Supplementary Material

Table S1. CHD ICD-10 codes, grouped by complexity.

Mild/Moderate CHD*	ICD-10 code	n (%)
Atrial septal defect	Q211, Q211A-C	4281 (26.0%)
Bicuspid aortic valve	Q231A	67 (0.4%)
Coarctation of the aorta	Q251, Q251A	481 (2.9%)
Congenital aortic stenosis	Q230	279 (1.7%)
Congenital aortic insufficiency	Q231	196 (1.2%)
Congenital mitral insufficiency	Q233	328 (2.0%)
Congenital mitral stenosis	Q232	20 (0.1%)
Congenital pulmonary valve insufficiency	Q222	12 (0.1%)
Congenital stenosis of vena cava	Q26, Q260	5-8 (0%)
Congenital subaortic stenosis	Q244	67 (0.4%)
Congenital tricuspid stenosis	Q224	7 (0%)
Cor triatriatum	Q242	1-4 (0%)
Double aortic arch	Q254E	20 (0.1%)
Malformation of coronary vessels	Q245	31 (0.2%)
Partial anomalous pulmonary venous return	Q263	13 (0.1%)
Patent ductus arteriosus	Q250	1,193 (7.2%)
Persistent LSVC (in isolation)	Q261	31 (0.2%)
Pulmonary artery stenosis	Q256	408 (2.5%)
Pulmonary infundibular stenosis	Q243	17 (0.1%)
Pulmonary stenosis	Q221	765 (4.6%)
Supravalvar aortic stenosis	Q253	40 (0.2%)
Ventricular septal defect	Q210	4038 (24.5%)

Severe CHD	ICD-10 code	n (%)
Aortopulmonary septal defect	Q214	9 (0.1%)
Atrioventricular septal defect	Q212	456 (2.8%)
Congenital heart block	Q246	36 (0.2%)
Discordant atrioventricular connection	Q205, Q205A-B	16 (0.4%)
Discordant ventriculoarterial connection	Q203, Q203A	212 (1.3%)
Double-outlet right ventricle	Q201	58 (0.3%)
Ebstein anomaly	Q225	37 (9.2%)
Pulmonary valve atresia	Q220, Q220A	37 (0.2%)
Total anomalous pulmonary venous return	Q262	17 (0.1%)
Tetralogy of Fallot	Q213, Q213A	274 (1.7%)
Truncus arteriosus	Q200	41 (0.2%)

Single ventricle CHD	ICD-10 code	n (%)
Aortic atresia	Q252	11 (0.1%)
Double-inlet left ventricle	Q204	26 (0.2%)
Hypoplastic left heart syndrome	Q234	42 (0.3%)
Hypoplastic right heart syndrome	Q226	21 (0.1%)
Pulmonary atresia	Q255	14 (0.1%)

Other	ICD-10 code	n (%)
Anomalous pulmonary venous connection	Q264	32 (0.2%)
Congenital malformation of aortic and mitral valves	Q239	19 (0.1%)
Congenital malformation of cardiac chambers and connections	Q209	109 (0.7%)
Congenital malformation of cardiac septum	Q219	94 (0.6%)
Congenital malformation of great arteries	Q259	23 (0.1%)
Congenital malformation of great vein	Q269	18 (0.1%)
Congenital malformation of heart	Q249	1966 (11.9%)
Congenital malformation of tricuspid valve	Q229	5 (0.0%)
Other congenital malformation of cardiac septa	Q218A-C	1 (0.0%)
Other congenital malformations of aortic and mitral valves	Q238	141 (0.8%)
Other congenital malformations of cardiac chambers/connections	Q208A-C,E	11 (0.1%)
Other congenital malformations of cardiac septa	Q218	25 (0.2%)
Other congenital malformations of great veins	Q268A,C-D	22 (0.1%)
Other congenital malformations of other great arteries	Q258	45 (0.3%)
Other congenital malformations of pulmonary artery	Q257	41 (0.2%)
Other congenital malformations of pulmonary valve	Q223	12 (0.1%)
Other congenital malformations of the aorta	Q254	101 (0.6%)
Other congenital malformations of tricuspid valve	Q228	43 (0.3%)
Other specified congenital malformations of heart	Q248A-K	152 (0.9%)

Table S1 lists the CHD diagnoses, corresponding ICD-10 codes, and number of subjects (n (%)) identified in the Danish National Patient Registry. CHD complexity was categorized into 5 groups: (1) mild CHD, defined as all simple congenital heart anomalies not requiring intervention in the first year of life; (2) moderate CHD, defined as simple biventricular malformations requiring surgical or catheter-based intervention (*e.g.*, atrial septal defects, ventricular septal

defects, coarctation of the aorta, and patent ductus arteriosus); (3) severe CHD, defined as significantly malformed but biventricular heart defects requiring surgery in the first year of life (*e.g*., tetralogy of Fallot, transposition of the great arteries, atrioventricular canal defects); (4) single-ventricle CHD (*e.g*., hypoplastic left heart syndrome); and (5) other (*e.g*., unspecified malformations of cardiac chambers, septa, or valves).[21,22] Interventions were identified from Danish Classification of Surgical Procedures and Therapies codes 30-33 and Nordic Medico-Statistical Committee Classification of Surgical Procedure code KF.[22]

Abbreviations: *CHD = congenital heart disease; ICD-10 = International Classification of Diseases, Tenth Revision*

Table S2. Codes utilized for major congenital anomalies, psychotropic medications, and psychotherapy encounters.

Major congenital anomalies	All ICD-10 Q codes were included in addition to D215, D1810, P350, P351, and P371. *Minor congenital anomalies were excluded*: Q671, Q674, Q672, Q189, Q670, Q673, Q753, Q135, Q101, Q102, Q752, Q103, Q105,Q170, Q171, Q172, Q173, Q174, Q175, Q179, Q180, Q181, Q182, Q189, Q385, Q186, Q382, Q184, Q187, Q185, Q674, Q381, Q189, Q680, Q740G, Q845, Q8280, Q653-656, Q668, Q669, Q665, Q845, Q663, Q666, Q662, Q667, Q664, Q833, Q825, Q766, Q765, Q683, Q684, Q685, Q675, Q764L, Q676, Q682A, Q677, Q678, Q760, Q767C, Q270, Q250 (if GA < 37 weeks), Q211C, Q256 (if GA < 37 weeks), Q261, Q254E, Q331, Q314, Q315, Q320, Q401, Q430, Q400, Q633, Q610, Q627, Q552F, Q527, Q525, Q523, Q552, Q53, Q899, Q950, Q951* **Q53 and Q65 were specifically excluded due to poor validity in Danish National Patient Registry*
	Genetic syndromes: Q447B, Q619A, Q751, Q754, Q87, Q936, D821; Q90-Q92; Q93, Q96-99
Psychotropic medications	WHO Anatomical Therapeutic Chemical codes: • Antipsychotics (NO5A) • Anxiolytics (NO5B) • Hypnotics/sedatives (NO5C) • Antidepressants (N06A and NO6C) • Stimulants (NO6B).
Community-based psychotherapeutic services	Health insurance codes: • General practitioner encounters for mental health concerns: 804003, 804021-027, 804094-095, 804106, and 806101 • Psychologist encounters: 63xxxx • Psychiatrist encounters: 24xxxx, 26xxxx

Major congenital anomalies (MCAs) including genetic syndromes were identified using ICD-10 codes according to the EUROCAT categorization system. This Table was modeled after the work of Rotberg *et al*.[25] The World Health Organization (WHO) Anatomical Therapeutic Chemical code system was used to identify relevant psychotropic medications. Lastly, mental health-related encounters were identified in the National Health Insurance Service Registry using health insurance codes associated with a general practitioner visit for mental health concerns, psychotherapy encounters with a psychologist, and any visit to a psychiatrist.

Table S3. Parental socioeconomic and health characteristics for the CHD cohort and the three comparison cohorts.

	CHD cohort 16,473	General population cohort 162,204	Sibling cohort 20,079	MCA cohort 47,799
Maternal socioeconomic data				
Age (years)	32.2 ± 5.9	32.1 ± 5.7	32.1 ± 5.5	32.1 ± 5.7
Education				
High school	5,280 (32.1%)	48,001 (29.6%)	7,146 (35.6%)	14,682 (30.7%)
Technical school	5,676 (34.5%)	54,831 (33.8%)	6,765 (33.7%)	16,151 (33.8%)
College degree	4,808 (29.2%)	52,242 (32.2%)	5,520 (27.5%)	14,836 (31%)
Income				
Lowest quartile	2,645 (16.1%)	24,582 (15.2%)	3,197 (15.9%)	7,274 (15.2%)
Low-middle quartile	4,525 (27.5%)	41,965 (25.9%)	5,950 (29.6%)	12,611 (26.4%)
High-middle quartile	4,869 (29.6%)	47,982 (29.6%)	5,932 (29.5%)	14,249 (29.8%)
Highest quartile	4,361 (26.5%)	46,757 (28.8%)	13,379 (28.0%)	4,943 (24.6%)
Employment status				
Employed	12,106 (73.5%)	122,979 (75.8%)	14,006 (69.8%)	35,460 (74.2%)
Unemployed	880 (5.3%)	8,223 (5.1%)	1,222 (6.1%)	2,571 (5.4%)
Out of workforce	3,262 (19.8%)	28,935 (17.8%)	4,656 (23.2%)	9,049 (18.9%)
SES				
Low	1,115 (6.8%)	9,750 (6.0%)	1,635 (8.1%)	2,959 (6.2%)
Medium	9,033 (54.8%)	85,170 (52.5%)	11,425 (56.9%)	25,501 (53.4%)
High	5,462 (33.2%)	58,963 (36.4%)	6,221 (31.0%)	16,794 (35.1%)
Rural living	6,297 (38.2%)	55,221 (34.0%)	8112 (40.4%)	15,507 (32.4%)
Married	9,694 (58.8%)	98,594 (60.8%)	12,661 (63.1%)	28,744 (60.1%)
Dual-parent household	14,755 (89.6%)	147,424 (90.9%)	11,734 (58.4%)	43,221 (90.4%)
Paternal socioeconomic data				
Age (years)	34.9 ± 6.8	34.7 ± 6.5	34.9 ± 6.5	34.8 ± 6.6
Education				
High school	4,567 (27.7%)	42,848 (26.4%)	5,944 (29.6%)	12,974 (27.1%)
Technical school	7,520 (45.7%)	71,839 (44.3%)	9,088 (45.3%)	21,218 (44.4%)
College degree	3,358 (20.4%)	38,020 (23.4%)	3,964 (19.7%)	10,563 (22.1%)
Paternal socioeconomic data, cont'd.				
Income				
Lowest quartile	2,512 (15.2%)	23,806 (14.7%)	3,453 (17.2%)	7,342 (15.4%)
Low-middle quartile	3,907 (23.7%)	36,579 (22.6%)	4,904 (24.4%)	11,012 (23.0%)
High-middle quartile	4,585 (27.8%)	45,619 (28.1%)	5,435 (27.1%)	13,134 (27.5%)
Highest quartile	4,985 (30.3%)	52,327 (32.3%)	5,744 (28.6%)	15,034 (31.5%)
Employment status				
Employed	13,827 (83.9%)	138,876 (85.6%)	16,607 (82.7%)	40,265 (84.2%)
Unemployed	613 (3.7%)	5,638 (3.5%)	848 (4.2%)	1,830 (3.8%)
Out of workforce	1,382 (8.4%)	12,178 (7.5%)	1,849 (9.2%)	3,891 (8.1%)
SES				
Low	740 (4.5%)	6,737 (4.2%)	1,098 (5.5%)	2,186 (4.6%)
Medium	9,375 (56.9%)	88,331 (54.5%)	11,658 (58.1%)	26,276 (55.0%)
High	5,139 (31.2%)	55,871 (34.4%)	5,952 (29.6%)	15,724 (32.9%)
Parental health				
Maternal MHC	6,454 (39.2%)	57,487 (35.4%)	7,451 (37.1%)	18,182 (38.0%)
Maternal substance use disorder	549 (3.3%)	4,007 (2.5%)	662 (3.3%)	1,335 (2.8%)
Maternal CCI score				
One to Two	1,453 (8.8%)	10,360 (6.4%)	1,676 (8.3%)	3,467 (7.3%)
Three+	77 (0.5%)	481 (0.3%)	79 (0.4%)	153 (0.3%)
Paternal MHC	4,321 (26.2%)	38,878 (24.0%)	5,176 (25.8%)	12,276 (25.7%)
Paternal substance use disorder	774 (4.7%)	6,296 (3.9%)	934 (4.7%)	2,058 (4.3%)
Paternal CCI score				
One to Two	1,164 (7.1%)	10,302 (6.4%)	1,412 (7.0%)	3,069 (6.4%)
Three+	71 (0.4%)	621 (0.4%)	90 (0.4%)	196 (0.4%)

A composite socioeconomic status (SES) score was created based on parental education, income, and employment status in accordance with Jørgensen *et al.*[32] Data are presented as means ± standard deviation and n's (%).

Abbreviations: *CCI = Charlson Comorbidity Index; CHD = congenital heart disease; MCA = major congenital anomaly; MHC = mental health condition; SES = socioeconomic status*

Table S4. Incidence rates and aHRs of mental health conditions, demonstrating age-group-based differences within strata of sex and CHD complexity.

	CHD cohort n=16,473 IR [95% CI]	General population cohort n=162,204 IR [95% CI]	aHR [95% CI]	Sibling cohort n=20,079 IR [95% CI]	aHR [95% CI]	MCA cohort N=47,799 IR [95% CI]	aHR [95% CI]
Sex							
Female	**20.71 [19.67-21.76]**	**13.17 [12.92-13.43]**	*1.57 [1.49-1.66]*	**15.29 [14.31-16.28]**	*1.35 [1.18-1.54]*	**22.14 [21.49-22.78]**	*0.92 [0.87-0.98]*
0-<1y	45.04 [39.02-51.06]	9.28 [8.43-10.14]	*4.94 [4.18-5.84]*	6.41 [3.36-9.46]	*3.39 [1.57-7.34]*	47.34 [43.64-51.04]	*0.94 [0.79-1.11]*
1-<3y	22.91 [20.10-25.71]	10.85 [10.26-11.45]	*2.05 [1.79-2.35]*	10.28 [7.68-12.88]	*1.89 [1.16-3.08]*	23.63 [21.95-25.32]	*0.97 [0.84-1.13]*
3-<5y	9.97 [8.10-11.84]	4.08 [3.71-4.45]	*2.47 [1.99-3.06]*	5.93 [4.16-7.71]	*1.32 [0.77-2.26]*	12.78 [11.52-14.04]	*0.78 [0.63-0.97]*
5-<10y	12.40 [10.99-13.82]	7.25 [6.92-7.58]	*1.68 [1.48-1.90]*	8.20 [6.95-9.45]	*1.31 [0.99-1.75]*	12.82 [11.96-13.68]	*0.97 [0.84-1.11]*
10-<18y	28.38 [26.18-30.57]	25.50 [24.86-26.13]	*1.10 [1.01-1.20]*	25.80 [23.81-27.79]	*1.22 [1.03-1.45]*	30.54 [29.17-31.91]	*0.92 [0.83-1.01]*
Male	**24.66 [23.52-25.80]**	**14.23 [13.97-14.49]**	*1.71 [1.63-1.80]*	**15.75 [14.81-16.69]**	*1.41 [1.25-1.60]*	**21.75 [21.13-22.38]**	*1.12 [1.06-1.19]*
0-<1y	46.76 [40.83-52.69]	9.27 [8.45-10.10]	*4.91 [4.19-5.76]*	7.38 [4.30-10.47]	*3.15 [1.60-6.17]*	32.45 [29.52-35.38]	*1.39 [1.17-1.64]*
1-<3y	28.23 [25.16-31.29]	13.73 [13.07-14.39]	*1.98 [1.75-2.23]*	14.39 [11.48-17.30]	*2.07 [1.34-3.20]*	23.56 [21.94-25.18]	*1.16 [1.02-1.33]*
3-<5y	17.36 [14.91-19.81]	8.26 [7.74-8.77]	*2.04 [1.74-2.39]*	6.64 [4.85-8.43]	*2.56 [1.56-4.21]*	14.17 [12.88-15.45]	*1.19 [1.00-1.42]*
5-<10y	21.87 [19.97-23.76]	14.73 [14.26-15.21]	*1.46 [1.33-1.60]*	14.95 [13.35-16.55]	*1.20 [0.97-1.48]*	22.01 [20.90-23.12]	*0.97 [0.87-1.08]*
10-<18y	24.31 [22.24-26.38]	18.02 [17.48-18.56]	*1.34 [1.22-1.47]*	20.16 [18.50-21.82]	*1.25 [1.04-1.50]*	22.01 [20.85-23.17]	*1.13 [1.01-1.26]*
CHD complexity							
Mild/Moderate	**21.95 [21.07-22.83]**	**13.52 [13.30-13.73]**	*1.60 [1.53-1.68]*	**15.54 [14.83-16.24]**	*1.38 [1.26-1.52]*	**21.92 [21.40-22.45]**	*0.99 [0.94-1.04]*
0-<1y	45.87 [41.03-50.71]	9.60 [8.91-10.30]	*4.62 [4.05-5.26]*	8.54 [6.12-10.96]	*4.03 [2.39-6.79]*	39.19 [36.52-41.86]	*1.11 [0.97-1.27]*
1-<3y	23.86 [21.57-26.15]	12.16 [11.65-12.66]	*1.90 [1.71-2.11]*	11.91 [9.97-13.85]	*2.26 [1.64-3.11]*	23.62 [22.29-24.96]	*1.01 [0.90-1.13]*
3-<5y	13.14 [11.41-14.88]	6.09 [5.73-6.45]	*2.12 [1.83-2.46]*	7.14 [5.79-8.48]	*1.60 [1.13-2.28]*	13.64 [12.60-14.68]	*0.94 [0.81-1.11]*
5-<10y	16.69 [15.34-18.04]	10.98 [10.64-11.31]	*1.50 [1.37-1.64]*	12.47 [11.39-13.55]	*1.22 [1.02-1.45]*	17.49 [16.67-18.32]	*0.96 [0.87-1.06]*
10-<18y	25.80 [24.02-27.58]	21.95 [21.44-22.45]	*1.15 [1.07-1.24]*	22.59 [21.24-23.94]	*1.23 [1.08-1.41]*	26.47 [25.38-27.55]	*0.97 [0.89-1.06]*
Severe/SV	**28.39 [25.29-31.49]**	**13.44 [12.82-14.06]**	*2.21 [1.96-2.51]*	**14.24 [12.31-16.16]**	*2.25 [1.67-3.03]*	**21.29 [19.79-22.80]**	*1.31 [1.14-1.51]*
0-<1y	56.84 [42.21-71.47]	8.27 [6.54-10.00]	*8.11 [5.67-11.59]*	7.29 [0.90-13.67]	*8.43 [1.92-37.04]*	49.00 [40.85-57.15]	*1.21 [0.87-1.68]*
1-<3y	32.93 [25.04-40.81]	14.59 [13.02-16.17]	*2.25 [1.71-2.94]*	7.35 [3.01-11.69]	*46.74 [3.78-578.27]*	21.72 [18.07-25.37]	*1.42 [1.04-1.94]*
3-<5y	19.15 [12.81-25.50]	6.25 [5.18-7.33]	*3.08 [2.07-4.58]*	6.87 [3.14-10.60]	*2.14 [0.79-5.79]*	10.51 [7.85-13.16]	*2.15 [1.31-3.52]*
5-<10y	19.68 [15.04-24.32]	10.61 [9.63-11.59]	*1.83 [1.41-2.38]*	10.68 [7.83-13.53]	*1.81 [1.08-3.05]*	19.10 [16.56-21.65]	*0.98 [0.73-1.31]*
10-<18y	31.50 [25.09-37.90]	21.31 [19.84-22.78]	*1.51 [1.21-1.89]*	22.61 [18.67-26.54]	*1.71 [1.09-2.69]*	21.82 [18.90-24.74]	*1.59 [1.20-2.11]*

Incidence rates [95% CIs] and adjusted hazard ratios (aHRs [95% CI]) of mental health conditions for the CHD, general population, sibling, and MCA cohorts, stratified by CHD complexity and sex. These subcohorts were further stratified by age group to evaluate differences across ages of children. Mental health conditions were defined as a composite outcome of the first medical contact yielding an associated ICD-10 diagnosis, prescription of a psychotropic medication, or provision of psychotherapy. Incidence rates are reported as mental health condition diagnoses per 1,000 person-years. The CHD cohort *vs.* the general population

cohort and the CHD cohort vs. the MCA cohort analyses were adjusted by design for sex and year of CHD diagnosis as a result of matching and further adjusted for immigration status, mother's marital status, socioeconomic status, rurality, maternal and paternal mental helath, and maternal and paternal physical health as determined by the Charlson Comorbidity Index; the CHD cohort *vs.* the sibling cohort analysis was adjusted for sex and calendar year.

Abbreviations: *CHD = congenital heart disease; CI = confidence interval; MCA = major congenital anomaly; SV = single ventricle*

Table S5. Incidence rates and aHRs of specific hospital-based mental health diagnoses, stratified by age group, sex, and CHD complexity.

	CHD cohort n=16,473	General population cohort n=162,204		Sibling cohort N=20,079		MCA cohort n=47,799	
	IR [95% CI]	IR [95% CI]	aHR [95% CI]	IR [95% CI]	aHR [95% CI]	IR [95% CI]	aHR [95% CI]
Overall	14.23 [13.63-14.82]	7.70 [7.56-7.83]	1.83 [1.74-1.91]	9.61 [9.15-10.07]	1.50 [1.37-1.65]	13.54 [13.20-13.88]	1.03 [0.97-1.08]
0-<1y	33.27 [29.68-36.86]	3.57 [3.20-3.93]	9.25 [7.91-10.81]	5.30 [3.66-6.95]	4.81 [2.70-8.56]	24.80 [22.95-26.65]	1.31 [1.13-1.52]
1-<3y	9.14 [7.92-10.36]	2.40 [2.20-2.59]	3.77 [3.21-4.44]	2.09 [1.40-2.78]	8.79 [4.35-17.75]	8.20 [7.52-8.87]	1.13 [0.96-1.34]
3-<5y	10.01 [8.72-11.31]	3.92 [3.66-4.17]	2.50 [2.15-2.89]	4.60 [3.69-5.52]	1.90 [1.33-2.71]	9.54 [8.80-10.28]	1.02 [0.87-1.19]
5-<10y	12.85 [11.85-13.85]	7.73 [7.49-7.96]	1.63 [1.50-1.78]	9.00 [8.22-9.77]	1.38 [1.16-1.63]	13.54 [12.93-14.14]	0.93 [0.85-1.02]
10-<18y	16.19 [15.06-17.33]	12.76 [12.45-13.07]	1.24 [1.15-1.34]	13.86 [12.99-14.72]	1.28 [1.13-1.46]	15.88 [15.21-16.55]	1.00 [0.92-1.09]
Sex							
Female	12.44 [11.65-13.23]	6.76 [6.58-6.94]	1.81 [1.69-1.94]	8.33 [7.61-9.04]	1.50 [1.27-1.77]	13.09 [12.60-13.57]	0.92 [0.85-0.99]
0-<1y	32.14 [27.06-37.21]	3.69 [3.15-4.23]	8.92 [7.11-11.19]	4.90 [2.24-7.56]	2.93 [1.26-6.78]	30.18 [27.23-33.13]	1.07 [0.87-1.32]
1-<3y	8.53 [6.84-10.22]	1.96 [1.70-2.21]	4.49 [3.50-5.75]	2.03 [0.88-3.18]	3.21 [1.14-8.99]	7.85 [6.89-8.80]	1.12 [0.88-1.42]
3-<5y	7.15 [5.59-8.71]	2.07 [1.81-2.33]	3.59 [2.77-4.65]	3.26 [1.95-4.56]	1.46 [0.73-2.93]	9.21 [8.16-10.25]	0.73 [0.56-0.94]
5-<10y	8.25 [7.12-9.38]	4.35 [4.10-4.60]	1.86 [1.60-2.17]	5.75 [4.71-6.79]	1.30 [0.94-1.81]	9.60 [8.87-10.33]	0.85 [0.72-1.00]
10-<18y	17.06 [15.43-18.69]	14.07 [13.61-14.52]	1.17 [1.06-1.30]	13.53 [12.12-14.93]	1.44 [1.17-1.79]	17.68 [16.68-18.68]	0.94 [0.83-1.06]
Male	16.01 [15.12-16.91]	8.62 [8.42-8.83]	1.84 [1.73-1.96]	10.72 [9.95-11.49]	1.43 [1.24-1.65]	13.97 [13.49-14.46]	1.13 [1.05-1.21]
0-<1y	34.32 [29.25-39.39]	3.45 [2.95-3.95]	9.78 [7.87-12.15]	4.02 [1.75-6.30]	4.97 [1.97-12.55]	19.88 [17.59-22.16]	1.68 [1.37-2.08]
1-<3y	9.72 [7.95-11.49]	2.82 [2.52-3.11]	3.36 [2.70-4.18]	2.26 [1.12-3.41]	11.83 [3.42-40.96]	8.52 [7.56-9.48]	1.21 [0.96-1.52]
3-<5y	12.80 [10.74-14.85]	5.70 [5.27-6.12]	2.14 [1.78-2.56]	4.90 [3.38-6.42]	1.99 [1.15-3.45]	9.85 [8.80-10.89]	1.32 [1.08-1.62]
5-<10y	17.46 [15.81-19.11]	11.06 [10.66-11.47]	1.54 [1.39-1.71]	11.65 [10.26-13.05]	1.32 [1.05-1.65]	17.30 [16.35-18.26]	0.98 [0.87-1.10]
10-<18y	15.30 [13.72-16.87]	11.42 [11.01-11.84]	1.34 [1.20-1.50]	14.21 [12.85-15.58]	1.18 [0.96-1.46]	14.09 [13.20-14.98]	1.09 [0.96-1.24]
CHD complexity							
Mild/Moderate	13.94 [13.26-14.63]	7.63 [7.47-7.78]	1.80 [1.71-1.90]	9.57 [9.03-10.11]	1.52 [1.36-1.70]	13.55 [13.15-13.95]	1.01 [0.95-1.07]
0-<1y	33.53 [29.40-37.66]	3.66 [3.23-4.08]	8.85 [7.40-10.57]	5.33 [3.42-7.24]	4.66 [2.34-9.25]	24.70 [22.59-26.82]	1.30 [1.10-1.54]
1-<3y	8.21 [6.89-9.53]	2.31 [2.09-2.53]	3.48 [2.87-4.23]	1.94 [1.17-2.72]	7.45 [3.39-16.38]	8.33 [7.55-9.11]	1.00 [0.82-1.21]
3-<5y	9.66 [8.21-11.12]	3.96 [3.67-4.25]	2.36 [1.99-2.80]	4.61 [3.54-5.68]	2.19 [1.43-3.36]	9.72 [8.86-10.58]	0.96 [0.80-1.16]
5-<10y	12.49 [11.35-13.63]	7.82 [7.54-8.09]	1.57 [1.42-1.74]	9.09 [8.18-10.01]	1.25 [1.02-1.52]	13.45 [12.75-14.15]	0.92 [0.82-1.02]
10-<18y	16.42 [15.06-17.79]	12.93 [12.56-13.31]	1.24 [1.13-1.36]	13.89 [12.85-14.93]	1.38 [1.18-1.62]	16.11 [15.29-16.92]	1.00 [0.90-1.12]
Severe/SV	18.87 [16.42-21.32]	7.39 [6.94-7.84]	2.67 [2.30-3.11]	8.01 [6.58-9.43]	2.56 [1.79-3.66]	13.27 [12.12-14.43]	1.35 [1.14-1.59]
0-<1y	41.97 [29.43-54.52]	3.29 [2.20-4.38]	16.23 [9.67-27.23]	2.91 [-1.12-6.95]	23.55 [1.43-386.76]	28.71 [22.49-34.92]	1.55 [1.02-2.35]
1-<3y	16.12 [10.70-21.54]	2.87 [2.18-3.56]	6.91 [4.37-10.93]	3.98 [0.79-7.16]	43.98 [2.87-672.83]	7.40 [5.31-9.49]	2.15 [1.32-3.50]
3-<5y	12.55 [7.53-17.57]	4.11 [3.25-4.97]	2.96 [1.84-4.77]	4.18 [1.28-7.07]	5.68 [0.99-32.56]	7.01 [4.89-9.13]	1.63 [0.92-2.88]
5-<10y	16.63 [12.49-20.77]	7.49 [6.68-8.30]	2.17 [1.63-2.89]	7.00 [4.72-9.29]	1.97 [1.09-3.56]	15.27 [13.06-17.48]	0.99 [0.72-1.36]
10-<18y	19.63 [14.86-24.40]	12.62 [11.53-13.71]	1.59 [1.21-2.07]	11.77 [8.99-14.55]	1.70 [0.98-2.96]	13.99 [11.75-16.23]	1.42 [1.02-1.98]

Incidence rates and adjusted hazard ratios with 95% confidence intervals (CIs) of specific hospital-based mental health diagnoses for the CHD, general population, sibling, and MCA cohorts, stratified by CHD complexity and sex. These subcohorts were further stratified by age group to evaluate differences across ages of children. Incidence rates are reported as hospital-based mental health diagnoses per 1,000 person-years. The CHD cohort *vs.* the general population cohort and the CHD cohort *vs.* the MCA cohort analyses were adjusted by design for sex and year of CHD diagnosis as a result of matching and further adjusted for immigration status, mother's marital status, socioeconomic status, rurality, maternal and paternal mental health, and maternal and paternal physical health as determined by the Charlson Comorbidity Index; the CHD cohort *vs.* the sibling cohort analysis was adjusted for sex and calendar year.

Abbreviations: *aHR = adjusted hazard ratios; CHD = congenital heart disease; CI = confidence interval; IR = incidence rate; MCA = major congenital anomaly; SV = single ventricle*

Table S6. Incidence rates and aHRs of specific hospital-based mental health diagnoses, by cohort.

Diagnosis	ICD-10 codes	CHD cohort	General population cohort		Sibling cohort		MCA cohort	
		IR [95% CI]	IR [95% CI]	aHR [95% CI]	IR [95% CI]	aHR [95% CI]	IR [95% CI]	aHR [95% CI]
Any mental diagnosis		14.23 [13.63-14.82]	7.70 [7.56-7.83]	1.83 [1.74-1.91]	9.61 [9.15-10.07]	1.50 [1.37-1.65]	13.54 [13.20-13.88]	1.03 [0.97-1.08]
Organic mental disorders	F00-F09	0.06 [0.02-0.10]	0.02 [0.01-0.03]	3.00 [1.41-6.35]	0.03 [0.00-0.05]	1.61 [0.38-6.72]	0.04 [0.02-0.06]	1.40 [0.58-3.38]
Substance use disorders	F10-F19	0.67 [0.55-0.79]	0.53 [0.50-0.57]	1.21 [0.99-1.47]	0.92 [0.78-1.06]	1.01 [0.74-1.38]	0.53 [0.46-0.59]	1.25 [0.98-1.58]
Schizophrenia spectrum disorders	F20-F29	0.28 [0.20-0.36]	0.23 [0.21-0.25]	1.22 [0.89-1.66]	0.35 [0.26-0.43]	1.00 [0.61-1.62]	0.37 [0.31-0.42]	0.75 [0.53-1.05]
Mood disorders	F30-F39	0.63 [0.51-0.75]	0.61 [0.57-0.65]	1.03 [0.84-1.27]	0.73 [0.61-0.86]	1.23 [0.87-1.75]	0.63 [0.56-0.70]	1.01 [0.80-1.27]
Depression	F32-F33	0.57 [0.46-0.69]	0.58 [0.54-0.61]	1.00 [0.81-1.23]	0.65 [0.54-0.77]	1.18 [0.81-1.70]	0.58 [0.52-0.65]	0.99 [0.78-1.27]
Anxiety disorders	F40-F48	4.41 [4.09-4.73]	2.46 [2.39-2.54]	1.75 [1.61-1.90]	3.21 [2.95-3.47]	1.55 [1.32-1.82]	3.65 [3.48-3.82]	1.14 [1.04-1.25]
Anxiety	F41	0.57 [0.46-0.69]	0.48 [0.45-0.52]	1.15 [0.93-1.43]	0.50 [0.40-0.60]	1.93 [1.23-3.03]	0.52 [0.45-0.58]	1.11 [0.87-1.43]
Severe stress reaction	F43	3.43 [3.15-3.71]	1.73 [1.66-1.79]	1.95 [1.78-2.14]	2.37 [2.14-2.59]	1.51 [1.25-1.81]	2.74 [2.59-2.89]	1.17 [1.06-1.30]
Eating Disorders	F50	0.96 [0.81-1.10]	0.43 [0.40-0.46]	2.28 [1.91-2.71]	0.54 [0.43-0.64]	1.58 [1.07-2.32]	0.74 [0.67-0.82]	1.28 [1.05-1.56]
Anorexia Nervosa	F50.0	0.15 [0.09-0.21]	0.15 [0.14-0.17]	0.98 [0.65-1.49]	0.19 [0.13-0.26]	0.64 [0.28-1.42]	0.13 [0.10-0.17]	1.37 [0.81-2.30]
Personality disorders	F60	0.20 [0.13-0.26]	0.15 [0.13-0.17]	1.25 [0.85-1.82]	0.26 [0.19-0.33]	1.11 [0.59-2.11]	0.15 [0.12-0.19]	1.37 [0.86-2.21]
Intellectual disability	F70-F79	2.95 [2.69-3.21]	0.60 [0.56-0.63]	4.98 [4.44-5.57]	0.72 [0.59-0.84]	4.42 [3.34-5.85]	3.32 [3.15-3.48]	0.90 [0.81-1.00]
Mild intellectual disability	F70	1.06 [0.90-1.21]	0.36 [0.33-0.39]	2.83 [2.38-3.37]	0.47 [0.37-0.57]	2.18 [1.53-3.12]	1.19 [1.09-1.29]	0.88 [0.74-1.05]
Moderate intellectual disability	F71	0.65 [0.53-0.77]	0.10 [0.08-0.11]	7.23 [5.58-9.36]	0.09 [0.05-0.13]	8.82 [4.30-18.12]	0.65 [0.58-0.73]	1.03 [0.82-1.29]
Developmental disorders	F80-84	4.48 [4.15-4.80]	2.57 [2.49-2.64]	1.72 [1.58-1.86]	2.72 [2.48-2.96]	1.61 [1.36-1.92]	4.78 [4.58-4.98]	0.92 [0.84-1.00]
Autism spectrum disorders	F84.x, excluding F84.2-84.4	2.64 [2.39-2.89]	1.72 [1.65-1.78]	1.54 [1.39-1.70]	1.69 [1.50-1.88]	1.37 [1.11-1.70]	2.98 [2.82-3.14]	0.88 [0.79-0.98]
Behavior, attention, and emotional disorders	F90-F99	5.86 [5.49-6.23]	3.87 [3.77-3.96]	1.46 [1.36-1.56]	4.74 [4.42-5.06]	1.25 [1.09-1.43]	5.80 [5.58-6.02]	0.98 [0.91-1.06]
ADHD	F90 and F98.8	3.22 [2.94-3.49]	2.33 [2.26-2.41]	1.32 [1.21-1.45]	2.85 [2.60-3.10]	1.30 [1.09-1.55]	3.47 [3.30-3.64]	0.89 [0.80-0.99]
Attachment disorders	F94.x excluding F94.0	0.47 [0.36-0.57]	0.29 [0.26-0.32]	1.48 [1.13-1.93]	0.42 [0.32-0.51]	1.23 [0.78-1.94]	0.43 [0.38-0.49]	1.15 [0.84-1.58]
Tic disorders	F95	0.73 [0.60-0.86]	0.46 [0.42-0.49]	1.57 [1.29-1.90]	0.53 [0.42-0.63]	1.27 [0.85-1.88]	0.53 [0.46-0.59]	1.35 [1.07-1.70]
Self-harm or suicidal history	R45.8, T14.91, X60-84	0.11 [0.06-0.16]	0.15 [0.13-0.17]	0.73 [0.45-1.20]	0.24 [0.17-0.31]	0.46 [0.17-1.27]	0.17 [0.13-0.21]	0.57 [0.32-1.01]

Incidence rates and adjusted hazard ratios with 95% confidence intervals (CIs) of specific hospital-based mental health diagnoses in the CHD population compared to the general population, sibling, and MCA cohorts. The CHD cohort *vs.* the general population cohort and the CHD *vs.* the MCA cohort analyses were adjusted by design for sex and year of CHD diagnosis as a result of matching and further adjusted for immigration status, mother's marital status, socioeconomic status, rurality, maternal and paternal mental health, and maternal and paternal physical health as determined by the Charlson Comorbidity Index; the CHD cohort *vs.* the sibling cohort analysis was adjusted for sex and calendar year. N/A signifies incidence rates and hazard ratios that could not be calculated due to inadequate number of outcomes.

Abbreviations: *ADHD = attention-deficit/hyperactivity disorder; aHR = adjusted hazard ratio; CD = conduct disorder; CHD = congenital heart disease; IR = incidence rate; MCA = major congenital anomaly; ODD = oppositional defiant disorder*
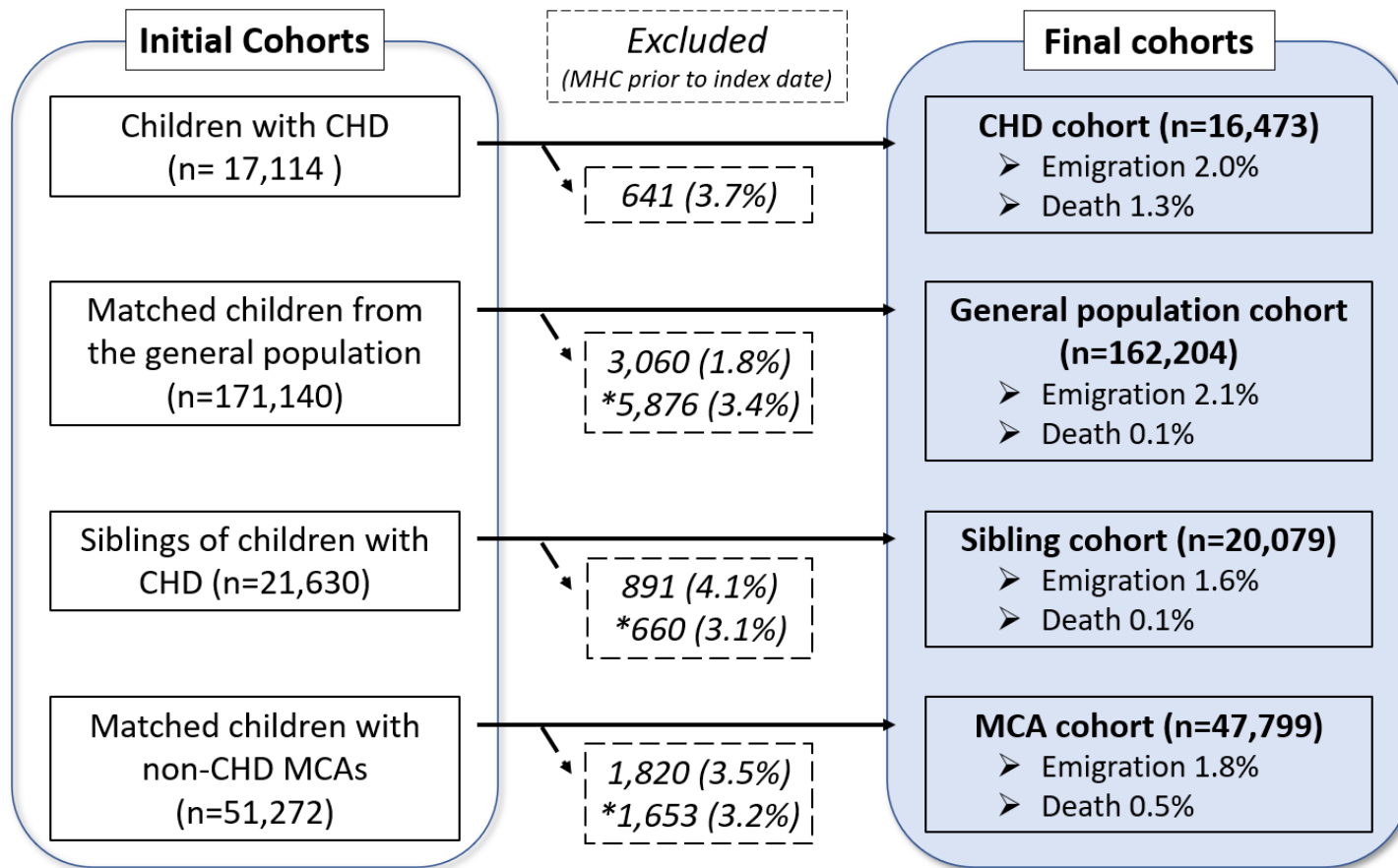
Figure S1. Flow diagram of the CHD and comparison cohorts. Children diagnosed with CHD during 1996-2017 were included in the CHD cohort. The comparison cohorts consisted of children from the general population (matched 10:1 by age and sex), siblings of children with CHD, and children with non-CHD MCAs (matched 3:1 by age and sex). Children were excluded from the comparison cohorts if they had a history of a mental health condition prior to the index date or *if their matched CHD patient was excluded due to history of a mental health condition. The final cohorts as depicted on the right. The number of children who died or were lost to follow-up due to emigration during the study period are specified for each cohort.

Abbreviations: *CHD = congenital heart disease; MCA = major congenital anomalies.*
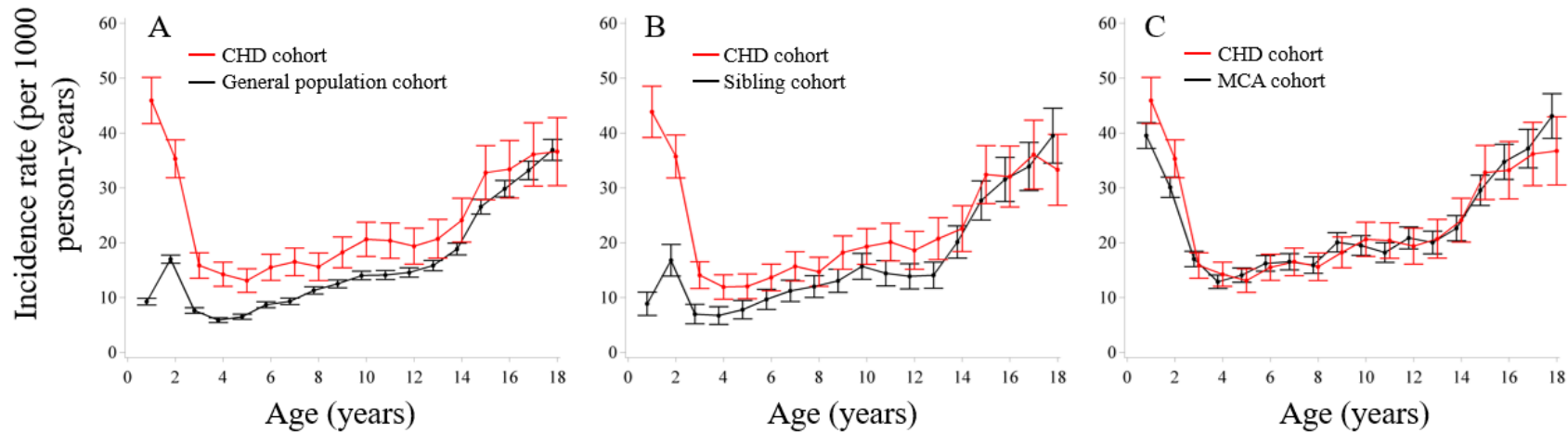
Figure S2. Incidence rates of mental health conditions in the CHD cohort compared to the general population (A), sibling (B), and MCA cohorts (C).

Mental health conditions were defined as a composite outcome of the first medical contact yielding an associated ICD-10 diagnosis, prescription of a psychotropic medication, or provision of psychotherapy. Incidence rates and 95% CIs are graphed in one-year intervals of age.

Abbreviations: *CHD = congenital heart disease; MCA = major congenital anomalies.*
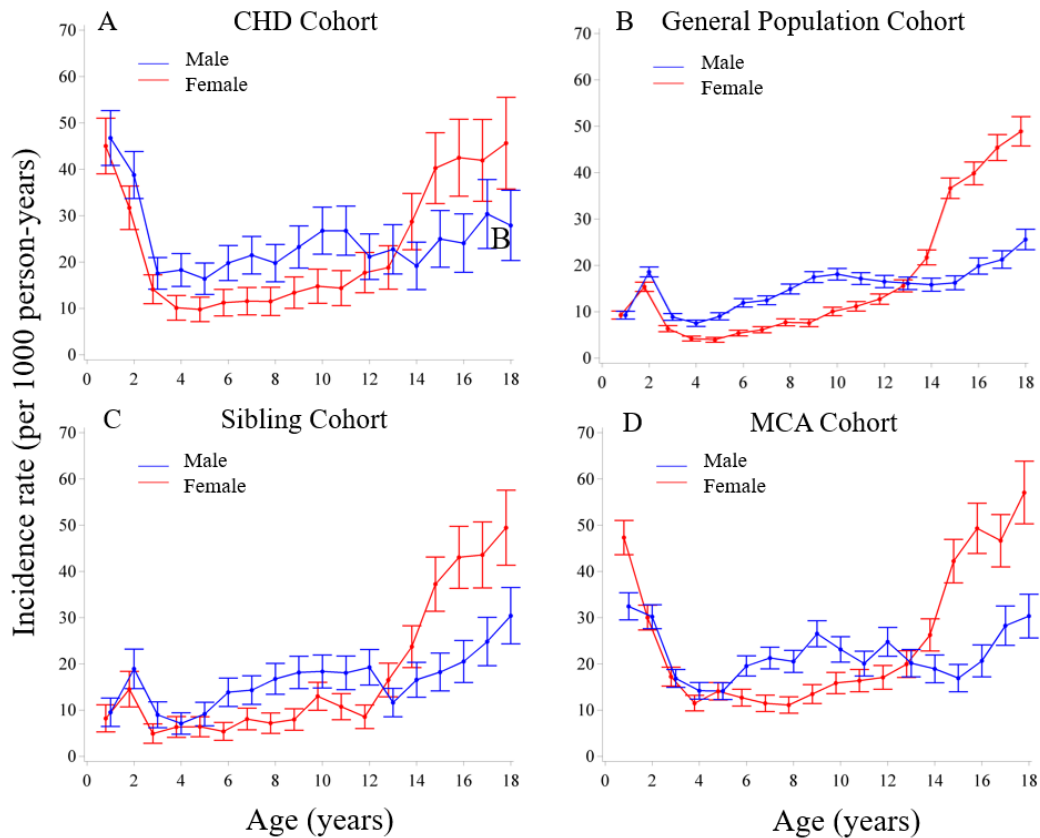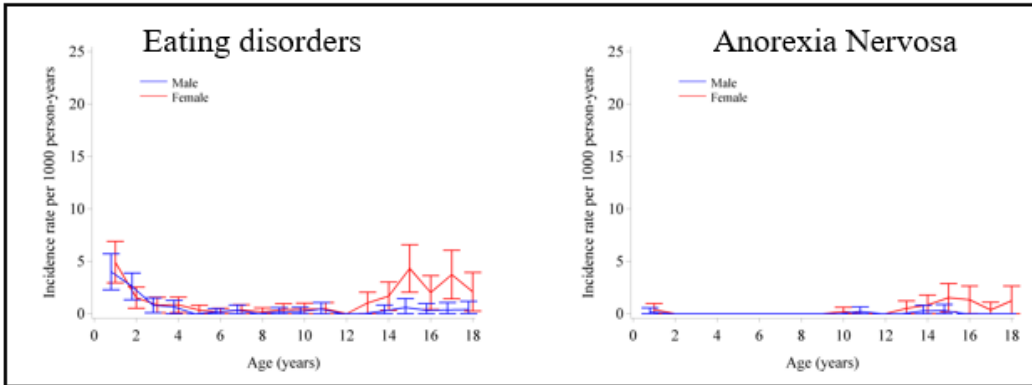
Figure S3. Incidence rates of mental health conditions in the CHD cohort (A) compared to the general population (B), sibling (C), and MCA cohorts (D), stratified by sex. Mental health conditions were defined as a composite outcome of the first medical contact yielding an associated ICD-10 diagnosis, prescription of a psychotropic medication, or provision of psychotherapy. Incidence rates and 95% CIs for females (red) and males (blue) are graphed in one-year intervals of age.

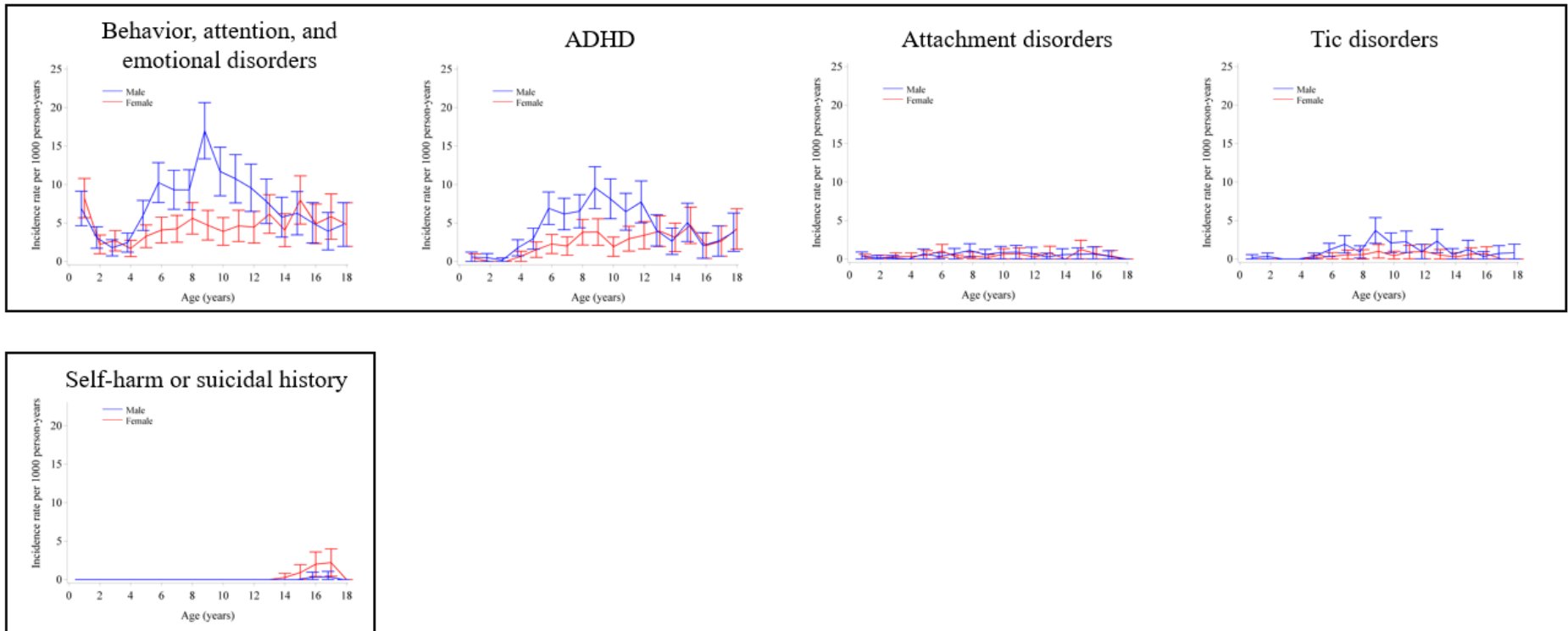Abbreviations: *CHD = congenital heart disease; MCA = major congenital anomalies.*
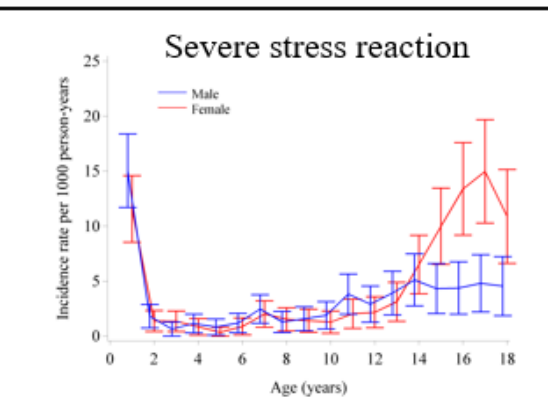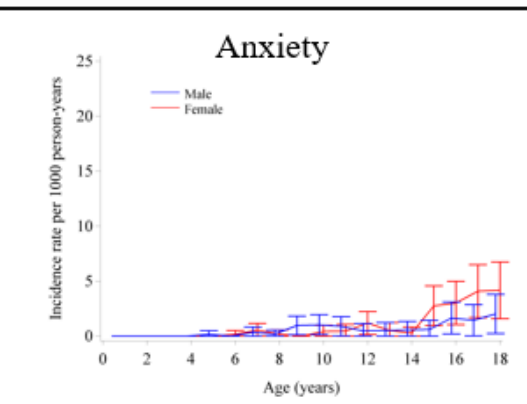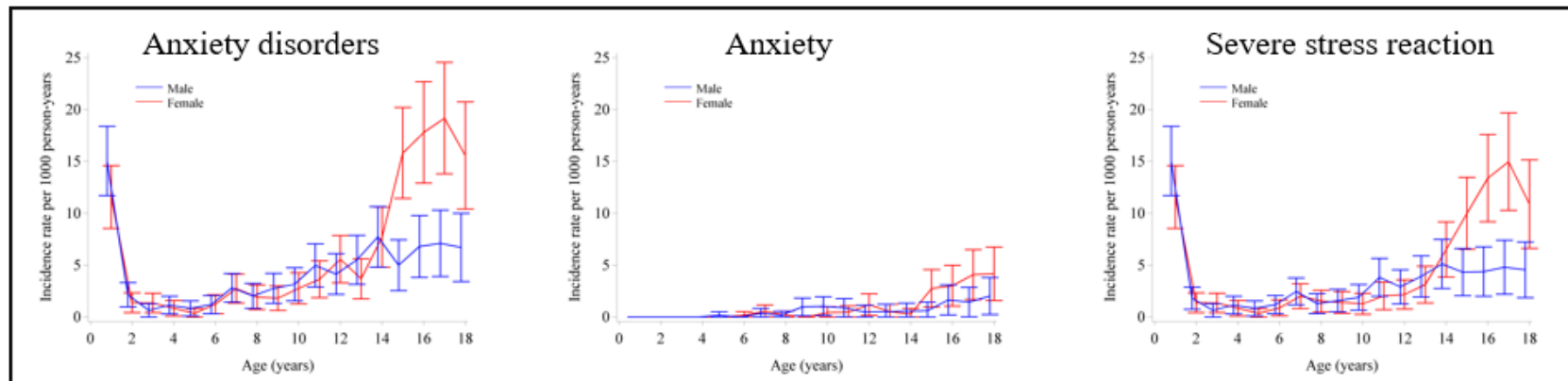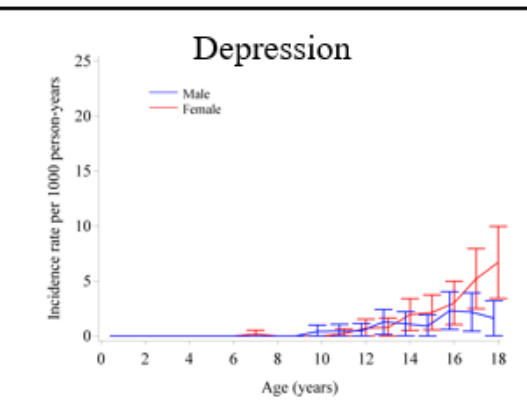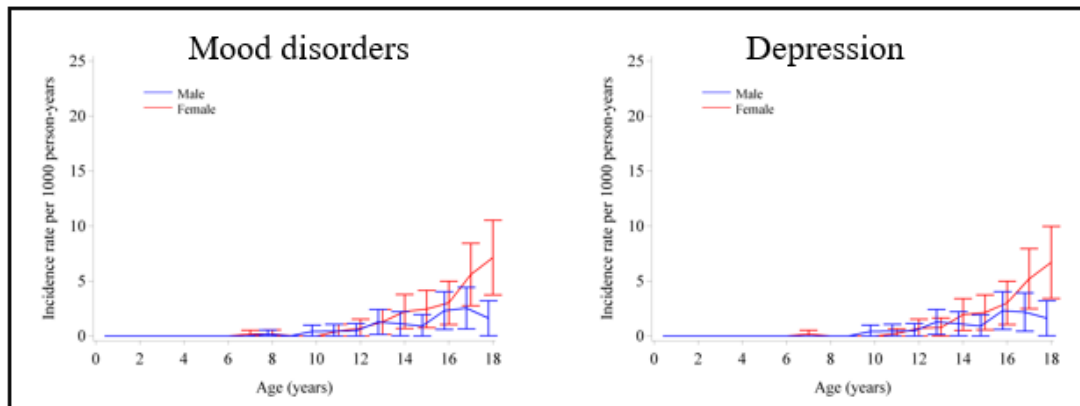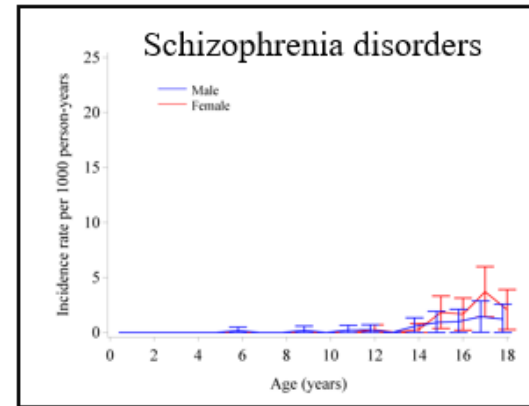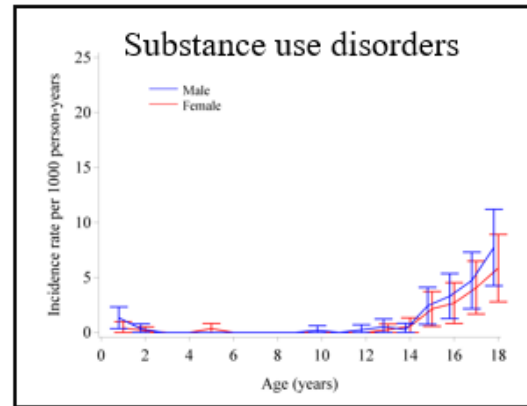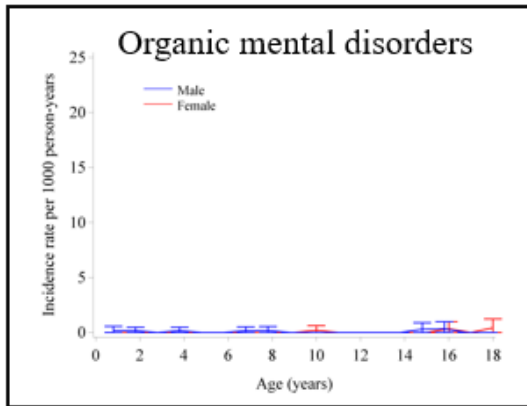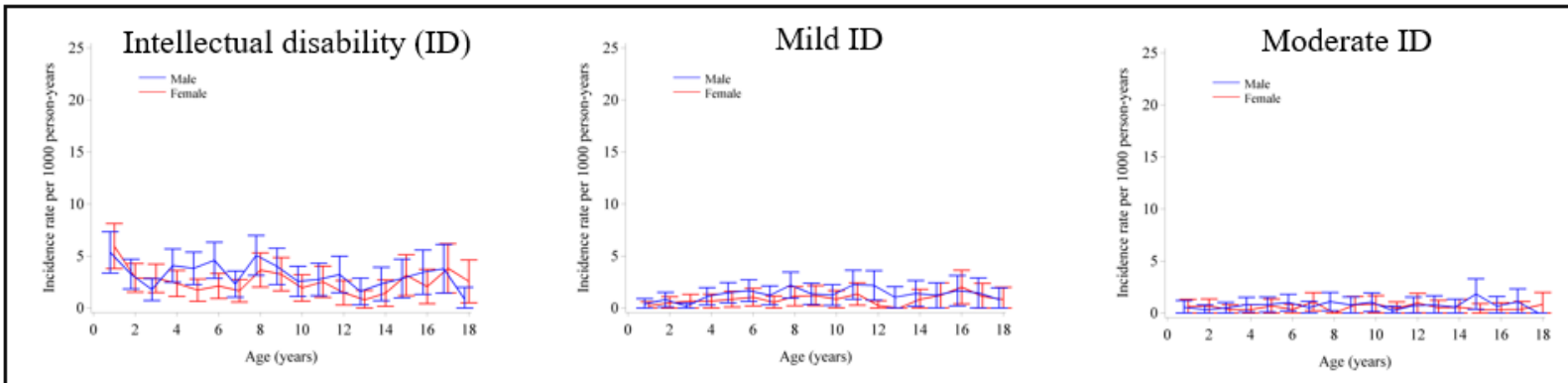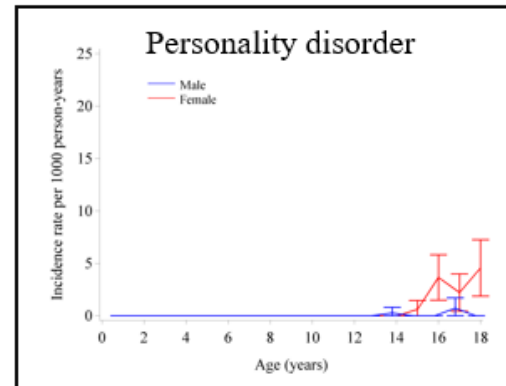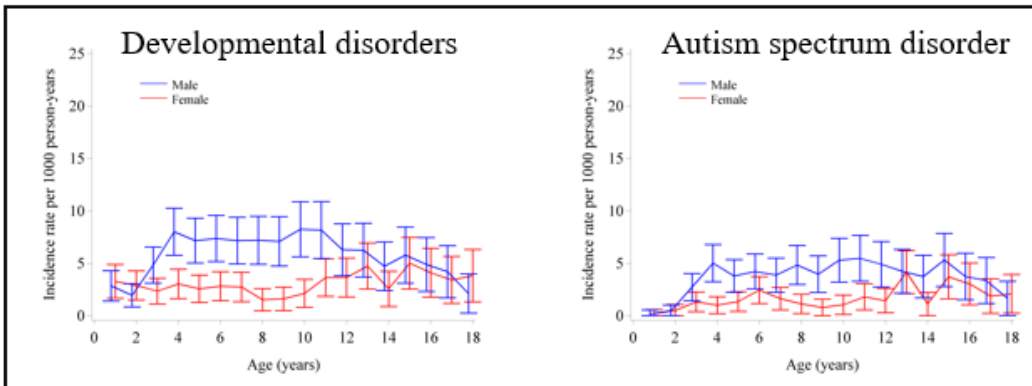
Figure S4. Incidence rates of hospital-based mental health diagnostic groups and specific diagnoses in the CHD cohort, stratified by sex. In each box, the incidence rate graphs for each diagnostic group are presented in addition to specific diagnoses within the group. Incidence rates and 95% CIs for females (red) and males (blue) are graphed in one-year intervals of age.

Abbreviations: *ADHD = attention deficit/hyperactivity disorder; ASD = autism spectrum disorder; CHD = congenital heart disease*