</i> = 37	Domestic adoptees stepchildren <i>n</i> = 60	Domestic adoptees stepchildren <i>n</i> = 299			
ICD-10: F10 – F19 Psychotic or behaviour-related suffering due to use of alcohol or other psychoactive drugs. <i>n</i> = 1,323	3.1 (4.4 / 1.7)	2.3 (3.0 / 1.6)	1.5	0	3.1	2.7		3.6	6.7	0	
ICD-10: F20 – F29 Schizophrenia, schizotypic mental disorder, paranoid psychoses. <i>n</i> = 1,197	2.8 (3.2 / 2.3)	2.4 (2.2 / 2.6)	2.4	0	0	8.1		1.3	6.7	0	
ICD-10: F30 – F39 Affective mental disorders. <i>n</i> = 3,612	8.5 (4.9 / 12.4)	5.8 (3.3 / 8.7)	4.1	6.7	9.4	2.7		10.1	6.7	0	
ICD-10: F40 – F48 Nervous and stress-related disease with nervous determined physical symptoms. <i>n</i> = 10,425	24.5 (16.4 / 33.3)	16.3 (9.9 / 23.7)	13.4	0	9.4	16.2		21.9	33.3	0	
ICD-10: F50 – F99 Inherent or acquired brain suffering. <i>n</i> = 21,173	48.8 (58.9 / 37.7)	62.3 (71.2 / 51.8)	68.9	80.0	62.5	54.1		50.7	35.0	85.7	
ICD-10: X600 – Y099 Self damage, attacks and mis-treatments. <i>n</i> = 248	0.6 (0.3 / 0.9)	0.5 (0.3 / 0.7)	0.4	0	3.1	2.7		0	1.7	0	
ICD-10: Z004 – Z749 Observation, high-risk, special conditions (judgement, socioeconomic condition). <i>n</i> = 4,460	10.4 (10.5 / 10.3)	9.1 (8.5 / 9.8)	8.5	13.3	12.5	10.8		10.1	8.3	14.3	
Unknown, other or before 1994 <i>n</i> = 594	1.4 (1.4 / 1.3)	1.3 (1.3 / 1.0)	0.9	0	0	2.7		2.3	1.7	0	

Table V. Age at adoption related to psychiatric contact (from 1992 to 2008).

Age at adoption	0 year n = 3,639	1 year n = 3,146	2 years n = 1,243	3 years n = 916	4 years n = 693	5 years n = 576	6 years n = 538	7 years n = 423	8 years n = 374	9 years n = 389	10 years n = 347
Psychiatric contact n = 1240	201 (5.2%)	193 (5.8%)	164 (11.7%)	137 (13.0%)	127 (15.5%)	92 (13.8%)	77 (12.5%)	64 (13.1%)	62 (14.2%)	54 (12.2%)	69 (16.6%)
Freq. (%)											
Unadjusted odds ratio (95% CI)	Reference = 1	1.111	2.389 (1.93–2.97)	2.708 (2.15–3.40)	3.318 (2.62–4.20)	2.892 (2.23–3.76)	2.591 (1.96–4.2)	2.739 (2.03–3.69)	3.001 (2.22–4.07)	2.513 (1.83–3.45)	3.600 (2.68–4.83)
p values < 0.0005 except*		*p 0.311 (0.91–1.36)									

The delayed entries for the foreign-born cases are considered to be a statistical weakness, but comparisons between designs 1 and 2 (with and without delayed entries) show no significant differences among the OR_u and OR_a . The difference in prevalence is not important, since it is due to a difference in period of time and age of the population in the two designs.

The preconditions for a successful comparative register research were similar backgrounds for the involved cases. As a matter of fact, the history of the different types of adoptees was not comparable. Some children are adopted due to mental incapability of the birth-mother to care adequately for the child, to abandonment or to forced removals. Other adoptions are related to poor public health coverage after mother's death or stigmatization and exclusion of single teenage-mothers, often children themselves.

International research has stressed that a risk factor for adoptees' reverse health outcome is the child's age at the adoption: the older, the higher risk, apparently due to placements at unqualified, insecure institutions before the adoption [11,12]. This statement is confirmed in our research for adoptees >1 year old at the adoption, but the results do not show significant increased risk related to higher age. The risk is the same for the 3-year old as for the 9-year old children (Table V).

Children who were registered as "Registered partner's child adopted by the other partner" (two mothers) were most often adopted before 12 months of age and they had a psychiatric contact pattern inferior to non-adoptees. It seems that being a registered partner's child may have a protective effect, but the number is too small to draw any final conclusions. Registered partners are similar to nuclear families, having a child-project in common, but for obvious reasons their children are recorded as "stepchildren".

The results stress a high psychiatric risk for stepchildren and Danish-born >12 months at the adoption date. Children adopted >12 months old might have been suffering from placement in institutions or similar turbulent incidences. Stepchildren have one birth-parent, but might have been suffering from the other parent's death or from any other family insecurity before the adoption, or the birth-parent might have psycho-social problems or the new partner, adopting the child, might have difficulties in finding his/her new place as a parent. These factors can result in reverse health outcomes for the adopted stepchild.

The findings show a lower psychiatric contact for single adoptants' children, but the number is limited. The results indicate that adoptees might have the

advantage of focused individual care from a single adoptant (single mother by choice), despite the fact that the economic status is lower for the single adoptant than for the nuclear family. Furthermore, children of single adoptants by choice do not receive the specific economic support that other children with a single parent receive from the Danish state.

The benefit of one single caretaker, for a vulnerable adopted child, has been emphasized by Groze [13]. Our results are in contradiction to other international research that stresses that being adopted by a single parent gives more health problems compared with non-adoptees who have a single birth-mother [14,15].

Socio-cultural origin might have an impact on psychiatric contact and diagnoses [16], but our study finds a higher risk of psychiatric contact for adoptees compared with non-adoptees of the same birth origin. This result emphasises that origin *alone* cannot explain the difference in psychiatric contact, and the findings confirm international research arguing that the conditions before adoption determine the outcome of adoption. The non-significant differences in results from South East Asia require further research.

Concealing the truth about facts related to the birth origin and the adoption procedure are also potential risk factors [17]. The international adoptees are most often anonymous, and so are most of the Danish-born adoptees aged ≤ 12 months at the adoption date. The anonymous Danish-born adoptees are registered at birth, getting a national identification number, but generally they get no family name before the adoption, when they are assigned the adoptants' family name. These children are often removed from their birth-mother immediately after the birth. In this study a "more than doubled risk" for psychiatric contact is also seen for this type.

The psychiatric contact frequency for adopted boys is higher than that for adopted girls, despite 8% more girls being among the adoptees. This status needs qualitative research in order to highlight parents' and other educators' differentiation in raising boys and girls and in order to elucidate medical care variations within sex.

The diagnoses show a higher frequency of "inherent or acquired brain suffering" among adoptees than among non-adoptees. Only foreign-born stepchildren present a lower frequency to this diagnosis than non-adoptees. Whether the diagnosis is the reason for adoption or whether the adoption is the underlying reason for the disease is unknown. Early separation from the birth-mother might result in post-traumatic stress disorders leaving permanent scars in the brain [18,19].

The analyses related to diagnoses are frequencies only, and have to be considered as a basis for further research.

Conclusions

The findings clearly show that the variable "adoptee" is an independent risk factor for psychiatric contact for international adoptees as well as for domestic adoptees in Denmark. Nevertheless, concrete findings deserve to be put into perspective.

Parents' long education and high income are not sufficient to reduce the risk of psychiatric contact: e.g. adoptees, "registered partner's child", have a lower risk for psychiatric contacts than non-adoptees with a similar socioeconomic status; "adoptees, single mother" have a lower risk than "adoptees, nuclear family", although their income is smaller.

Questions that often arise in research related to adoptees' health concerns are whether health issues are predominantly of genetic origin; a product of birth-mothers' possible drug- or alcohol abuse during pregnancy [20]; a result of social and medical poor condition before the adoption [21,22]; early separation from the birth-mother [18,19,23–25], change to another culture [16,26], forced migration [27] and an infancy and childhood as an adoptee at other individuals' premises triggering identity difficulties and coping strategies [28–30]. In addition to these questions further investigations are needed related to the qualifications of adoptants, medical staff and social- and health workers, or a lack of the same, to handle and care for adopted children and youth.

A tentative conclusion of the above could be that the main reason for the more frequent psychiatric contact is an insufficient sense of security and attachment at an early age.

It should also be noted that openness and respect of the initial identity, family and cultural history are indicators for healthy identity creation and development during a lifetime. Each individual has the right to fully participate in his/her life battle, and research on adoptees' feelings of participation is required. The impact of loss on health and development and ethical considerations (children's' and birth-mothers' rights) are issues that require extended attention from public health and human rights.

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