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ORIGINAL RESEARCH

Disability Among Young Adults With Congenital Heart Defects: Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being 2016–2019

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BACKGROUND: Disabilities have implications for health, well-being, and health care, yet limited information is available on the percentage of adults with congenital heart defects (CHD) living with disabilities. We evaluated the prevalence of disability and associated characteristics among the 2016–2019 CH STRONG (Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being) population-based sample of 19- to 38-year-olds with CHD from 3 US locations.

METHODS AND RESULTS: Prevalence of disability types (hearing, vision, cognition, mobility, self-care, living independently) were compared with similarly aged adults from the general population as estimated by the American Community Survey and standardized to the CH STRONG eligible population to reduce nonresponse bias and confounding. Health-related quality of life (HRQOL) was measured via Patient-Reported Outcomes Measurement Information System Global Health Scale T-scores standardized to US 18- to 34-year-olds. Separate multivariable regression models assessed associations between disability and HRQOL. Of 1478 participants, 40% reported disabilities, with cognition most prevalent (29%). Of those reporting disability, 45% ever received disability benefits and 46% were unemployed. Prevalence of disability types were 5 to 8 times higher in adults with CHD than the general population. Those with ≥1 disability had greater odds of being female, and of having non-Hispanic Black maternal race and ethnicity, severe CHD, recent cardiac care, and noncardiac congenital anomalies. On average, adults with CHD and cognition, mobility, and self-care disabilities had impaired mental HRQOL and those with any disability type had impaired physical HRQOL.

CONCLUSIONS: Two of 5 adults with CHD may have disabilities, which are associated with impaired HRQOL. These results may inform healthcare needs and services for this growing population.

Key Words: adult ■ congenital heart defect ■ disability ■ health-related quality of life

Because of advancements in cardiac management, 85% to 90% of individuals with congenital heart defects (CHD) survive to adulthood, with an estimated 1.4 million adults living with CHD in the United States.[1,2] Adults with CHD have special healthcare needs and considerations that may be further impacted by the presence of other health conditions like disabilities.[3] While up to 34% of adults with CHD may have cognitive impairment[4–6] and some genetic syndromes are known to result in both heart defects and sensory impairment,[7,8] the overall prevalence of disabilities (hearing, vision, cognition, mobility, self-care, or living independently) among adults with CHD is unknown. A better understanding of the prevalence, characteristics, and outcomes of adults with CHD who also have a disability may help determine healthcare needs and services for this specialized population. Therefore, using data from the 2016–2019 CH STRONG

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CLINICAL PERSPECTIVE

What Is New?

- Using population-based data, this study identified that 2 in 5 young adults with congenital heart defects (CHD) have a disability, with cognitive disabilities most common.
- Disabilities are 5 to 8 times more common in young adults with CHD than young adults in the general population, even after excluding those with noncardiac congenital anomalies.
- Among adults with CHD, disabilities were more common among those who had been born to Black mothers and those with severe CHD.
- Among adults with CHD, health-related quality of life was impaired for those with disabilities, and almost half reported not working in the past 12 months.

What Are the Clinical Implications?

- In accordance with the US Surgeon General's Call to Action in 2005, improving the health and wellness of patients with CHD with disabilities may include provider training and continuing education curricula on the healthcare challenges and best practices in healthcare provision for patients with CHD with disabilities; implementing clinical practices that consider patients' full range of health concerns, including medical, social, emotional, family, or community needs; and identifying opportunities to improve access to care and services and to offer more inclusive health promotion and wellness services for patients with CHD with disabilities.

Nonstandard Abbreviations and Acronyms

ACS	American Community Survey
APPROACH-IS	Assessment of Patterns of Patient-Reported Outcomes in Adults With Congenital Heart Disease–International Study
CDC	Centers for Disease Control and Prevention
CH STRONG	Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being
GMH	Global Mental Health
GPH	Global Physical Health
HRQOL	health-related quality of life
PROMIS GHS	Patient-Reported Outcomes Measurement Information System Global Health Scale

(Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being), we assessed prevalence of disability among a population-based sample of young adults with CHD born in 3 US locations and compared those estimates to that of young adults in the general population. Among young adults with CHD, we further examined associations between disability status and demographic and health characteristics, including health-related quality of life (HRQOL).

METHODS

Requests to access the data set from qualified researchers trained in human subject confidentiality protocols may be sent to the Centers for Disease Control and Prevention (CDC) at chstrong@cdc.gov.

Study Population

CH STRONG, funded by the CDC, is a cross-sectional survey on longer-term outcomes of adults born between 1980 and 1997 and diagnosed with CHD in early childhood (www.chstrong.org).[9] Eligible adults were identified from 3 active, population-based birth defect registries in Arizona, Arkansas, and the 5 metropolitan counties of Atlanta, Georgia (Clayton, Cobb, DeKalb, Fulton, and Gwinnett). All were recruited between October 2016 and January 2019. Individuals incarcerated or deceased at the time of survey recruitment or unable to complete the survey in English or Spanish were ineligible. If eligible but unable to complete the survey, a proxy (eg, relative or caretaker) could complete the survey on the individual's behalf. Survey data were linked to registry data to include characteristics at birth and specific type of CHD.

CH STRONG was approved by CDC and University of Arkansas for Medical Sciences' Institutional Review Boards. The University of Arizona deferred to the CDC Institutional Review Board. A more detailed description of the CH STRONG sampling and design has been published.[9]

Data

Congenital Heart Defects

Using the CDC-modified *International Classification of Diseases, Ninth Revision* (*ICD-9*) with the British Paediatric Association Classification of Diseases diagnosis code extension, CHD was defined as having ≥1 code between 745.000 and 747.430, excluding the minor or unconfirmed CHD codes in Table S1.[9] Data on functional class was unavailable, so CHD severity was determined by diagnosis codes using a previously published algorithm[10] and dichotomized as severe (defects that typically require intervention in the first year of life) or nonsevere (shunt, valve, or other defects that

typically do not require early intervention; Table S1 and Figure S1).

Disability

The 6-item set of Department of Health and Human Services Standard Disability Status Questions was included in the CH STRONG survey. These questions identify individuals who have serious difficulties with hearing; vision (even when wearing glasses); cognition (eg, concentrating, remembering, or making decisions because of a physical, mental, or emotional condition); mobility (eg, walking or climbing stairs); self-care (eg, dressing or bathing); and living independently (eg, doing errands alone because of a physical, mental, or emotional condition). These are the federal data standard for survey questions on disability, having outperformed other measures in cognitive and field testing.[11]

As a comparison group for disability prevalence, we used 1-year estimates among 18- to 35-year-olds residing in Arizona, Arkansas, and Metro Atlanta (same 5 counties as CH STRONG) who participated in the 2017 American Community Survey (ACS), an annual federally mandated survey for a random sample of >3.5 million US households. The 2017 survey covered 97.9% of US households and achieved a 93.7% response rate. (https://www.census.gov/programs-surveys/acs/).

Demographic and Health Characteristics

From registries, we ascertained sex, maternal race and ethnicity, year of birth to calculate age, and diagnosis codes to identify those with any noncardiac congenital anomalies (Table S2), noncardiac birth defects only (a subset of noncardiac congenital anomalies identified by codes outside of 758.000–758.999), chromosomal anomalies only (a subset of noncardiac congenital anomalies, including Down syndrome, identified by codes between 758.000 and 758.999), and Down syndrome only (a subset of chromosomal anomalies identified by codes 758.000–758.090). Time since last visit with a cardiologist was reported via the survey.

Health-Related Quality of Life

Because of its brevity, ease of administration, and standardization for national comparison, the 10-item Patient-Reported Outcomes Measurement Information System Global Health Scale (PROMIS GHS) was selected to assess HRQOL on the CH STRONG survey. PROMIS GHS splits into 2 HRQOL domains: Global Physical Health (GPH) and Global Mental Health (GMH), each summarizing a unique set of 4 items on the 10-item scale (Table S3). The PROMIS GHS has internal consistency, with a reliability kappa of 0.92, and both the GPH and GMH have high internal consistency with Cronbach's alpha of 0.81 and 0.86, respectively.[12]

GPH and GMH raw scores convert to T-scores representative of the 2000 US Census.[12] US 18- to 34-year-olds are estimated to have a mean GPH T-score of 51.6 (SD=8.4) and mean GMH T-score of 48.5 (SD=9.7), which we used as reference values to compare with CH STRONG (http://www.healthmeasures.net/score-and-interpret/interpret-scores/promis/reference-populations). T-scores above reference values indicate better perceived HRQOL than the general population and scores below indicate worse. Furthermore, individuals with impaired physical and mental HRQOL were defined as those with GPH and GMH T-scores ½ SD below the reference means (ie, GPH T-scores <47.4 and GMH T-scores <43.7), cutoffs representing the minimally important difference between impaired and normal HRQOL.[13–15]

The other 2 items not incorporated into the GPH or GMH are:

1. The general health domain: "In general, would you say your health is … Excellent, Very Good, Good, Fair, or Poor?"
2. The social functioning domain: "In general, please rate how well you carry out your usual social activities and roles … Excellent, Very Good, Good, Fair, or Poor?"

For both, responses were dichotomized into Excellent/Very Good/Good or Fair/Poor as has been done elsewhere.[16,17] General population reference values for the general health and social functioning domains were not available.

Disability Benefits

Among those with CHD and disabilities, we assessed the prevalence of ever receiving disability benefits, of ever being denied disability benefits, and employment status in the past 12 months as reported on the survey.

Statistical Methods

Inclusion Criteria

CH STRONG participants included in the sample responded to all demographic or health characteristics of interest, including all 6 disability questions and all 10 items from the PROMIS GHS. All analyses were conducted using SAS-callable SUDAAN software version 11.0 (Research Triangle Institute 2011).

Standardization for Comparison With National Estimates

To address potential nonresponse bias and improve comparability with national estimates,[9] we standardized

the disability prevalence and HRQOL estimates from the analytic sample to the 9312 eligible individuals in CH STRONG by site, sex, race and ethnicity, birth year, and CHD severity. Furthermore, to address potential confounding when comparing CH STRONG to ACS disability prevalence estimates, we standardized the ACS estimates to the CH STRONG eligible population by the strata they have in common: site (defined as birth state in CH STRONG and current state in ACS) and sex.

Disability Prevalence Estimates

For both CH STRONG and ACS, standardized disability prevalence estimates and 95% CIs were calculated for each disability type and for having ≥1 disability. We calculated *Z* scores and corresponding *P* values for the difference in mean proportions between CH STRONG and ACS. Furthermore, standardized prevalence of ≥1 disability among CHD types with >10 cases was calculated.

Demographics, Health, and HRQOL Among Those With CHD by Disability Status and Type

Among the CH STRONG sample, we estimated unstandardized prevalence, adjusted odds ratios (aORs), and 95% CIs of reporting ≥1 disability by demographic and health characteristics. We also estimated the standardized mean GPH and GMH T-scores and the unstandardized prevalence, aORs, and 95% CIs of reporting poor HRQOL outcomes (fair/poor general health, fair/poor social functioning, impaired physical HRQOL, and impaired mental HRQOL) by presence of disability and disability type. Because nonresponse may not bias associations between variables, but confounding could be a concern,[18] we chose to adjust all models for CHD severity, age, sex, maternal race and ethnicity, and site rather than standardize by these characteristics. Models were additionally adjusted for presence of noncardiac congenital anomalies, except for models examining variables that are components of noncardiac congenital anomalies, such as chromosomal anomalies, noncardiac birth defects, and Down syndrome, or the model examining proxy report since 75% of those who responded via proxy had a non-congenital cardiac anomaly.

Sensitivity Analyses

We conducted 5 sensitivity analyses excluding CH STRONG participants who had (1) their survey completed by proxy because relatives may report different disabilities and HRQOL than self-report; (2) noncardiac congenital anomalies, (3) chromosomal anomalies, or (4) Down syndrome because these can be associated with disabilities; and (5) any of the aforementioned criteria.

RESULTS

Sample Characteristics

Of 1656 CH STRONG participants, 11% were excluded for missing data on any of the following: maternal race and ethnicity (n=25), type of survey respondent (ie, self or proxy; n=27), Department of Health and Human Services disability items (n=45), PROMIS GHS items (n=73), or last receipt of cardiac care (n=8). After standardizing the analytic sample (n=1478) to the CH STRONG eligible population, 20% had the survey completed by a proxy, the majority of whom responded that the individual with CHD was mentally unable. The most common primary CHD types in the analytic sample were ventricular septal defects (28%), atrial septal defects (11%), and tetralogy of Fallot (7%). Approximately 65% were non-Hispanic White individuals, and 35% had co-occurring noncardiac congenital anomalies.

Prevalence of Disability

Among young adults, disabilities were more common among those with CHD compared with the general population (Figure 1). The standardized prevalence of ≥1 disability and the 6 disability types were 5 to 8 times higher in CH STRONG compared with ACS. Even those with nonsevere CHD were 5 times more likely than the ACS sample to report ≥1 disability. About 40% of the CH STRONG sample reported ≥1 disability compared with 7% in the ACS sample. The most common disability type in both samples was cognition (CH STRONG, 29%; ACS, 5%) followed by independent living (CH STRONG, 22%; ACS, 3%). Reporting ≥1 disability differed among those with severe and nonsevere CHD (45% and 37%, respectively; P=0.006) as did disability in mobility (14% and 10% respectively, P=0.038). Individuals with common atrioventricular canal (81%), interrupted aortic arch (65%), and tricuspid valve atresia (55%) most commonly reported ≥1 disability.

Excluding CH STRONG participants with noncardiac congenital anomalies (n=497), proxy report (n=277), or both (n=567; Figure S2), standardized prevalence of ≥1 disability fell from 40% to 26% to 35%, but was still 5% to 7% higher than the general population. The standardized prevalence for hearing, vision, and self-care disabilities among those with CHD fell below 5%. However, the standardized prevalence of all disability types, except hearing and vision, in CH STRONG compared with ACS remained elevated (P<0.05). No other results substantially changed in sensitivity analyses.

Multivariable Associations Between Demographic and Health Characteristics and Disability

Among the CH STRONG sample, having ≥1 disability was associated with all examined characteristics,

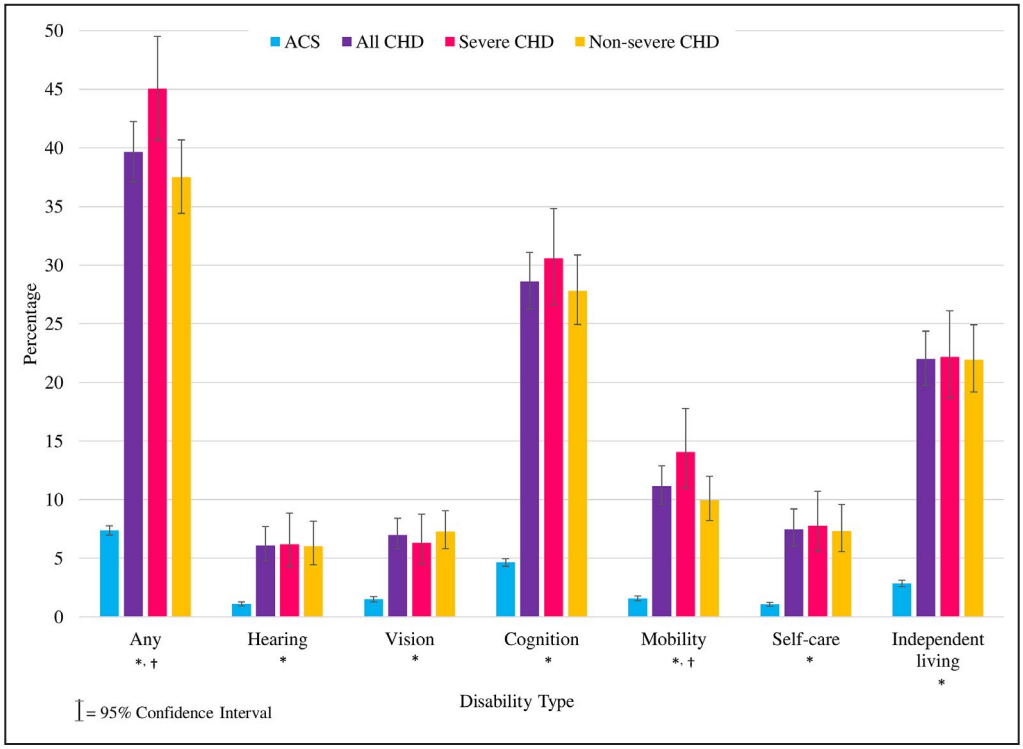

Figure 1. Standardized prevalence of disability among adults with severe and nonsevere CHD in 2016–2019 CH STRONG (Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being) compared with 2017 ACS participants.
CHD estimates were standardized to the CH STRONG eligible sample (n=9312) by site, sex, race and ethnicity, birth year, and CHD severity. ACS estimates were standardized to the same eligible sample by site and sex. More young adults with CHD reported disabilities compared with ACS participants. *All CHD: ACS $P<0.05$. †Severe: nonsevere $P<0.05$. ACS indicates American Community Survey; and CHD, congenital heart defects.

except age (Table 1). The adjusted odds of having severe CHD (aOR, 1.4; 95% CI, 1.1–1.9) and having a recent (≤2 years) visit with a cardiologist (aOR, 1.6; 95% CI, 1.2–2.0) were greater for individuals with ≥1 disability compared with those with no disabilities. Additionally, those with ≥1 disability were 1.6 times (95% CI, 1.3–2.0) as likely to be female and 1.6 (95% CI, 1.1–2.2) times as likely to have maternal non-Hispanic Black race. They were also more likely to have co-occurring noncardiac congenital anomalies (aOR, 2.5; 95% CI, 2.0–3.3), including noncardiac birth defects (aOR, 14.0; 95% CI, 8.5–23.1), chromosomal anomalies (aOR, 8.4; 95% CI, 6.1–11.6), and Down syndrome (aOR, 4.0; 95% CI, 3.2–5.1), and to have their survey completed by a proxy (aOR, 16.3; 95% CI, 9.2–29.1). Estimates did not substantially change after excluding individuals with noncardiac congenital anomalies or proxy report.

Standardized HRQOL by Disability Status and Type

In CH STRONG, the standardized mean GPH T-score (51.9) and GMH T-score (49.8) among all adults with CHD were comparable to the reference population means (GPH=51.8, GMH=48.5; Figure 2). However, physical and mental HRQOL were lower for those with disabilities; those with ≥1 disability or all of the specific disability types had lower standardized mean GPH or GMH T-scores compared with those without disabilities (all $P<0.001$). All mean GPH T-scores for individuals with disabilities were <47.4, the cutoff for impaired physical HRQOL. Mean GMH T-scores for those with cognition, mobility, and self-care disabilities were <43.7, the cutoff for impaired mental HRQOL. Individuals with CHD and mobility disability had the lowest mean scores for both GPH (40.2) and GMH (41.5).

Multivariable Associations With HRQOL by Disability Status and Type

Approximately 14% of the CH STRONG analytic sample reported fair or poor general health and social functioning, 25% reported poor physical HRQOL, and 31% reported poor mental HRQOL (Table 2). Compared with those without disabilities and after adjustment for covariates, individuals with ≥1 disability were more

Table 1. Demographic and Health Characteristics of Adults with Congenital Heart Defects by Disability Status: CH STRONG, 2016–2019

Characteristic	≥1 Disability			No disabilities			Have ≥1 disability: no disabilities
	n	%	Standardized* % (95% CI)	n	%	Standardized* % (95% CI)	aOR (95% CI)
CHD severity†,‡							
Severe	216	42.5	45.0 (40.6–49.5)	292	57.5	55.0 (50.5–59.4)	1.4 (1.1–1.8)
Nonsevere	352	36.3	37.5 (34.4–40.7)	618	63.7	62.5 (59.3–65.6)	Ref
Last visit with a cardiologist†,‡							
≤2 y	312	45.0	46.4 (42.3–50.5)	382	55.0	53.6 (49.5–57.7)	1.6 (1.2–2.0)
>2 y or never	256	32.7	35.0 (31.7–38.4)	528	67.3	65.0 (61.6–68.3)	Ref
Age at survey completion (y)†,‡							
19–24	252	39.4	37.6 (33.8–41.6)	388	60.6	62.4 (58.4–66.2)	Ref
25–30	217	36.5	36.1 (31.5–41.0)	377	63.5	63.9 (59–68.5)	0.9 (0.7–1.1)
31–38	99	40.6	42.6 (36.4–49.0)	145	59.4	57.4 (51.0–63.6)	1.3 (0.9–1.8)
Sex†,‡							
Female	334	41.8	42.4 (38.9–46.0)	466	58.3	57.6 (54.0–61.1)	1.6 (1.3–2.0)
Male	234	34.5	37.0 (33.4–40.8)	444	65.5	63.0 (59.2–66.6)	Ref
Maternal race and ethnicity†,‡							
Hispanic	48	44.0	41.2 (29.5–54.0)	61	56.0	58.8 (46.0–70.5)	1.2 (0.7–1.8)
NH Black	88	44.9	41.3 (36.8–46.0)	108	55.1	58.7 (54.0–63.2)	1.6 (1.1–2.2)
NH White	418	37.0	36.3 (33.4–39.2)	713	63.0	63.7 (60.8–66.6)	Ref
Other¶	14	33.3	38.8 (34.0–43.8)	28	66.7	61.2 (56.2–66.0)	0.8 (0.4–1.6)
Noncardiac congenital anomaly†							
Yes	297	59.8	60.3 (55.8–64.7)	200	40.2	39.7 (35.3–44.2)	2.5 (2.0–3.3)
No	271	27.6	27.5 (24.7–30.5)	710	72.4	72.5 (69.5–75.3)	Ref
Noncardiac birth defects†,§							
Yes	170	48.4	49.2 (44.0–54.3)	181	51.6	50.8 (45.7–56.0)	14.0 (8.5–23.1)
No	398	35.3	36.1 (33.3–39.0)	729	64.7	63.9 (61.0–66.7)	Ref
Chromosomal anomalies†							
Yes	127	87.0	86.3 (81.0–90.3)	19	13.0	13.7 (9.7–19.0)	8.4 (6.1–11.6)
No	441	33.1	34.6 (32.0–37.2)	891	66.9	65.4 (62.8–68.0)	Ref
Down syndrome†							
Yes	111	88.8	87.2 (81.7–91.3)	14	11.2	12.8 (8.7–18.3)	4.0 (3.2–5.1)
No	457	33.8	35.4 (32.8–38.0)	896	66.2	64.6 (62.0–67.2)	Ref

(*Continued*)

Table 1. (Continued)

Characteristic	≥1 Disability			No disabilities			Have ≥1 disability: no disabilities
	n	%	Standardized* % (95% CI)	n	%	Standardized* % (95% CI)	aOR (95% CI)
Survey completed by a proxy†							
Yes	210	75.8	76.3 (71.2–80.8)	67	24.2	23.7 (19.2–28.8)	16.3 (9.2–29.1)
No	358	29.8	30.8 (28.3–33.5)	843	70.2	69.2 (66.5–71.7)	Ref

aOR indicates adjusted odds ratio; CHD, congenital heart defect; CH STRONG, Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being; and NH, non-Hispanic.

* Standardized to the CH STRONG eligible sample (n=9312 individuals with CHD in birth defect registries who were not deceased or incarcerated at time of survey) by site, sex, race and ethnicity, birth year, and CHD severity.

† Adjusted for CHD severity, age, sex, maternal/race ethnicity, and site.

‡ Model additionally adjusted for noncardiac congenital anomalies.

§ Model additionally adjusted for chromosomal anomalies.

¶ Other includes non-Hispanic American Indian or Alaska Native and non-Hispanic Asian or Pacific Islander.

likely to report fair or poor general health (aOR, 5.6; 95% CI, 3.9–7.9), fair or poor social functioning (aOR, 11.4; 95% CI, 7.6–17.0), impaired physical HRQOL (aOR, 7.7; 95% CI, 5.7–10.2), and impaired mental HRQOL (aOR, 7.0; 95% CI, 5.3–9.1). Furthermore, those with each individual disability type had increased odds of fair or poor general health (aORs, 6.1–13.2), fair or poor social functioning (aORs, 9.2–57.0), impaired physical HRQOL (aORs, 7.5–38.8), and impaired mental HRQOL (aORs, 3.5–10.3). While reported associations were strong and statistically significant, in some instances, the 95% confidence intervals were wide (eg, self-care disability and fair or poor social functioning: aOR=57.0, 95% CI: 26.2-123.9). After excluding those with noncardiac anomalies or proxy report, the association between impaired mental HRQOL and vision disability as well as the associations between fair or poor social functioning with vision and hearing disabilities were attenuated toward the null. No other associations substantially changed.

Disability Benefits by Work and Defect Type

Among the standardized CH STRONG sample with ≥1 disability, 45% reported ever receiving disability benefits and 21% reported ever being denied disability benefits. Among the disability types, those with self-care disabilities had both the highest percentage who received disability benefits (63%) and lowest percentage who were ever denied disability benefits (18%). Those with cognitive disabilities had the lowest percentage who ever received disability benefits (46%), and those with mobility disabilities had the highest percentage who were ever denied disability benefits (25%).

Additionally, among the 55% of individuals with single-ventricle defects who reported ≥1 disability and whose defect may qualify them for disability benefits under Compassionate Allowance,[19] 58% reported ever receiving disability benefits, and 30% reported ever being denied disability benefits. About 29% of those with ≥1 disability reported having any full-time work in the past 12 months (of whom 16% ever received disability benefits); 24% reported part-time work only (of whom 48% ever received disability benefits); and 46% reported having no work in the past 12 months (of whom 61% ever received disability benefits).

DISCUSSION

In this population-based survey of young adults with CHD, 40% had ≥1 disability, and disabilities were up to 8 times more prevalent among adults with CHD compared with adults in the general population. The increased prevalence of ≥1 disability was still apparent among young adults with CHD without chromosomal anomalies, ranging from 26% to 35%. Among young adults with CHD reporting disabilities, a little less than half had received disability benefits; 1 in 5 had been denied disability benefits; and a little less than half reported not working in the past 12 months. When stratifying by disability status, those with CHD who also had a disability experienced significantly poorer HRQOL compared with those with CHD without disabilities. We further found that young adults with CHD and cognition, mobility, and self-care disabilities had impaired mental HRQOL and those with any disability type had impaired physical HRQOL.

Heart trouble has been identified as the third-most-common self-reported cause of disability among adults in the United States, though it is unclear what proportions were caused by acquired cardiovascular conditions other than CHD.[20] Previous studies have more specifically reported that adults with CHD experience

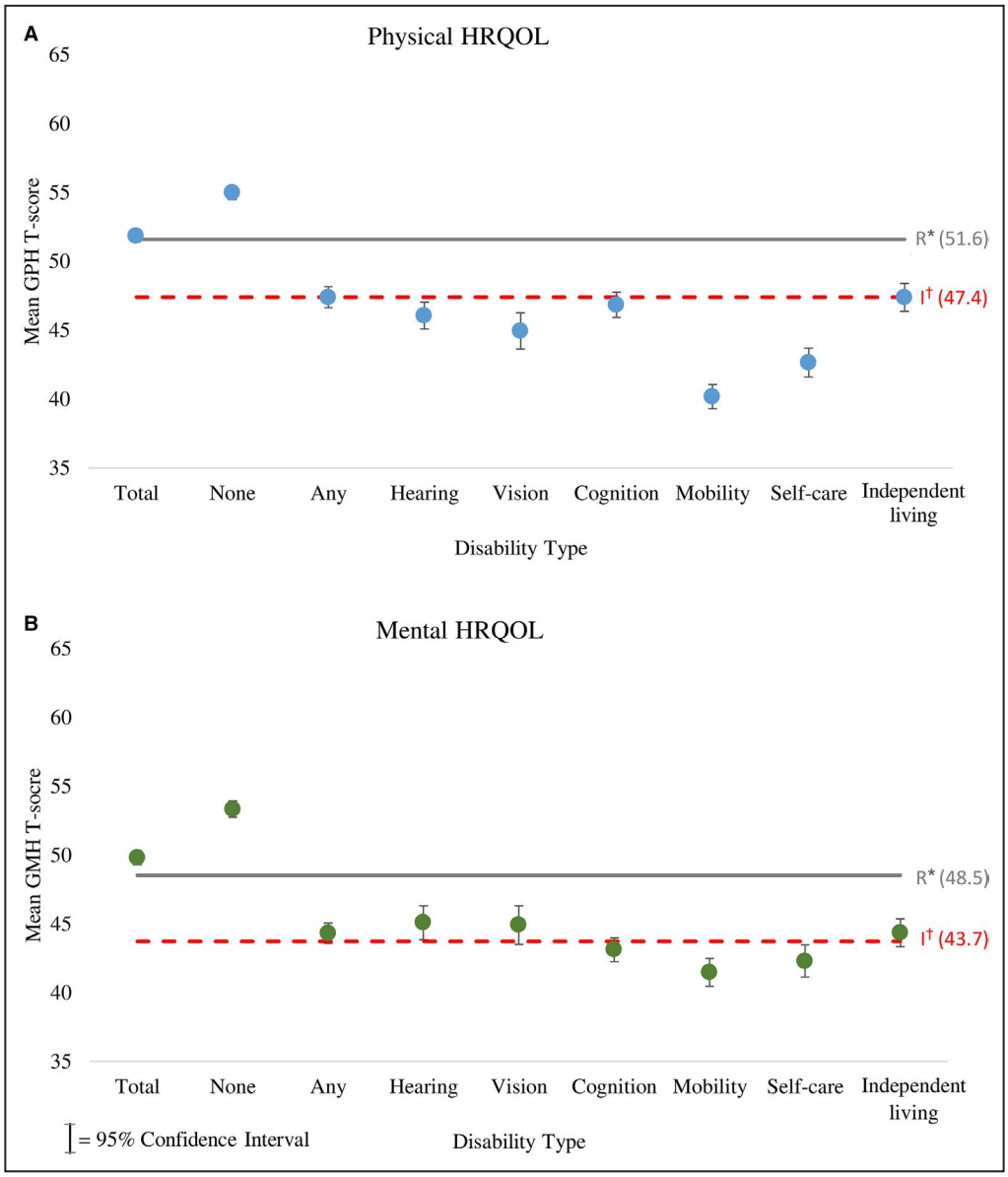

Figure 2. Standardized physical and mental health-related quality of life of adults with CHD by disability type: CH STRONG (Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being), 2016–2019.

Physical (**A**) and mental (**B**) HRQOL T-scores were standardized to the CH STRONG eligible sample (n=9312) by site, sex, race and ethnicity, birth year, and CHD severity. Mean T-scores for physical and mental HRQOL among individuals with CHD and disabilities were lower than reference population values, and those with some disabilities fall below the cutoffs for impaired HRQOL. CHD indicates congenital heart defect; GMH, Global Mental Health; GPH, Global Physical Health; and HRQOL, health-related quality of life. *Reference mean population scores denoted by letter R. †Cutoffs for impaired HRQOL denoted by letter I.

cognitive disability more commonly than those without CHD.[4,5] One study among 337 adult patients at CHD clinics found that one-third had significant neurocognitive deficits, similar to 29% reporting cognitive disabilities in CH STRONG.[6] To date, only 3 Dutch cohort studies have investigated mobility limitations among adults with CHD; 1 found adults with CHD had reduced gross motor functioning relative to the general population.[21–23] Even among young children with Down syndrome, those with a co-occurring CHD were more likely to have greater deficits in motor development than those with Down syndrome without CHD.[24]

To our knowledge, little to no information has been published on associations between CHD and difficulty hearing, seeing, or living independently, like those in CH STRONG, even after excluding individuals with

Table 2. Adjusted Odds Ratios of Reduced Health-Related Quality of Life by Disability Type Among Adults With Congenital Heart Defects: CH STRONG, 2016–2019

	Fair or poor			Fair or poor			Impaired* physical			Impaired† mental		
	General health			Social functioning			HRQOL			HRQOL		
Characteristic	n	%	aOR‡ (95% CI)	n	%	aOR‡ (95% CI)	n	%	aOR‡ (95% CI)	n	%	aOR‡ (95% CI)
Total	209	14.1		212	14.3		367	24.8		461	31.2	
Disability type												
None	59	6.5	Ref	34	3.7	Ref	101	11.1	Ref	150	16.5	Ref
Any	150	26.4	5.6 (3.9–7.9)	178	31.3	11.4 (7.6–17.0)	266	46.8	7.7 (5.7–10.2)	311	54.8	7.0 (5.3–9.1)
Hearing	25	31.6	9.1 (4.6–17.7)	23	29.1	9.2 (4.5–18.7)	43	54.4	10.2 (5.8–18.1)	33	41.8	3.5 (2.1–6.0)
Vision	26	33.3	6.6 (3.5–12.4)	26	33.3	9.9 (5.1–19.5)	40	51.3	7.5 (4.3–13.0)	34	43.6	3.7 (2.2–6.2)
Cognition	117	28.2	6.1 (4.2–8.9)	142	34.2	13.8 (9.0–21.0)	207	49.9	8.6 (6.3–11.7)	247	59.5	8.2 (6.1–11.0)
Mobility	70	45.8	12.6 (7.9–20.2)	72	47.1	21.4 (12.8–35.9)	127	83.0	38.8 (23.2–65.0)	103	67.3	10.3 (6.8–15.6)
Self-care	39	40.6	13.2 (7.0–24.9)	54	56.3	57.0 (26.2–123.9)	76	79.2	36.7 (19.2–69.9)	60	62.5	8.5 (5.1–14.2)
Living independently	78	25.2	6.3 (4.1–9.8)	118	38.2	19.9 (12.3–32.1)	147	47.6	9.8 (6.7–14.3)	170	55.0	7.8 (5.5–11.0)

aOR indicates adjusted odds ratio; CH STRONG, Congenital Heart Survey to Recognize Outcomes, Needs, and Well-Being; and HRQOL, health-related quality of life.
*Defined has having a Global Physical Health T-score<47.4, representing half a standard deviation below the mean of the general population.
†Defined has having a Global Mental Health T-score<43.7, representing half a SD below the mean of the general population.
‡Adjusted for CHD severity, age, sex, maternal/race ethnicity, site, and noncardiac congenital anomalies.

known chromosomal anomalies. However, Riehle-Colarusso et al[25] found that special education service use for vision and hearing impairments was 4 times more common among children with CHD (excluding other birth defects or known syndromes) than children without birth defects.

To our knowledge, this analysis is the first to show an association between disability and non-Hispanic Black maternal race and ethnicity among adults with CHD. Among individuals with CHD, disparities in survival and other health characteristics by race have been documented.[26–30] Specifically, studies have found that non-Hispanic Black individuals with CHD experience higher mortality than non-Hispanic Whites,[26–29] and they are more likely to be hospitalized for infective endocarditis as adults.[30] Authors suggest these differences may be related to access to health care, socioeconomic factors, comorbidities, timely diagnosis, or differences in severity of the lesions.[26,27,29] While disability is associated with less access to health care in the general population,[31–33] having a disability was associated with receipt of more recent cardiac care among our population-based sample of young adults with CHD, even after adjusting for CHD severity. Individuals with CHD who also have disabilities may have more interaction with healthcare systems because of more complex health needs or a perception of poorer health. Their perception of health or the referrals from other healthcare providers may prompt these individuals to seek cardiac care more frequently. Supporting this hypothesis, research by Gurvitz et al[34] identified that the most common reasons why cardiac patients do not seek regular cardiac care include feeling well, being unaware that follow-up was required, and complete absence of medical care. Among young adults with CHD, we also found disability to be associated with female sex and presence of noncardiac congenital anomalies.

In our analysis, those with disabilities had worse HRQOL compared with the US general population, whereas those without disabilities had better physical and mental HRQOL. Only 1 clinic-based study investigating HRQOL among 74 adolescents and adults with CHD stratified by physical limitations.[35] Similar to our analysis, those with physical limitations had reduced physical and psychological HRQOL compared with those without. Additionally, among >4000 patients with CHD enrolled in the APPROACH-IS (Assessment of Patterns of Patient-Reported Outcomes in Adults With Congenital Heart Disease–International Study), poor quality of life was most often observed among those who were job seeking, unemployed, or disabled, though disability was not defined or analyzed apart from employment status, and quality of life is a more broad measure than HRQOL.[36]

Study Limitations

For this analysis, self-report serves as both a strength and a limitation—an individual's perceptions, beyond objective health measurements, can significantly impact their health outcomes and success of their health care and management.[37] However, self-report is subjective, and report on disability types and benefits were not clinically or administratively confirmed. Furthermore, data to distinguish between short-term and permanent disabilities were not available. Classification of CHD severity was limited to diagnosis coding because data on CHD functional class at time of survey were not available. CH STRONG had a 24% survey response rate, which differed by maternal race and ethnicity.[9] To increase representativeness, we standardized our analytic sample to the CH STRONG eligible population (including non-respondents) by site, sex, birth year, maternal race and ethnicity, and CHD severity when estimating disability prevalence and mean GPH and GMH T-scores. Additionally, to increase the validity of comparisons to ACS, ACS data among similarly aged participants were standardized to the site and sex distribution of the CH STRONG eligible population. The CH STRONG sample was derived from individuals identified with CHD in early childhood and findings may not be generalizable to young adults whose CHD was identified later in life. Approximately 11% of CH STRONG participants had missing data and were excluded, possibly underestimating the percentage with disabilities by 0.7%.

CONCLUSIONS

In a population-based sample of young adults with CHD in and out of cardiac care, we found 5 to 8 times higher prevalence of all disabilities relative to young adults in the US general population, even when excluding those with other noncardiac anomalies. Among those with CHD, non-Hispanic Black adults were 60% more likely to have a disability compared with non-Hispanic White adults. Furthermore, adults with CHD and ≥1 disability had worse physical and mental HRQOL than those without disabilities and almost half reported not working in the past 12 months. To improve the health and wellness of people with disabilities, the US Surgeon General released a Call to Action in 2005 with 4 goals: (1) improve public understanding that persons with disabilities can lead long, healthy, productive lives; (2) improve provider training and capacity to treat the whole person and not just singular needs; (3) promote health and wellness for people with disabilities; and (4) provide access to health care and support services.[38] Implementing policies and practices to recognize and support those with disability within the general CHD

community may lead to better connection and usage of resources and, ultimately, improved health and well-being.

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None.

Supplementary Material

Table S1–S3
Figure S1–S2

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SUPPLEMENTAL MATERIAL

SUPPLEMENTAL MATERIAL

Table S1: CHD inclusions and exclusions

Severe Codes		
745.000	Common Truncus	
745.010	Aortic septal defect (ASD) / Aortopulmonary window	
745.100—745.190	Transposition (all types)	
	745.100	Transposition of great vessels, complete (no VSD)
	745.110	Transposition of great vessels, incomplete (w/ VSD), Taussig Bing
	745.120	Corrected transposition of great vessels, L transposition, vent inversion
	745.190	Unspecified transposition of great vessels
745.200	Tetralogy of Fallot	
745.210	Fallot's pentalogy (tetralogy plus ASD)	
745.300	Single ventricle, common ventricle, cor triloculare biatriatum	
745.620	Common atrioventricular canal with ventricular septal defect (VSD)	
745.630	Common atrioventricular canal	
745.680	Other specified cushion defect	
745.690	Endocardial cushion defect, NOS	
746.000	Pulmonary valve atresia, hypoplasia	
746.100	Tricuspid atresia and stenosis	
746.505	Absence, atresia, or hypoplasia of mitral valve	
746.700	Hypoplastic Left Heart Syndrome (HLHS)	
747.100—747.190	Coarctation of the aorta (all types)	
	747.100	Pre-ductal
	747.110	Post-ductal
	747.120	Ductal
747.200	Aortic atresia (including pseudotruncus arteriosus)	
747.210	Aortic hypoplasia	
747.215—747.217, or 747.285	Interrupted aortic arch	
747.420	Total Anomalous Pulmonary Venus Return (TAPVR)	

SUPPLEMENTAL MATERIAL

Table S1: CHD inclusions and exclusions

Non-severe: Shunt + Valve Codes	
745.520	Lutembacher syndrome
746.840	Trilogy of Fallot
Other cases will be in this category if have codes in both Shunt and Valve categories.	
Non-severe: Shunt Codes	
745.400—745.490	Ventricular Septal Defect (VSD), (all types)
	745.400 Roger's disease
	745.410 Eisenmenger's syndrome
	745.420 Gerbode defect
	745.480 Other specified ventricular septal defect
	745.490 Ventricular septal defect, NOS
745.510	Secundum atrial septal defect
745.580	Other specified atrial septal defect
745.590	Atrial septal defect, NOS
745.600	Ostium primum defects
745.610	Single common atrium, cor triloculare biventriculare
745.800	Other bulbus cordis anomalies and anomalies of cardiac septal closure
745.900	Unspecified defect of septal closure
747.430	Partial anomalous pulmonary venous return (PAPVR)
Non-severe: Valve Codes	
746.010	Pulmonary valve stenosis
746.830	Pulmonary infundibular stenosis
746.080	Other specified anomalies of the pulmonary valve
746.090	Unspecified anomaly of pulmonary valve
746.200	Ebstein anomaly
746.300	Aortic valve stenosis (includes valvar and subvalvar)
747.220	Supra-aortic stenosis (supra-valvar)
746.480	Other specified anomalies of aortic valve (including aortic valve atresia)
746.790	Unspecified anomalies of aortic valve
746.500	Congenital mitral stenosis

SUPPLEMENTAL MATERIAL

Table S1: CHD inclusions and exclusions

746.900	Unspecified anomalies of heart valves
746.995	Pulmonic or pulmonary atresia, stenosis, or hypoplasia, NOS
747.300	Pulmonary artery atresia, absence, or agenesis
747.310	Pulmonary artery atresia with septal defect
Non-severe: Other Codes	
745.700	Cor biloculare
746.820	Cor triatriatum
746.881	Hypoplastic left ventricle
746.882	Hypoplastic right heart/ ventricle (Uhl's disease)
746.883	Hypoplastic ventricle, NOS
746.885	Coronary artery anomaly
746.887	Other defects of the atria
746.910	Anomalous bands of heart
746.920	Acyanotic congenital heart disease, NOS
746.930	Cyanotic congenital heart disease, NOS
747.230—747.290	Anomalies of aorta (all types) 747.230 Persistent right aortic arch 747.240 Aneurysm of sinus of Valsalva 747.250 Vascular ring (includes double aortic arch) 747.260 Overriding aorta 747.270 Aortic aneurysm 747.280 Other specified anomalies of aorta 747.290 Unspecified anomalies of aorta
747.400	Stenosis of vena cava (inferior or superior)
747.410	Persistent left superior vena cava

NOS: Not otherwise specified

CHD case is excluded if ONLY has **one or more** of these codes:

745.xx8, 746.xx8, 747.xx8 ANY CHD code which is considered "possible or probable," designated by using an "8" as the 6th digit.

745.500 Patent Foramen Ovale

SUPPLEMENTAL MATERIAL

Table S1: CHD inclusions and exclusions

746.020 Pulmonary insufficiency
746.105 Tricuspid valve insufficiency
746.400 Aortic insufficiency/Bicuspid aortic valve
746.600 Mitral insufficiency

746.800 Dextrocardia
746.810 Levocardia
746.850 Anomalies of pericardium
746.860 Anomalies of myocardium
746.870 Congenital heart block
746.880 Other specified anomaly of heart
746.886 Ventricular hypertrophy
746.990 Unspecified anomalies of heart

747.000 Patent Ductus Arteriosus

747.320 – 747.399 This includes ALL of the following codes, and any designation of left or right-sidedness (a "1" or "2" is used as 6th digit for this purpose)

747.320 Pulmonary artery stenosis
747.325 Peripheral pulmonary artery stenosis
747.330 Aneurysm of pulmonary artery
747.340 Pulmonary AVM
747.380 Other specified anomaly of pulmonary artery
747.390 Unspecified anomaly of pulmonary artery

747.440 Anomalous portal vein termination
747.450 Portal-hepatic vein fistula
747.480 Other specified anomalies of great veins
747.490 Unspecified anomalies of great veins

747.500 Single umbilical artery

747.6xx Other anomalies of peripheral vascular system, including:

747.600 Stenosis of renal artery
747.610 Other anomalies of renal artery
747.620 Arteriovenous malformation (peripheral)
747.630 Congenital phlebectasia, congenital varix
747.640 Other anomalies of peripheral arteries, including aberrant subclavian artery
747.650 Other anomalies of peripheral veins
747.680 Other anomalies of peripheral vascular system
747.690 Unspecified anomalies of peripheral vascular system

747.8xx Other specified anomalies of circulatory system, including:

747.800 Arteriovenous (malformation) aneurysm of brain
747.810 Other anomalies of cerebral vessels
747.880 OS anomalies of circulatory system

747.9xx Unspecified anomaly of circulatory system

SUPPLEMENTAL MATERIAL

Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

90000	Syphilis, congenital
155000	Neoplasms - Liver
159800	Neoplasms - Abdomen
162800	Neoplasms - Lung, laterality unk
162801	Neoplasms - Lung, left
162802	Neoplasms - Lung, right
162803	Neoplasms - Lung, unilateral NOS
162804	Neoplasms - Lung, bilateral
171800	Neoplasms - Connective tissue
186000	Neoplasms - Testes, laterality unk
186001	Neoplasms - Testes, left
186002	Neoplasms - Testes, right
186003	Neoplasms - Testes, unilateral NOS
186004	Neoplasms - Testes, bilateral
189000	Wilms tumor - laterality unk
189001	Wilms tumor - left
189002	Wilms tumor - right
189003	Wilms tumor - unilateral NOS
189004	Wilms tumor - bilateral
190500	Retinoblastoma - laterality unk
190501	Retinoblastoma - left eye
190502	Retinoblastoma - right eye
190503	Retinoblastoma - unilateral NOS
190504	Retinoblastoma - both eyes
191000	Neoplasms - CNS
194000	Neuroblastoma
202300	Histiocytosis, malignant
208000	Leukemia - Congenital, NOS
214000	Lipoma - Skin and subcutaneous tissue of face, laterality unk
214001	Lipoma - Skin and subcutaneous tissue of left face
214002	Lipoma - Skin and subcutaneous tissue of right face
214003	Lipoma - Skin and subcutaneous tissue of face, unilateral NOS
214004	Lipoma - Skin and subcutaneous tissue of both sides of face
214100	Lipoma - Other skin and subcutaneous tissue
214200	Lipoma - Intrathoracic organs
214300	Lipoma - Intra-abdominal organs
214400	Lipoma - Spermatic cord, laterality unk
214401	Lipoma - Spermatic cord, left
214402	Lipoma - Spermatic cord, right
214403	Lipoma - Spermatic cord, unilateral NOS
214404	Lipoma - Spermatic cord, bilateral
214800	Lipoma - Other specified sites
214810	Lipoma - Lumbar or sacral lipoma
214900	Lipoma - Unspecified
216920	Hairy nevus
228000	Hemangioma - Unspecified site
228010	Hemangioma - Skin and subcutaneous, NOS
228020	Hemangioma - Intracranial
228030	Hemangioma - Retinal, laterality unk
228031	Hemangioma - Retinal, left
228032	Hemangioma - Retinal, right
228033	Hemangioma - Retinal, unilateral NOS
228034	Hemangioma - Retinal, bilateral
228040	Hemangioma - intra-abdominal
228090	Hemangioma - Other sites
228100	Cystic hygroma, laterality unk
228101	Cystic hygroma, left
228102	Cystic hygroma, right
228103	Cystic hygroma, unilateral NOS
228104	Cystic hygroma, bilateral
237700	Neurofibromatosis
238000	Teratoma - NOS
238010	Teratoma - Head and face
238020	Teratoma - Neck
238030	Teratoma - Abdomen
238040	Teratoma - Sacral or coccygeal
238080	Teratoma - Other specified
239200	Neck cyst, laterality unk
239201	Neck cyst, left
239202	Neck cyst, right
239203	Neck cyst, unilateral NOS
239204	Neck cyst, bilateral
253280	Hypopituitarism, congenital
253820	Diencephalic syndrome
255200	Adrenogenital syndrome
257800	Testicular feminization syndrome
272700	Lysosomal storage diseases
277400	Disorders of bilirubin excretion
277500	Mucopolysaccharidoses
277510	Hurler syndrome
279110	DiGeorge syndrome
279200	Combined immunodeficiency syndrome
331890	Familial degenerative CNS disease
335000	Werdnig-Hoffman disease
345600	Infantile spasms, congenital
352600	Moebius syndrome
362600	Retinal degeneration, peripheral, laterality unk
362601	Retinal degeneration, peripheral, left eye
362602	Retinal degeneration, peripheral, right eye
362603	Retinal degeneration, peripheral, unilateral NOS
362604	Retinal degeneration, peripheral, both eyes
362700	Retinitis pigmentosa
363200	Chorioretinitis, laterality unk
363201	Chorioretinitis, left eye
363202	Chorioretinitis, right eye
363203	Chorioretinitis, unilateral NOS

SUPPLEMENTAL MATERIAL

Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

741990	Spina bifida without hydrocephalus - Unspecified site
742000	Encephalocele - Occipital
742080	Encephalocele - Other specified site
742085	Encephalocele - Frontal
742086	Encephalocele - Parietal
742090	Encephalocele - Unspecified site
742100	Microcephalus
742200	Anomalies of cerebrum
742210	Anomalies of corpus callosum
742220	Anomalies of hypothalamus
742230	Anomalies of cerebellum
742235	Cerebellar Hypoplasia
742240	Agyria and lissencephaly
742250	Microgyria
742260	Holoprosencephaly
742270	Arhinencephaly
742280	Other specified reduction defect of brain
742290	Unspecified reduction defect of brain
742300	Anomalies of aqueduct of Sylvius
742310	Dandy-Walker syndrome
742320	Hydranencephaly
742380	Other specified hydrocephaly
742390	Unspecified hydrocephaly
742400	Enlarged brain or head
742410	Porencephaly, laterality unk
742411	Porencephaly, left side of brain
742412	Porencephaly, right side of brain
742413	Porencephaly, unilateral NOS
742414	Porencephaly, both sides of brain
742420	Cerebral cyst, laterality unk
742421	Cerebral cyst, left side of brain
742422	Cerebral cyst, right side of brain
742423	Cerebral cyst, unilateral NOS
742424	Cerebral cyst, both sides of brain
742480	Other specified anomalies of brain, laterality unk
742481	Other specified anomalies of brain, left
742482	Other specified anomalies of brain, right
742483	Other specified anomalies of brain, unilateral NOS
742484	Other specified anomalies of brain, bilateral
742485	Ventricular cysts
742486	Small brain
742500	Amyelia
742510	Hypoplasia or dysplasia of spinal cord
742520	Diastematomyelia
742530	Other cauda equina anomalies
742540	Hydromyelia
742580	Other specified anomalies of spinal cord and membranes
742800	Jaw-winking syndrome
742810	Familial dysautonomia
742880	Other specified anomalies of nervous system
742900	Unspecified anomalies - Brain
742910	Unspecified anomalies - Spinal cord
742990	Unspecified anomalies - Nervous system
743000	Anophthalmos, laterality unk
743001	Anophthalmos, left eye
743002	Anophthalmos, right eye
743003	Anophthalmos, unilateral NOS
743004	Anophthalmos, both eyes
743100	Microphthalmos, laterality unk
743101	Microphthalmos, left eye
743102	Microphthalmos, right eye
743103	Microphthalmos, unilateral NOS
743104	Microphthalmos, both eyes
743200	Buphthalmos, laterality unk
743201	Buphthalmos, left eye
743202	Buphthalmos, right eye
743203	Buphthalmos, unilateral NOS
743204	Buphthalmos, both eyes
743210	Enlarged eye, NOS, laterality unk
743211	Enlarged eye, NOS, left eye
743212	Enlarged eye, NOS, right eye
743213	Enlarged eye, NOS, unilateral NOS
743214	Enlarged eye, NOS, both eyes
743220	Enlarged cornea, laterality unk
743221	Enlarged cornea, left eye
743222	Enlarged cornea, right eye
743223	Enlarged cornea, unilateral NOS
743224	Enlarged cornea, both eyes
743300	Lens - Absence, laterality unk
743301	Lens - Absence, left eye
743302	Lens - Absence, right eye
743303	Lens - Absence, unilateral NOS
743304	Lens - Absence, both eyes
743310	Lens - Spherical, laterality unk
743311	Lens - Spherical, left eye
743312	Lens - Spherical, right eye
743313	Lens - Spherical, unilateral NOS
743314	Lens - Spherical, both eyes
743320	Cataract - NOS, laterality unk
743321	Cataract - NOS, left eye
743322	Cataract - NOS, right eye
743323	Cataract - NOS, unilateral NOS
743324	Cataract - NOS, both eyes
743325	Cataract - Anterior polar
743326	Cataract - Other specified

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

743330	Lens - Displaced, laterality unk
743331	Lens - Displaced, left eye
743332	Lens - Displaced, right eye
743333	Lens - Displaced, unilateral NOS
743334	Lens - Displaced, both eyes
743340	Lens - Coloboma, laterality unk
743341	Lens - Coloboma, left eye
743342	Lens - Coloboma, right eye
743343	Lens - Coloboma, unilateral
743344	Lens - Coloboma, both eyes
743380	Lens - Other specified anomalies, laterality unk
743381	Lens - Other specified anomalies, left eye
743382	Lens - Other specified anomalies, right eye
743383	Lens - Other specified anomalies, unilateral
743384	Lens - Other specified anomalies, both eyes
743390	Lens - Unspecified anomalies, laterality unk
743391	Lens - Unspecified anomalies, left eye
743392	Lens - Unspecified anomalies, right eye
743393	Lens - Unspecified anomalies, unilateral NOS
743394	Lens - Unspecified anomalies, both eyes
743400	Cornea - Opacity, laterality unk
743401	Cornea - Opacity, left eye
743402	Cornea - Opacity, right eye
743403	Cornea - Opacity, unilateral NOS
743404	Cornea - Opacity, both eyes
743410	Cornea - Other anomalies, laterality unk
743411	Cornea - Other anomalies, left eye
743412	Cornea - Other anomalies, right eye
743413	Cornea - Other anomalies, unilateral NOS
743414	Cornea - Other anomalies, both eyes
743420	Iris - Absence, laterality unk
743421	Iris - Absence, left eye
743422	Iris - Absence, right eye
743423	Iris - Absence, unilateral NOS
743424	Iris - Absence, both eyes
743430	Iris - Coloboma, laterality unk
743431	Iris - Coloboma, left eye
743432	Iris - Coloboma, right eye
743433	Iris - Coloboma, unilateral NOS
743434	Iris - Coloboma, both eyes
743440	Iris - Other anomalies, laterality unk
743441	Iris - Other anomalies, left eye
743442	Iris - Other anomalies, right eye
743443	Iris - Other anomalies, unilateral NOS
743444	Iris - Other anomalies, both eyes
743480	Anterior segment - Other specified colobomas and anomalies, laterality unk
743481	Anterior segment - Other specified colobomas and anomalies, left eye
743482	Anterior segment - Other specified colobomas and anomalies, right eye
743483	Anterior segment - Other specified colobomas and anomalies, unilateral NOS
743484	Anterior segment - Other specified colobomas and anomalies, both eyes
743490	Anterior segment - Unspecified colobomas and anomalies, laterality unk
743491	Anterior segment - Unspecified colobomas and anomalies, left eye
743492	Anterior segment - Unspecified colobomas and anomalies, right eye
743493	Anterior segment - Unspecified colobomas and anomalies, unilateral NOS
743494	Anterior segment - Unspecified colobomas and anomalies, both eyes
743500	Vitreous humor - Specified anomalies, laterality unk
743501	Vitreous humor - Specified anomalies, left eye
743502	Vitreous humor - Specified anomalies, right eye
743503	Vitreous humor - Specified anomalies, unilateral NOS
743504	Vitreous humor - Specified anomalies, both eyes
743510	Retina - Specified anomalies, laterality unk
743511	Retina - Specified anomalies, left eye
743512	Retina - Specified anomalies, right eye
743513	Retina - Specified anomalies, unilateral NOS
743514	Retina - Specified anomalies, both eyes
743520	Optic disk - Specified anomalies, laterality unk
743521	Optic disk - Specified anomalies, left eye
743522	Optic disk - Specified anomalies, right eye
743523	Optic disk - Specified anomalies, unilateral NOS
743524	Optic disk - Specified anomalies, both eyes
743530	Choroid - Specified anomalies, laterality unk
743531	Choroid - Specified anomalies, left eye
743532	Choroid - Specified anomalies, right eye
743533	Choroid - Specified anomalies, unilateral NOS
743534	Choroid - Specified anomalies, both eyes
743535	Choroid - Coloboma
743580	Posterior segment - Other specified anomalies, laterality unk
743581	Posterior segment - Other specified anomalies, left eye
743582	Posterior segment - Other specified anomalies, right eye
743583	Posterior segment - Other specified anomalies, unilateral NOS
743584	Posterior segment - Other specified anomalies, both eyes
743590	Posterior segment - Unspecified anomalies, laterality unk

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

743591	Posterior segment - Unspecified anomalies, left eye
743592	Posterior segment - Unspecified anomalies, right eye
743593	Posterior segment - Unspecified anomalies, unilateral NOS
743594	Posterior segment - Unspecified anomalies, both eye
743600	Blepharoptosis, laterality unk
743601	Blepharoptosis, left eye
743602	Blepharoptosis, right eye
743603	Blepharoptosis, unilateral NOS
743604	Blepharoptosis, both eyes
743610	Ectropion, laterality unk
743611	Ectropion, left eye
743612	Ectropion, right eye
743613	Ectropion, unilateral NOS
743614	Ectropion, both eyes
743620	Entropion, laterality unk
743621	Entropion, left eye
743622	Entropion, right eye
743623	Entropion, unilateral NOS
743624	Entropion, both eyes
743630	Eyelids - Other anomalies, laterality unk
743631	Eyelids - Other anomalies, left eye
743632	Eyelids - Other anomalies, right eye
743633	Eyelids - Other anomalies, unilateral NOS
743634	Eyelids - Other anomalies, both eyes
743635	Blepharophimosis
743636	Eyelids - Coloboma
743640	Lacrimal apparatus - Absence or agenesis, laterality unk
743641	Lacrimal apparatus - Absence or agenesis, left eye
743642	Lacrimal apparatus - Absence or agenesis, right eye
743643	Lacrimal apparatus - Absence or agenesis, unilateral NOS
743644	Lacrimal apparatus - Absence or agenesis, both eyes
743660	Lacrimal duct - Other anomalies, laterality unk
743661	Lacrimal duct - Other anomalies, left eye
743662	Lacrimal duct - Other anomalies, right eye
743663	Lacrimal duct - Other anomalies, unilateral NOS
743664	Lacrimal duct - Other anomalies, both eyes
743670	Anomalies of orbit, laterality unk
743671	Anomalies of orbit, left eye
743672	Anomalies of orbit, right eye
743673	Anomalies of orbit, unilateral NOS
743674	Anomalies of orbit, both eyes
743800	Eye - Other specified anomalies , laterality unk
743801	Eye - Other specified anomalies , left eye
743802	Eye - Other specified anomalies , right eye
743803	Eye - Other specified anomalies , unilateral NOS
743804	Eye - Other specified anomalies, both eyes
743810	Epibulbar dermoid cyst, laterality unk
743811	Epibulbar dermoid cyst, left eye
743812	Epibulbar dermoid cyst, right eye
743813	Epibulbar dermoid cyst, unilateral NOS
743814	Epibulbar dermoid cyst, both eyes
743900	Eye - Unspecified anomalies, laterality unk
743901	Eye - Unspecified anomalies, left eye
743902	Eye - Unspecified anomalies, right eye
743903	Eye - Unspecified anomalies, unilateral NOS
743904	Eye - Unspecified anomalies, both eyes
744000	Auditory canal - Absence or stricture, laterality unk
744001	Auditory canal - Absence or stricture, left ear
744002	Auditory canal - Absence or stricture, right ear
744003	Auditory canal - Absence or stricture, unilateral NOS
744004	Auditory canal - Absence or stricture, both ears
744010	External ear - Absence, laterality unk
744011	External ear - Absence, left ear
744012	External ear - Absence, right ear
744013	External ear - Absence, unilateral NOS
744014	External ear - Absence, both ears
744020	Middle ear - Anomaly, laterality unk
744021	Middle ear - Anomaly, left ear
744022	Middle ear - Anomaly, right ear
744023	Middle ear - Anomaly, unilateral NOS
744024	Middle ear - Anomaly, both ears
744030	Inner ear - Anomaly, laterality unk
744031	Inner ear - Anomaly, left ear
744032	Inner ear - Anomaly, right ear
744033	Inner ear - Anomaly, unilateral NOS
744034	Inner ear - Anomaly, both ears
744090	Ear - Unspecified anomalies with hearing impairment, laterality unk
744091	Ear - Unspecified anomalies with hearing impairment, left ear
744092	Ear - Unspecified anomalies with hearing impairment, right ear
744093	Ear - Unspecified anomalies with hearing impairment, unilateral NOS
744094	Ear - Unspecified anomalies with hearing impairment, both ears
744100	External ear - Accessory auricle or polyotia
744110	Preauricular (in front of ear canal) appendage, tag, or lobule

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

744120	Other ear tag, appendage, lobule, or papilloma
744200	Macrotia, laterality unk
744201	Macrotia, left ear
744202	Macrotia, right ear
744203	Macrotia, unilateral NOS
744204	Macrotia, both ears
744210	Microtia, laterality unk
744211	Microtia, left ear
744212	Microtia, right ear
744213	Microtia, unilateral NOS
744214	Microtia, both ears
744230	External ear - Other misshapen, laterality unk
744231	External ear - Other misshapen, left ear
744232	External ear - Other misshapen, right ear
744233	External ear - Other misshapen, unilateral NOS
744234	External ear - Other misshapen, both ears
744240	External ear - Misplaced, laterality unk
744241	External ear - Misplaced, left ear
744242	External ear - Misplaced, right ear
744243	External ear - Misplaced, unilateral NOS
744244	External ear - Misplaced, both ears
744250	Eustachian tube - Absence or anomaly, laterality unk
744251	Eustachian tube - Absence or anomaly, left ear
744252	Eustachian tube - Absence or anomaly, right ear
744253	Eustachian tube - Absence or anomaly, unilateral NOS
744254	Eustachian tube - Absence or anomaly, both ears
744280	Ear - Other specified anomalies, laterality unk
744281	Ear - Other specified anomalies, left ear
744282	Ear - Other specified anomalies, right ear
744283	Ear - Other specified anomalies, unilateral NOS
744284	Ear - Other specified anomalies, both ears
744300	Ear - Unspecified anomalies, laterality unk
744301	Ear - Unspecified anomalies, left ear
744302	Ear - Unspecified anomalies, right ear
744303	Ear - Unspecified anomalies, unilateral NOS
744304	Ear - Unspecified anomalies, both ears
744400	Branchial cleft, sinus, fistula, cyst, or pit, laterality unk
744401	Branchial cleft, sinus, fistula, cyst, or pit, left
744402	Branchial cleft, sinus, fistula, cyst, or pit, right
744403	Branchial cleft, sinus, fistula, cyst, or pit, unilateral NOS
744404	Branchial cleft, sinus, fistula, cyst, or pit, bilateral
744480	Other branchial cleft anomalies, laterality unk
744481	Other branchial cleft anomalies, left
744482	Other branchial cleft anomalies, right
744483	Other branchial cleft anomalies, unilateral NOS
744484	Other branchial cleft anomalies, bilateral
744800	Macrostomia
744810	Microstomia
744880	Other specified anomalies of face or neck, laterality unk
744881	Other specified anomalies of face or neck, left
744882	Other specified anomalies of face or neck, right
744883	Other specified anomalies of face or neck, unilateral NOS
744884	Other specified anomalies of face or neck, bilateral
744900	Congenital anomaly of neck, NOS
744910	Congenital anomaly of face, NOS
748000	Choanal atresia, laterality unk
748001	Choanal atresia, left
748002	Choanal atresia, right
748003	Choanal atresia, unilateral NOS
748004	Choanal atresia, bilateral
748100	Nose - Agenesis or underdevelopment, laterality unk
748101	Nose - Agenesis or underdevelopment, left
748102	Nose - Agenesis or underdevelopment, right
748103	Nose - Agenesis or underdevelopment, unilateral NOS
748104	Nose - Agenesis or underdevelopment, bilateral
748110	Nose - Accessory
748120	Nose - Fissured, notched, or cleft, laterality unk
748121	Nose - Fissured, notched, or cleft, left
748122	Nose - Fissured, notched, or cleft, right
748123	Nose - Fissured, notched, or cleft, unilateral NOS
748124	Nose - Fissured, notched, or cleft, bilateral
748130	Sinus wall anomalies
748140	Nasal septum - Perforated
748180	Nose - Other specified anomalies, laterality unk
748181	Nose - Other specified anomalies, left
748182	Nose - Other specified anomalies, right
748183	Nose - Other specified anomalies, unilateral NOS
748184	Nose - Other specified anomalies, bilateral
748185	Nose - Tubular, single, proboscis
748190	Nose - Unspecified anomalies
748205	Laryngeal web - Glottic
748206	Laryngeal web - Subglottic

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

748209	Laryngeal web - Site unspecified
748300	Larynx and supporting cartilage - Other anomalies
748310	Subglottic stenosis - Congenital
748330	Trachea - Other anomalies
748340	Bronchus - Stenosis, laterality unk
748341	Bronchus - Stenosis, left
748342	Bronchus - Stenosis, right
748343	Bronchus - Stenosis, unilateral NOS
748344	Bronchus - Stenosis, bilateral
748350	Bronchus - Other anomalies, laterality unk
748351	Bronchus - Other anomalies, left
748352	Bronchus - Other anomalies, right
748353	Bronchus - Other anomalies, unilateral NOS
748354	Bronchus - Other anomalies, bilateral
748360	Laryngeal stridor - Congenital
748380	Larynx, bronchus - Other specified anomalies
748385	Larynx - Cleft
748390	Larynx, trachea, bronchus - Unspecified anomalies
748400	Lung - Single cyst, laterality unk
748401	Lung - Single cyst, left
748402	Lung - Single cyst, right
748403	Lung - Single cyst, unilateral NOS
748410	Lung - Multiple cysts, laterality unk
748411	Lung - Multiple cysts, left
748412	Lung - Multiple cysts, right
748413	Lung - Multiple cysts, unilateral NOS
748414	Lung - Multiple cysts, bilateral
748420	Lung - Honeycomb, laterality unk
748421	Lung - Honeycomb, left
748422	Lung - Honeycomb, right
748423	Lung - Honeycomb, unilateral NOS
748424	Lung - Honeycomb, bilateral
748480	Lung - Other specified congenital cystic, laterality unk
748481	Lung - Other specified congenital cystic, left
748482	Lung - Other specified congenital cystic, right
748483	Lung - Other specified congenital cystic, unilateral NOS
748484	Lung - Other specified congenital cystic, bilateral
748500	Lung - Agenesis or aplasia, laterality unk
748501	Lung - Agenesis or aplasia, left
748502	Lung - Agenesis or aplasia, right
748503	Lung - Agenesis or aplasia, unilateral NOS
748504	Lung - Agenesis or aplasia, bilateral
748510	Lung - Hypoplasia, laterality unk
748511	Lung - Hypoplasia, left
748512	Lung - Hypoplasia, right
748513	Lung - Hypoplasia, unilateral NOS
748514	Lung - Hypoplasia, bilateral
748520	Lung - Sequestration, laterality unk
748521	Lung - Sequestration, left
748522	Lung - Sequestration, right
748523	Lung - Sequestration, unilateral NOS
748524	Lung - Sequestration, bilateral
748580	Lung - Other specified dysplasia, laterality unk
748581	Lung - Other specified dysplasia, left
748582	Lung - Other specified dysplasia, right
748583	Lung - Other specified dysplasia, unilateral NOS
748584	Lung - Other specified dysplasia, bilateral
748590	Lung - Unspecified dysplasia, laterality unk
748591	Lung - Unspecified dysplasia, left
748592	Lung - Unspecified dysplasia, right
748593	Lung - Unspecified dysplasia, unilateral NOS
748594	Lung - Unspecified dysplasia, bilateral
748600	Lung - Ectopic tissue, laterality unk
748601	Lung - Ectopic tissue, left
748602	Lung - Ectopic tissue, right
748603	Lung - Ectopic tissue, unilateral NOS
748604	Lung - Ectopic tissue, bilateral
748610	Bronchiectasis, laterality unk
748611	Bronchiectasis, left
748612	Bronchiectasis, right
748613	Bronchiectasis, unilateral NOS
748614	Bronchiectasis, bilateral
748620	Lung - Accessory lobe, laterality unk
748621	Lung - Accessory lobe, left
748622	Lung - Accessory lobe, right
748623	Lung - Accessory lobe, unilateral NOS
748624	Lung - Accessory lobe, bilateral
748625	Bilobar right lung
748690	Lung - Other and unspecified anomalies, laterality unk
748691	Lung - Other and unspecified anomalies, left
748692	Lung - Other and unspecified anomalies, right
748693	Lung - Other and unspecified anomalies, unilateral NOS
748694	Lung - Other and unspecified anomalies, bilateral
748800	Pleural anomaly, laterality unk
748801	Pleural anomaly, left
748802	Pleural anomaly, right
748803	Pleural anomaly, unilateral NOS
748804	Pleural anomaly, bilateral
748810	Mediastinum - Congenital cyst
748880	Respiratory system - Other specified anomalies, laterality unk

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

748881	Respiratory system - Other specified anomalies, left
748882	Respiratory system - Other specified anomalies, right
748883	Respiratory system - Other specified anomalies, unilateral NOS
748884	Respiratory system - Other specified anomalies, bilateral
748900	Respiratory system - Unspecified anomalies
749000	Cleft hard palate - Unilateral, without cleft lip
749010	Cleft hard palate - Bilateral, without cleft lip
749020	Cleft hard palate - Central, without cleft lip
749030	Cleft hard palate - NOS, without cleft lip
749040	Cleft soft palate - Unilateral, without cleft lip
749050	Cleft soft palate - Bilateral, without cleft lip
749060	Cleft soft palate - Central, without cleft lip
749070	Cleft soft palate - NOS, without cleft lip
749080	Cleft uvula, without cleft lip
749090	Cleft palate - NOS, hard or soft not specified, without cleft lip
749100	Cleft lip - Unilateral, without cleft palate
749110	Cleft lip - Bilateral, without cleft palate
749120	Cleft lip - Central, without cleft palate
749190	Cleft lip - NOS, without cleft palate
749200	Cleft lip - Unilateral, with any cleft palate
749210	Cleft lip - Bilateral, with any cleft palate
749220	Cleft lip - Central, with any cleft palate
749290	Cleft lip - NOS, with any cleft palate
750000	Ankyloglossia
750100	Tongue - Absence
750110	Tongue - Small
750120	Tongue - Large
750130	Tongue - Dislocation or displacement
750140	Tongue - Cleft or split
750180	Tongue - Other specified anomalies
750190	Tongue - Unspecified anomalies
750200	Pharyngeal pouch
750210	Pharynx - Other anomalies
750230	Salivary glands or ducts - Other anomalies
750250	Palate - Other anomalies
750260	Lip - fistulae or pits
750270	Lip - Other anomalies
750280	Mouth and pharynx - Other specified anomalies
750300	Esophageal atresia - Without tracheoesophageal (T-E) fistula (TEF)
750310	Esophageal atresia - With tracheoesophageal (T-E) fistula (TEF)
750320	Tracheoesophageal (T-E) fistula (TEF) - Without esophageal atresia
750325	Tracheoesophageal (T-E) fistula (TEF) - "H" type
750330	Bronchoesophageal fistula - With or without esophageal atresia
750340	Esophagus - Stenosis or stricture
750350	Esophageal web
750380	Trachea and esophagus - Other anomalies
750400	Esophagus - Congenital dilatation
750410	Esophagus - Displaced
750420	Esophagus - Diverticulum
750430	Esophagus - Duplication
750480	Esophagus - Other specified anomalies
750510	Pyloric stenosis - Congenital hypertrophic
750580	Pyloric obstruction - Other congenital
750600	Hiatal hernia - Congenital
750700	Stomach - Microgastria
750710	Stomach - Megalogastria
750720	Stomach - Cardiospasm
750730	Stomach - Displacement or transposition
750740	Stomach - Diverticulum
750750	Stomach - Duplication
750780	Stomach - Other specified anomalies
750800	Upper alimentary tract - Other specified anomalies
750900	Mouth and pharynx - Unspecified anomalies
750910	Esophagus - Unspecified anomalies
750920	Stomach - Unspecified anomalies
750990	Upper alimentary tract - Unspecified anomalies
751000	Omphalomesenteric duct - persistent
751100	Duodenum - Stenosis, atresia or absence
751110	Jejunum - Stenosis, atresia or absence of jejunum
751120	Ileum - Stenosis, atresia or absence
751190	Small intestine, NOS - Stenosis, atresia or absence
751195	Small intestine, NOS - Stenosis, atresia or absence, with fistula
751200	Large intestine - Stenosis, atresia or absence
751210	Rectum - Stenosis, atresia or absence, with fistula
751220	Rectum - Stenosis, atresia or absence without mention of fistula
751230	Anus - Stenosis, atresia or absence, with fistula
751240	Anus - Stenosis, atresia or absence, without mention of fistula
751300	Hirschsprung's disease - Total intestinal aganglionosis

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

751310	Hirschsprung's disease - Long-segment (aganglionosis beyond the rectum)
751320	Hirschsprung's disease - Short-segment (aganglionosis involving no more than the anal sphincter and the rectum)
751330	Hirschsprung's disease - NOS
751340	Megacolon - congenital
751400	Malrotation - cecum and/or colon
751410	Mesentery anomalies
751420	Congenital adhesions or bands of omentum and peritoneum
751490	Malrotation - Other specified and unspecified
751495	Malrotation - small intestine only
751500	Duplication of anus, rectum, appendix, cecum, or intestine
751510	Transposition of appendix, colon, or intestine
751520	Microcolon
751530	Anus - Ectopic
751540	Anal fistula - Congenital
751550	Cloaca - Persistent cloaca
751555	Cloaca - Exstrophy
751560	Duodenum - Web
751580	Intestine - Other specified anomalies
751590	Intestine - Unspecified anomalies
751600	Liver - Absence or agenesis, total or partial
751610	Liver - Cystic or fibrocystic disease
751620	Liver - Other anomalies
751630	Gallbladder - Agenesis or hypoplasia
751640	Gallbladder - Other anomalies
751650	Hepatic or bile ducts - Agenesis or atresia
751660	Choledochal cyst
751670	Hepatic or bile ducts - Other anomalies
751680	Biliary tract - Other anomalies
751700	Pancreas - Absence, agenesis or hypoplasia
751710	Pancreas - accessory
751720	Pancreas - Annular
751730	Pancreas - Ectopic
751740	Pancreas - Cyst
751780	Pancreas - Other specified anomalies
751790	Pancreas - Unspecified anomalies
751800	Alimentary tract - Absence, complete or partial, NOS
751810	Alimentary tract - Duplication, NOS
751880	Digestive system - Other specified anomalies
751900	Digestive system - Unspecified anomalies
752000	Ovary - Absence or agenesis, laterality unk
752001	Ovary - Absence or agenesis, left
752002	Ovary - Absence or agenesis, right
752003	Ovary - Absence or agenesis, unilateral NOS
752004	Ovary - Absence or agenesis, bilateral
752010	Ovary - Streak, laterality unk
752011	Ovary - Streak, left
752012	Ovary - Streak, right
752013	Ovary - Streak, unilateral NOS
752014	Ovary - Streak, bilateral
752020	Ovary - Accessory, laterality unk
752021	Ovary - Accessory, left
752022	Ovary - Accessory, right
752023	Ovary - Accessory, unilateral NOS
752024	Ovary - Accessory, bilateral
752080	Ovary - Other specified anomalies, laterality unk
752081	Ovary - Other specified anomalies, left
752082	Ovary - Other specified anomalies, right
752083	Ovary - Other specified anomalies, unilateral NOS
752084	Ovary - Other specified anomalies, bilateral
752085	Ovary - Multiple cysts
752090	Ovary - Unspecified anomalies, laterality unk
752091	Ovary - Unspecified anomalies, left
752092	Ovary - Unspecified anomalies, right
752093	Ovary - Unspecified anomalies, unilateral NOS
752094	Ovary - Unspecified anomalies, bilateral
752100	Fallopian tube - Absent, laterality unk
752101	Fallopian tube - Absent, left
752102	Fallopian tube - Absent, right
752103	Fallopian tube - Absent, unilateral NOS
752104	Fallopian tube - Absent, bilateral
752110	Cyst - Mesenteric remnant
752120	Cyst - Fimbrial cyst, laterality unk
752121	Cyst - Fimbrial cyst, left
752122	Cyst - Fimbrial cyst, right
752123	Cyst - Fimbrial cyst, unilateral NOS
752124	Cyst - Fimbrial cyst, bilateral
752190	Fallopian tube - Other and unspecified anomalies, laterality unk
752191	Fallopian tube - Other and unspecified anomalies, left
752192	Fallopian tube - Other and unspecified anomalies, right
752193	Fallopian tube - Other and unspecified anomalies, unilateral NOS
752194	Fallopian tube - Other and unspecified anomalies, bilateral
752200	Uterus - Double
752300	Uterus - Absence or agenesis
752310	Uterus - Displaced
752320	Uterus - Fistula with digestive or urinary tract
752380	Uterus - Other anomalies
752390	Uterus - Unspecified anomalies

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

752400	Cervix - Absence, atresia or agenesis
752410	Vagina - Absence or atresia
752420	Fistula - Congenital rectovaginal
752440	Vulva - Absence or other anomaly
752450	Clitoris - Absence or other anomaly
752470	Vagina - Other cyst
752480	External female genitalia - Other specified anomalies
752490	External female genitalia - Unspecified anomalies
752500	Testicle - Undescended or unpalpable, unilateral NOS
752501	Testicle - Undescended or unpalpable, left
752502	Testicle - Undescended or unpalpable, right
752514	Testicle - Undescended or unpalpable, bilateral
752520	Testicle - Undescended or unpalpable, laterality unk
752530	Testicle - Ectopic, laterality unk
752531	Testicle - Ectopic, left
752532	Testicle - Ectopic, right
752533	Testicle - Ectopic, unilateral NOS
752534	Testicle - Ectopic, bilateral
752600	Hypospadias without chordee - Degree not specified
752605	Hypospadias without chordee - First-degree (glandular or coronal)
752606	Hypospadias without chordee - Second-degree (penile)
752607	Hypospadias without chordee - Third-degree (perineal or scrotal)
752610	Epispadias
752620	Chordee, congenital, with hypospadias - Degree not specified
752621	Chordee, congenital, alone (no hypospadias)
752625	Chordee, congenital, with first-degree hypospadias (glandular or coronal)
752626	Chordee, congenital, with second-degree hypospadias (penile)
752627	Chordee, congenital, with third-degree hypospadias (perineal or scrotal)
752700	True hermaphroditism
752710	Pseudohermaphroditism in a male
752720	Pseudohermaphroditism in a female
752730	Pseudohermaphroditism, sex not specified
752790	Indeterminate sex, NOS
752800	Testicle - Absent, laterality unk
752801	Testicle - Absent, left
752802	Testicle - Absent, right
752803	Testicle - Absent, unilateral NOS
752804	Testicle - Absent, bilateral
752810	Testicle and scrotum - Aplasia, laterality unk
752811	Testicle and scrotum - Aplasia, left
752812	Testicle and scrotum - Aplasia, right
752813	Testicle and scrotum - Aplasia, unilateral NOS
752814	Testicle and scrotum - Aplasia, bilateral
752820	Testicle and scrotum - Other anomalies
752830	Vas deferens - Atresia, laterality unk
752831	Vas deferens - Atresia, left
752832	Vas deferens - Atresia, right
752833	Vas deferens - Atresia, unilateral NOS
752834	Vas deferens - Atresia, bilateral
752840	Vas deferens and prostate - Other anomalies
752850	Penis - Absence or aplasia
752860	Penis - Other anomalies
752865	Penis - small or hypoplastic
752870	Cysts of embryonic remnants
752880	Genital organs, male - Other specified anomalies
752900	Genital organs, male - Unspecified anomalies
753000	Kidneys - Absence, agenesis, dysplasia, or hypoplasia - Bilateral
753009	Kidneys - Absence, agenesis, dysplasia, or hypoplasia - NOS
753010	Kidney - Absence, agenesis, dysplasia, or hypoplasia, laterality unk
753011	Kidney - Absence, agenesis, dysplasia, or hypoplasia, unilateral, left
753012	Kidney - Absence, agenesis, dysplasia, or hypoplasia, unilateral, right
753013	Kidney - Absence, agenesis, dysplasia, or hypoplasia, unilateral, NOS
753100	Kidney - Single cyst, laterality unk
753101	Kidney - Single cyst, left
753102	Kidney - Single cyst, right
753103	Kidney - Single cyst, unilateral NOS
753110	Kidneys, polycystic - Infantile type, laterality unk
753111	Kidneys, polycystic - Infantile type, left
753112	Kidneys, polycystic - Infantile type, right
753113	Kidneys, polycystic - Infantile type, unilateral NOS
753114	Kidneys, polycystic - Infantile type, bilateral
753120	Kidneys, polycystic - Adult type, Laterality Unk
753121	Kidneys, polycystic - Adult type, Left
753122	Kidneys, polycystic - Adult type, Right
753123	Kidneys, polycystic - Adult type, Unilateral NOS
753124	Kidneys, polycystic - Adult type, Bilateral
753130	Kidneys, polycystic -Type not specified, Laterality Unk
753131	Kidneys, polycystic - Type not specified, Left
753132	Kidneys, polycystic - Type not specified, Right

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

753133	Kidneys, polycystic - Type not specified, Unilateral NOS
753134	Kidneys, polycystic - Type not specified, Bilateral
753140	Kidneys, medullary cystic disease - Juvenile type, Laterality Unk
753141	Kidneys, medullary cystic disease - Juvenile type, Left
753142	Kidneys, medullary cystic disease - Juvenile type, Right
753143	Kidneys, medullary cystic disease - Juvenile type, Unilateral NOS
753144	Kidneys, medullary cystic disease - Juvenile type, Bilateral
753150	Kidneys, medullary cystic disease - Adult type, Laterality Unk
753151	Kidneys, medullary cystic disease - Adult type, Left
753152	Kidneys, medullary cystic disease - Adult type, Right
753153	Kidneys, medullary cystic disease - Adult type, Unilateral NOS
753154	Kidneys, medullary cystic disease - Adult type, Bilateral
753160	Kidneys, multicystic dysplasia, Laterality Unk
753161	Kidneys, multicystic dysplasia, Left
753162	Kidneys, multicystic dysplasia, Right
753163	Kidneys, multicystic dysplasia, Unilateral NOS
753164	Kidneys, multicystic dysplasia, Bilateral
753180	Kidneys, cystic - Other specified types, Laterality Unk
753181	Kidneys, cystic - Other specified types, Left
753182	Kidneys, cystic - Other specified types, Right
753183	Kidneys, cystic - Other specified types, Unilateral NOS
753184	Kidneys, cystic - Other specified types, Bilateral
753200	Hydronephrosis, congenital, Laterality Unk
753201	Hydronephrosis, congenital, Left
753202	Hydronephrosis, congenital, Right
753203	Hydronephrosis, congenital, Unilateral NOS
753204	Hydronephrosis, congenital, Bilateral
753210	Ureter - Atresia, stricture, or stenosis, Laterality Unk
753211	Ureter - Atresia, stricture, or stenosis, Left
753212	Ureter - Atresia, stricture, or stenosis, Right
753213	Ureter - Atresia, stricture, or stenosis, Unilateral NOS
753214	Ureter - Atresia, stricture, or stenosis, Bilateral
753220	Megaloureter, NOS, Laterality Unk
753221	Megaloureter, NOS, Left
753222	Megaloureter, NOS, Right
753223	Megaloureter, NOS, Unilateral NOS
753224	Megaloureter, NOS, Bilateral
753290	Renal pelvis and ureter - Other and unspecified obstructive defects, Laterality Unk
753291	Renal pelvis and ureter - Other and unspecified obstructive defects, Left
753292	Renal pelvis and ureter - Other and unspecified obstructive defects, Right
753293	Renal pelvis and ureter - Other and unspecified obstructive defects, Unilateral NOS
753294	Renal pelvis and ureter - Other and unspecified obstructive defects, Bilateral
753300	Kidney - Accessory kidney, Laterality Unk
753301	Kidney - Accessory kidney, Left
753302	Kidney - Accessory kidney, Right
753303	Kidney - Accessory kidney, Unilateral NOS
753304	Kidney - Accessory kidney, Bilateral
753310	Kidney - Double or triple, Laterality Unk
753311	Kidney - Double or triple, Left
753312	Kidney - Double or triple, Right
753313	Kidney - Double or triple, Unilateral NOS
753314	Kidney - Double or triple, Bilateral
753320	Kidney - Lobulated, fused, or horseshoe, Laterality Unk
753321	Kidney - Lobulated, fused, or horseshoe, Left
753322	Kidney - Lobulated, fused, or horseshoe, Right
753323	Kidney - Lobulated, fused, or horseshoe, Unilateral NOS
753324	Kidney - Lobulated, fused, or horseshoe, Bilateral
753330	Kidney - Ectopic, Laterality Unk
753331	Kidney - Ectopic, Left
753332	Kidney - Ectopic, Right
753333	Kidney - Ectopic, Unilateral NOS
753334	Kidney - Ectopic, Bilateral
753340	Kidney - Enlarged, hyperplastic, or giant, Unilaterality Unk
753341	Kidney - Enlarged, hyperplastic, or giant, Left
753342	Kidney - Enlarged, hyperplastic, or giant, Right
753343	Kidney - Enlarged, hyperplastic, or giant, Unilateral NOS
753344	Kidney - Enlarged, hyperplastic, or giant, Bilateral
753350	Renal calculi, congenital, Laterality Unk
753351	Renal calculi, congenital, Left
753352	Renal calculi, congenital, Right
753353	Renal calculi, congenital, Unilateral NOS
753354	Renal calculi, congenital, Bilateral

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

753380	Kidney - Other specified anomalies, Laterality Unk
753381	Kidney - Other specified anomalies, Left
753382	Kidney - Other specified anomalies, Right
753383	Kidney - Other specified anomalies, Unilateral NOS
753384	Kidney - Other specified anomalies, Bilateral
753400	Ureter - Absent, Laterality Unk
753401	Ureter - Absent, Left
753402	Ureter - Absent, Right
753403	Ureter - Absent, Unilateral NOS
753404	Ureter - Absent, Bilateral
753410	Ureter - Accessory, Laterality Unk
753411	Ureter - Accessory, Left
753412	Ureter - Accessory, Right
753413	Ureter - Accessory, Unilateral NOS
753414	Ureter - Accessory, Bilateral
753320	Kidney - Lobulated, fused, or horseshoe, Laterality Unk
753321	Kidney - Lobulated, fused, or horseshoe, Left
753322	Kidney - Lobulated, fused, or horseshoe, Right
753323	Kidney - Lobulated, fused, or horseshoe, Unilateral NOS
753324	Kidney - Lobulated, fused, or horseshoe, Bilateral
753330	Kidney - Ectopic, Laterality Unk
753331	Kidney - Ectopic, Left
753332	Kidney - Ectopic, Right
753333	Kidney - Ectopic, Unilateral NOS
753334	Kidney - Ectopic, Bilateral
753340	Kidney - Enlarged, hyperplastic, or giant, Unilaterality Unk
753341	Kidney - Enlarged, hyperplastic, or giant, Left
753342	Kidney - Enlarged, hyperplastic, or giant, Right
753343	Kidney - Enlarged, hyperplastic, or giant, Unilateral NOS
753344	Kidney - Enlarged, hyperplastic, or giant, Bilateral
753350	Renal calculi, congenital, Laterality Unk
753351	Renal calculi, congenital, Left
753352	Renal calculi, congenital, Right
753353	Renal calculi, congenital, Unilateral NOS
753354	Renal calculi, congenital, Bilateral
753380	Kidney - Other specified anomalies, Laterality Unk
753381	Kidney - Other specified anomalies, Left
753382	Kidney - Other specified anomalies, Right
753383	Kidney - Other specified anomalies, Unilateral NOS
753384	Kidney - Other specified anomalies, Bilateral
753400	Ureter - Absent, Laterality Unk
753401	Ureter - Absent, Left
753402	Ureter - Absent, Right
753403	Ureter - Absent, Unilateral NOS
753404	Ureter - Absent, Bilateral
753410	Ureter - Accessory, Laterality Unk
753411	Ureter - Accessory, Left
753412	Ureter - Accessory, Right
753413	Ureter - Accessory, Unilateral NOS
753414	Ureter - Accessory, Bilateral
753420	Ureter - Ectopic, Laterality Unk
753421	Ureter - Ectopic, Left
753422	Ureter - Ectopic, Right
753423	Ureter - Ectopic, Unilateral NOS
753424	Ureter - Ectopic, Bilateral
753480	Ureter - Other specified anomalies, Laterality Unk
753481	Ureter - Other specified anomalies, Left
753482	Ureter - Other specified anomalies, Right
753483	Ureter - Other specified anomalies, Unilateral NOS
753484	Ureter - Other specified anomalies, Bilateral
753485	Vesicoureteral reflux
753500	Exstrophy of urinary bladder
753600	Posterior urethral valves, congenital
753610	Bladder - Other atresia, or stenosis of neck
753620	Urethra - Anterior obstruction, atresia or stenosis
753630	Urinary meatus - Obstruction, atresia or stenosis
753690	Urethra and bladder neck - Other and unspecified atresia or stenosis
753700	Urachus - Patent
753710	Urachus - Cyst
753790	Urachus - Other and unspecified anomaly
753800	Bladder or urethra - Absent
753810	Bladder - Ectopic
753820	Bladder - Congenital diverticulum or hernia
753830	Bladder - Congenital prolapse
753840	Urethra or urinary meatus - Double
753850	Urethra or urethral orifice - Ectopic
753860	Fistula of digestive-urinary tract, congenital
753870	Fistula of urethra, NOS
753880	Bladder and urethra - Other specified anomalies
753900	Kidney - Unspecified anomaly, Laterality Unk
753901	Kidney - Unspecified anomaly, Left
753902	Kidney - Unspecified anomaly, Right
753903	Kidney - Unspecified anomaly, Unilateral NOS
753904	Kidney - Unspecified anomaly, Bilateral

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

753910	Ureter - Unspecified anomaly, Laterality Unk
753911	Ureter - Unspecified anomaly, Left
753912	Ureter - Unspecified anomaly, Right
753913	Ureter - Unspecified anomaly, Unilateral NOS
753914	Ureter - Unspecified anomaly, Bilateral
753920	Bladder - Unspecified anomaly
753930	Urethra - Unspecified anomaly
753990	Urinary system - Unspecified anomaly, NOS
754000	Face - Asymmetry
754010	Facies - Compression
754030	Dolichocephaly
754040	Skull - Depressions
754050	Plagiocephaly, laterality unk
754051	Plagiocephaly, left
754052	Plagiocephaly, right
754053	Plagiocephaly, unilateral NOS
754054	Plagiocephaly, bilateral
754055	Asymmetric head
754060	Scaphocephaly
754070	Trigonocephaly
754080	Skull - Other specified deformity
754090	Skull - Deformity, NOS
754100	Sternocleidomastoid muscle - Anomalies, laterality unk
754101	Sternocleidomastoid muscle - Anomalies, left
754102	Sternocleidomastoid muscle - Anomalies, right
754103	Sternocleidomastoid muscle - Anomalies, unilateral NOS
754104	Sternocleidomastoid muscle - Anomalies, bilateral
754200	Scoliosis - Congenital postural
754210	Lordosis - Congenital postural
754220	Curvature of spine - Congenital postural, NOS
754300	Hip - Congenital dislocation, laterality unk
754301	Hip - Congenital dislocation, left
754302	Hip - Congenital dislocation, right
754303	Hip - Congenital dislocation, unilateral NOS
754304	Hip - Congenital dislocation, bilateral
754310	Hip - Unstable hip , Laterality Unk
754311	Hip - Unstable hip, Left
754312	Hip - Unstable hip, Right
754313	Hip - Unstable hip, Unilateral NOS
754314	Hip - Unstable hip, Bilateral
754400	Femur - Bowed, Laterality Unk
754401	Femur - Bowed, Left
754402	Femur - Bowed, Right
754403	Femur - Bowed, Unilateral NOS
754404	Femur - Bowed, Bilateral
754410	Tibia and/or fibula - Bowed, Laterality Unk
754411	Tibia and/or fibula - Bowed, Left
754412	Tibia and/or fibula - Bowed, Right
754413	Tibia and/or fibula - Bowed, Unilateral NOS
754414	Tibia and/or fibula - Bowed, Bilateral
754420	Legs - Bowed, NOS, Laterality Unk
754421	Legs - Bowed, NOS, Left
754422	Legs - Bowed, NOS, Right
754423	Legs - Bowed, NOS, Unilateral NOS
754424	Legs - Bowed, NOS, Bilateral
754430	Genu recurvatum, Laterality Unk
754431	Genu recurvatum, Left
754432	Genu recurvatum, Right
754433	Genu recurvatum, Unilateral NOS
754434	Genu recurvatum, Bilateral
754440	Knee - Congenital dislocation, Laterality Unk
754441	Knee - Congenital dislocation, Left
754442	Knee - Congenital dislocation, Right
754443	Knee - Congenital dislocation, Unilateral NOS
754444	Knee - Congenital dislocation, Bilateral
754490	Leg - Deformity, NOS, Laterality Unk
754491	Leg - Deformity, NOS, Left
754492	Leg - Deformity, NOS, Right
754493	Leg - Deformity, NOS, Unilateral NOS
754494	Leg - Deformity, NOS, Bilateral
754500	Talipes equinovarus, Laterality Unk
754501	Talipes equinovarus, Left
754502	Talipes equinovarus, Right
754503	Talipes equinovarus, Unilateral NOS
754504	Talipes equinovarus, Bilateral
754510	Talipes calcaneovarus, Laterality Unk
754511	Talipes calcaneovarus, Left
754512	Talipes calcaneovarus, Right
754513	Talipes calcaneovarus, Unilateral NOS
754514	Talipes calcaneovarus, Bilateral
754530	Feet - Varus deformities, complex, Laterality Unk
754531	Feet - Varus deformities, complex, Left
754532	Feet - Varus deformities, complex, Right
754533	Feet - Varus deformities, complex, Unilateral NOS
754534	Feet - Varus deformities, complex, Bilateral
754590	Feet - Unspecified varus deformities, Laterality Unk
754591	Feet - Unspecified varus deformities, Left
754592	Feet - Unspecified varus deformities, Right
754593	Feet - Unspecified varus deformities, Unilateral NOS
754594	Feet - Unspecified varus deformities, Bilateral

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

754600	Talipes calcaneovalgus, Laterality Unk
754601	Talipes calcaneovalgus, Left
754602	Talipes calcaneovalgus, Right
754603	Talipes calcaneovalgus, Unilateral NOS
754604	Talipes calcaneovalgus, Bilateral
754610	Congenital pes planus, Laterality Unk
754611	Congenital pes planus, Left
754612	Congenital pes planus, Right
754613	Congenital pes planus, Unilateral NOS
754614	Congenital pes planus, Bilateral
754615	Pes valgus
754680	Feet - Other specified valgus deformities, Laterality Unk
754681	Feet - Other specified valgus deformities, Left
754682	Feet - Other specified valgus deformities, Right
754683	Feet - Other specified valgus deformities, Unilateral NOS
754684	Feet - Other specified valgus deformities, Bilateral
754690	Feet - Unspecified valgus deformities, Laterality Unk
754691	Feet - Unspecified valgus deformities, Left
754692	Feet - Unspecified valgus deformities, Right
754693	Feet - Unspecified valgus deformities, Unilateral NOS
754694	Feet - Unspecified valgus deformities, Bilateral
754700	Pes cavus, Laterality Unk
754701	Pes cavus, Left
754702	Pes cavus, Right
754703	Pes cavus, Unilateral NOS
754704	Pes cavus, Bilateral
754720	Achilles tendon - Short, Laterality Unk
754721	Achilles tendon - Short, Left
754722	Achilles tendon - Short, Right
754723	Achilles tendon - Short, Unilateral NOS
754724	Achilles tendon - Short, Bilateral
754730	Clubfoot, NOS, Laterality Unk
754731	Clubfoot, NOS, Left
754732	Clubfoot, NOS, Right
754733	Clubfoot, NOS, Unilateral NOS
754734	Clubfoot, NOS, Bilateral
754735	Foot - Congenital deformities, NOS
754780	Ankle and/or toes - Other specified deformities, Laterality Unk
754781	Ankle and/or toes - Other specified deformities, Left
754782	Ankle and/or toes - Other specified deformities, Right
754783	Ankle and/or toes - Other specified deformities, Unilateral NOS
754784	Ankle and/or toes - Other specified deformities, Bilateral
754800	Pectus carinatum
754810	Pectus excavatum
754820	Chest - Other anomalies
754825	Chest - Shield
754830	Elbow - Congenital dislocation, Laterality Unk
754831	Elbow - Congenital dislocation, Left
754832	Elbow - Congenital dislocation, Right
754833	Elbow - Congenital dislocation, Unilateral NOS
754834	Elbow - Congenital dislocation, Bilateral
754840	Hand or fingers - Clubbed, congenital, Laterality Unk
754841	Hand or fingers - Clubbed, congenital, Left
754842	Hand or fingers - Clubbed, congenital, Right
754843	Hand or fingers - Clubbed, congenital, Unilateral NOS
754844	Hand or fingers - Clubbed, congenital, Bilateral
754850	Hand - Spade-like, Laterality Unk
754851	Hand - Spade-like, Left
754852	Hand - Spade-like, Right
754853	Hand - Spade-like, Unilateral NOS
754854	Hand - Spade-like, Bilateral
754880	Hands - Other specified deformity of hands, Laterality Unk
754881	Hands - Other specified deformity of hands, Left
754882	Hands - Other specified deformity of hands, Right
754883	Hands - Other specified deformity of hands, Unilateral NOS
754884	Hands - Other specified deformity of hands, Bilateral
755005	Polydactyly, fingers - Postaxial, Type A
755006	Polydactyly, fingers or toes - Postaxial, Type B
755007	Polydactyly, fingers - Postaxial, type (finger vs. skin tag) not specified.
755010	Polydactyly, fingers - Preaxial, Laterality Unk
755011	Polydactyly, fingers - Preaxial, Left
755012	Polydactyly, fingers - Preaxial, Right
755013	Polydactyly, fingers - Preaxial, Unilateral NOS
755014	Polydactyly, fingers - Preaxial, Bilateral
755020	Polydactyly, toes - Postaxial, Laterality Unk
755021	Polydactyly, toes - Postaxial, Left
755022	Polydactyly, toes - Postaxial, Right
755023	Polydactyly, toes - Postaxial, Unilateral NOS
755024	Polydactyly, toes - Postaxial, Bilateral
755030	Polydactyly, toes - Preaxial, Laterality Unk
755031	Polydactyly, toes - Preaxial, Left
755032	Polydactyly, toes - Preaxial, Right

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

755033	Polydactyly, toes - Preaxial, Unilateral NOS
755034	Polydactyly, toes - Preaxial, Bilateral
755090	Polydactyly, hand/foot not specified, Laterality Unk
755091	Polydactyly, hand/foot not specified, Left
755092	Polydactyly, hand/foot not specified, Right
755093	Polydactyly, hand/foot not specified, Unilateral NOS
755094	Polydactyly, hand/foot not specified, Bilateral
755095	Polydactyly, fingers - Preaxial/postaxial not specified
755096	Polydactyly, toes - Preaxial/postaxial not specified
755100	Syndactyly, fingers - Fused, Laterality Unk
755101	Syndactyly, fingers - Fused, Left
755102	Syndactyly, fingers - Fused, Right
755103	Syndactyly, fingers - Fused, Unilateral NOS
755104	Syndactyly, fingers - Fused, Bilateral
755110	Syndactyly, fingers - Webbed, Laterality Unk
755111	Syndactyly, fingers - Webbed, Left
755112	Syndactyly, fingers - Webbed, Right
755113	Syndactyly, fingers - Webbed, Unilateral NOS
755114	Syndactyly, fingers - Webbed, Bilateral
755120	Syndactyly, toes - Fused, Laterality Unk
755121	Syndactyly, toes - Fused, Left
755122	Syndactyly, toes - Fused, Right
755123	Syndactyly, toes - Fused, Unilateral NOS
755124	Syndactyly, toes - Fused, Bilateral
755130	Syndactyly, toes - Webbed, Laterality Unk
755131	Syndactyly, toes - Webbed, Left
755132	Syndactyly, toes - Webbed, Right
755133	Syndactyly, toes - Webbed, Unilateral NOS
755134	Syndactyly, toes - Webbed, Bilateral
755190	Syndactyly - Unspecified
755193	Syndactyly, thumb and/or fingers - Webbed vs. fused unspecified
755196	Syndactyly, toes - Webbed vs. fused unspecified
755200	Absent upper limb, laterality unk
755201	Absent upper limb, left
755202	Absent upper limb, right
755203	Absent upper limb, unilateral NOS
755204	Absent upper limb, bilateral
755210	Absent upper arm and forearm, laterality unk
755211	Absent upper arm and forearm, left
755212	Absent upper arm and forearm, right
755213	Absent upper arm and forearm, unilateral NOS
755214	Absent upper arm and forearm, bilateral
755220	Absent upper arm only or forearm only, laterality unk
755221	Absent upper arm only or forearm only, left
755222	Absent upper arm only or forearm only, right
755223	Absent upper arm only or forearm only, unilateral NOS
755224	Absent upper arm only or forearm only, bilateral
755230	Absent forearm and hand, laterality unk
755231	Absent forearm and hand, left
755232	Absent forearm and hand, right
755233	Absent forearm and hand, unilateral NOS
755234	Absent forearm and hand, bilateral
755240	Absent hand or fingers, laterality unk
755241	Absent hand or fingers, left
755242	Absent hand or fingers, right
755243	Absent hand or fingers, unilateral NOS
755244	Absent hand or fingers, bilateral
755250	Split-hand malformation, laterality unk
755251	Split-hand malformation, left
755252	Split-hand malformation, right
755253	Split-hand malformation, unilateral NOS
755254	Split-hand malformation, bilateral
755260	Preaxial longitudinal reduction defect - Upper limb, laterality unk
755261	Preaxial longitudinal reduction defect - Upper limb, left
755262	Preaxial longitudinal reduction defect - Upper limb, right
755263	Preaxial longitudinal reduction defect - Upper limb, unilateral NOS
755264	Preaxial longitudinal reduction defect - Upper limb, bilateral
755265	Longitudinal reduction defect, type not specified - Upper limb
755270	Postaxial longitudinal reduction defect - Upper limb, laterality unk
755271	Postaxial longitudinal reduction defect - Upper limb, left
755272	Postaxial longitudinal reduction defect - Upper limb, right
755273	Postaxial longitudinal reduction defect - Upper limb, unilateral NOS
755274	Postaxial longitudinal reduction defect - Upper limb, bilateral
755280	Other specified reduction defect - Upper limb, laterality unk
755281	Other specified reduction defect - Upper limb, left
755282	Other specified reduction defect - Upper limb, right

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

755283	Other specified reduction defect - Upper limb, unilateral NOS
755284	Other specified reduction defect - Upper limb, bilateral
755285	Transverse reduction defect - Upper limb, NOS
755290	Unspecified reduction defect - Upper limb, laterality unk
755291	Unspecified reduction defect - Upper limb, left
755292	Unspecified reduction defect - Upper limb, right
755293	Unspecified reduction defect - Upper limb, unilateral NOS
755294	Unspecified reduction defect - Upper limb, bilateral
755300	Absent lower limb, laterality unk
755301	Absent lower limb, left
755302	Absent lower limb, right
755303	Absent lower limb, unilateral NOS
755304	Absent lower limb, bilateral
755310	Absent thigh and lower leg, laterality unk
755311	Absent thigh and lower leg, left
755312	Absent thigh and lower leg, right
755313	Absent thigh and lower leg, unilateral NOS
755314	Absent thigh and lower leg, bilateral
755320	Absent femur only or lower leg only, laterality unk
755321	Absent femur only or lower leg only, left
755322	Absent femur only or lower leg only, right
755323	Absent femur only or lower leg only, unilateral NOS
755324	Absent femur only or lower leg only, bilateral
755330	Absent lower leg and foot, laterality unk
755331	Absent lower leg and foot, left
755332	Absent lower leg and foot, right
755333	Absent lower leg and foot, unilateral NOS
755334	Absent lower leg and foot, bilateral
755340	Absent foot or toes, laterality unk
755341	Absent foot or toes, left
755342	Absent foot or toes, right
755343	Absent foot or toes, unilateral NOS
755344	Absent foot or toes, bilateral
755350	Split-foot malformation, laterality unk
755351	Split-foot malformation, left
755352	Split-foot malformation, right
755353	Split-foot malformation, unilateral NOS
755354	Split-foot malformation, bilateral
755360	Longitudinal reduction defect, NOS - Lower limb, laterality unk
755361	Longitudinal reduction defect, NOS - Lower limb, left
755362	Longitudinal reduction defect, NOS - Lower limb, right
755363	Longitudinal reduction defect, NOS - Lower limb, unilateral NOS
755364	Longitudinal reduction defect, NOS - Lower limb, bilateral
755365	Preaxial longitudinal reduction defect - Lower limb
755366	Postaxial longitudinal reduction defect - Lower limb
755380	Other specified reduction defect - Lower limb, laterality unk
755381	Other specified reduction defect - Lower limb, left
755382	Other specified reduction defect - Lower limb, right
755383	Other specified reduction defect - Lower limb, unilateral NOS
755384	Other specified reduction defect - Lower limb, bilateral
755385	Transverse reduction defect, NOS - Lower limb
755390	Unspecified reduction defect - Lower limb, laterality unk
755391	Unspecified reduction defect - Lower limb, left
755392	Unspecified reduction defect - Lower limb, right
755393	Unspecified reduction defect - Lower limb, unilateral NOS
755394	Unspecified reduction defect - Lower limb, bilateral
755400	Absent limb, NOS, Laterality Unk
755401	Absent limb, NOS, Left
755402	Absent limb, NOS, Right
755403	Absent limb, NOS, Unilateral NOS
755404	Absent limb, NOS, Bilateral
755410	Phocomelia, NOS, Laterality Unk
755411	Phocomelia, NOS, Left
755412	Phocomelia, NOS, Right
755413	Phocomelia, NOS, Unilateral NOS
755414	Phocomelia, NOS, Bilateral
755420	Transverse reduction defect, NOS, Laterality Unk
755421	Transverse reduction defect, NOS, Left
755422	Transverse reduction defect, NOS, Right
755423	Transverse reduction defect, NOS, Unilateral NOS
755424	Transverse reduction defect, NOS, Bilateral
755430	Longitudinal reduction defect, NOS, Laterality Unk
755620	Anomalies of ankle, Laterality Unk
755621	Anomalies of ankle, Left

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

755622	Anomalies of ankle, Right
755623	Anomalies of ankle, Unilateral NOS
755624	Anomalies of ankle, Bilateral
755630	Anomalies of lower leg, Laterality Unk
755631	Anomalies of lower leg, Left
755632	Anomalies of lower leg, Right
755633	Anomalies of lower leg, Unilateral NOS
755634	Anomalies of lower leg, Bilateral
755640	Anomalies of knee, Laterality Unk
755641	Anomalies of knee, Left
755642	Anomalies of knee, Right
755643	Anomalies of knee, Unilateral NOS
755644	Anomalies of knee, Bilateral
755645	Genu valgum
755646	Genu varum
755647	Absent or rudimentary patella
755650	Anomalies of upper leg, Laterality Unk
755651	Anomalies of upper leg, Left
755652	Anomalies of upper leg, Right
755653	Anomalies of upper leg, Unilateral NOS
755654	Anomalies of upper leg, Bilateral
755660	Anomalies of hip, Laterality Unk
755661	Anomalies of hip, Left
755662	Anomalies of hip, Right
755663	Anomalies of hip, Unilateral NOS
755664	Anomalies of hip, Bilateral
755665	Hip dysplasia, NOS.
755670	Anomalies of pelvis
755680	Other specified anomalies of lower limb, Laterality Unk
755681	Other specified anomalies of lower limb, Left
755682	Other specified anomalies of lower limb, Right
755683	Other specified anomalies of lower limb, Unilateral NOS
755684	Other specified anomalies of lower limb, Bilateral
755685	Hypoplasia of lower limb
755690	Unspecified anomalies of legs, Laterality Unk
755691	Unspecified anomalies of legs, Left
755692	Unspecified anomalies of legs, Right
755693	Unspecified anomalies of legs, Unilateral NOS
755694	Unspecified anomalies of legs, Bilateral
755800	Arthrogryposis multiplex congenita
755810	Larsen's syndrome
755880	Other specified anomalies of unspecified limb
755900	Unspecified anomalies of unspecified limb
756000	Craniosynostosis, NOS, laterality unk
756001	Craniosynostosis, NOS, left
756002	Craniosynostosis, NOS, right
756003	Craniosynostosis, NOS, unilateral NOS
756004	Craniosynostosis, NOS, bilateral
756005	Craniosynostosis - Sagittal
756006	Craniosynostosis - Metopic
756010	Craniosynostosis - Coronal, laterality unk
756011	Craniosynostosis - Coronal, left
756012	Craniosynostosis - Coronal, right
756013	Craniosynostosis - Coronal, unilateral NOS
756014	Craniosynostosis - Coronal, bilateral
756020	Craniosynostosis - Lambdoidal, laterality unk
756021	Craniosynostosis - Lambdoidal, left
756022	Craniosynostosis - Lambdoidal, right
756023	Craniosynostosis - Lambdoidal, unilateral NOS
756024	Craniosynostosis - Lambdoidal, bilateral
756030	Craniosynostosis - Other types
756040	Craniofacial dysostosis
756045	Mandibulofacial dysostosis
756046	Other craniofacial syndromes
756050	Acrocephalosyndactyly, NOS
756055	Acrocephalosyndactyly, types I or II
756056	Acrocephalosyndactyly, type III
756057	Acrocephalosyndactylies - Other specified types
756060	Goldenhar syndrome
756065	Hemifacial microsomia
756080	Other specified skull and face bone anomalies
756085	Hypertelorism
756090	Unspecified skull and face bone anomalies.
756100	Spina bifida occulta
756110	Klippel-Feil syndrome
756120	Kyphosis
756130	Congenital spondylolisthesis
756140	Anomalies of cervical vertebrae
756145	Hemivertebrae of cervical vertebrae
756146	Agenesis of cervical vertebrae
756150	Anomalies of thoracic vertebrae
756155	Hemivertebrae of thoracic vertebrae
756156	Agenesis of thoracic vertebrae
756160	Anomalies of lumbar vertebrae
756165	Hemivertebrae of lumbar vertebrae
756166	Agenesis of lumbar vertebrae
756170	Sacrococcygeal anomalies
756175	Sacral agenesis
756179	Sacral mass, NOS
756180	Other specified vertebral anomalies
756185	Hemivertebrae, NOS
756190	Unspecified anomalies of spine
756300	Rib - Absent, laterality unk
756301	Rib - Absent, left

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

756302	Rib - Absent, right
756303	Rib - Absent, unilateral NOS
756304	Rib - Absent, bilateral
756310	Rib - Misshapen, laterality unk
756311	Rib - Misshapen, left
756312	Rib - Misshapen, right
756313	Rib - Misshapen, unilateral NOS
756314	Rib - Misshapen, bilateral
756320	Rib - Fused, laterality unk
756321	Rib - Fused, left
756322	Rib - Fused, right
756323	Rib - Fused, unilateral NOS
756324	Rib - Fused, bilateral
756330	Rib - Extra, laterality unk
756331	Rib - Extra, left
756332	Rib - Extra, right
756333	Rib - Extra, unilateral NOS
756334	Rib - Extra, bilateral
756340	Rib - Other anomalies, laterality unk
756341	Rib - Other anomalies, left
756342	Rib - Other anomalies, right
756343	Rib - Other anomalies, unilateral NOS
756344	Rib - Other anomalies, bilateral
756350	Absence of sternum
756360	Misshapen sternum
756380	Other anomalies of sternum
756390	Unspecified anomalies of thoracic cage
756400	Asphyxiating thoracic dystrophy
756410	Chondrodysplasia
756420	Chondrodysplasia with hemangioma
756430	Dwarfism - Achondroplastic
756445	Dwarfism - Diastrophic
756446	Dwarfism - Metatrophic
756447	Dwarfism - Thanatophoric
756450	Metaphyseal dysostosis
756460	Spondyloepiphyseal dysplasia
756470	Exostosis
756480	Other specified chondrodystrophy
756490	Unspecified chondrodystrophy
756500	Osteogenesis imperfecta
756505	Osteopsathyrosis
756506	Fragilitas ossium
756510	Polyostotic fibrous dysplasia
756520	Chondroectodermal dysplasia
756525	Ellis-van Creveld syndrome
756530	Infantile cortical hyperostosis
756540	Osteopetrosis
756550	Progressive diaphyseal dysplasia
756560	Osteopoikilosis
756570	Multiple epiphyseal dysplasia
756575	Conradi syndrome
756580	Other specified osteodystrophies
756590	Unspecified osteodystrophies
756600	Absent diaphragm
756610	Diaphragmatic hernia - Congenital, NOS
756615	Diaphragmatic hernia - Bochdalek
756616	Diaphragmatic hernia - Morgagni
756617	Hemidiaphragm
756620	Eventration of diaphragm, laterality unk
756621	Eventration of diaphragm, left
756622	Eventration of diaphragm, right
756623	Eventration of diaphragm, unilateral NOS
756624	Eventration of diaphragm, bilateral
756680	Other specified anomalies of diaphragm, laterality unk
756681	Other specified anomalies of diaphragm, left
756682	Other specified anomalies of diaphragm, right
756683	Other specified anomalies of diaphragm, unilateral NOS
756684	Other specified anomalies of diaphragm, bilateral
756690	Unspecified anomalies of diaphragm, laterality unk
756691	Unspecified anomalies of diaphragm, left
756692	Unspecified anomalies of diaphragm, right
756693	Unspecified anomalies of diaphragm, unilateral NOS
756694	Unspecified anomalies of diaphragm, bilateral
756700	Omphalocele
756710	Gastroschisis
756720	Prune belly syndrome
756790	Other and unspecified anomalies of abdominal wall
756795	Epigastric hernia
756800	Poland syndrome or anomaly, laterality unk
756801	Poland syndrome or anomaly, left
756802	Poland syndrome or anomaly, right
756803	Poland syndrome or anomaly, unilateral NOS
756804	Poland syndrome or anomaly, bilateral
756810	Other absent or hypoplastic muscle, laterality unk
756811	Other absent or hypoplastic muscle, left
756812	Other absent or hypoplastic muscle, right
756813	Other absent or hypoplastic muscle, unilateral NOS
756814	Other absent or hypoplastic muscle, bilateral
756820	Absent tendon, laterality unk
756821	Absent tendon, left
756822	Absent tendon, right
756823	Absent tendon, unilateral NOS
756824	Absent tendon, bilateral
756830	Nail-patella syndrome

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

756840	Amyotrophia congenita
756850	Ehlers-Danlos syndrome
756860	Congenital torticollis, laterality unk
756861	Congenital torticollis, left
756862	Congenital torticollis, right
756863	Congenital torticollis, unilateral NOS
756864	Congenital torticollis, bilateral
756880	Other specified anomalies of muscle, tendon, fascia and connective tissue
756900	Unspecified anomalies of muscle
756910	Unspecified anomalies of tendon
756920	Unspecified anomalies of bone
756930	Unspecified anomalies of cartilage
756940	Unspecified anomalies of connective tissue
756990	Unspecified anomalies of musculoskeletal system
757000	Hereditary edema of legs, laterality unk
757001	Hereditary edema of legs, left
757002	Hereditary edema of legs, right
757003	Hereditary edema of legs, unilateral NOS
757004	Hereditary edema of legs, bilateral
757100	Ichthyosis, congenital - Harlequin fetus
757110	Ichthyosis, congenital - Collodion baby
757115	Ichthyosis, congenital - Bullous type
757120	Ichthyosis, congenital - Sjogren-Larsson syndrome
757190	Ichthyosis, congenital - Other and unspecified
757195	Ichthyosis, congenital - Ichthyosis vulgaris
757196	Ichthyosis, congenital - X-linked ichthyosis
757197	Ichthyosis, congenital - Ichthyosiform erythroderma
757300	Specified syndromes involving skin, not elsewhere classified
757320	Urticaria pigmentosa
757330	Epidermolysis bullosa
757340	Ectodermal dysplasia, NOS
757345	Ectodermal dysplasia, X-linked type
757346	Ectodermal dysplasia, Other specified
757350	Incontinentia pigmenti
757360	Xeroderma pigmentosum
757370	Cutis laxa hyperelastica
757390	Skin - Other specified anomalies
757395	Skin - Absence
757400	Alopecia, congenital
757410	Hair - Beaded
757420	Hair - Twisted
757430	Hair - Taenzer's
757480	Hair - Other specified anomalies
757500	Anonychia, congenital, laterality unk
757501	Anonychia, congenital, left
757502	Anonychia, congenital, right
757503	Anonychia, congenital, unilateral NOS
757504	Anonychia, congenital, bilateral
757510	Nails - Enlarged or hypertrophic, laterality unk
757511	Nails - Enlarged or hypertrophic, left
757512	Nails - Enlarged or hypertrophic, right
757513	Nails - Enlarged or hypertrophic, unilateral NOS
757514	Nails - Enlarged or hypertrophic, bilateral
757515	Onychauxis
757516	Pachyonychia
757520	Koilonychia, congenital
757530	Leukonychia, congenital
757540	Club nail, laterality unk
757541	Club nail, left
757542	Club nail, right
757543	Club nail, unilateral NOS
757544	Club nail, bilateral
757580	Nails - Other specified anomalies
757585	Nails - Hypoplastic
757600	Breast - Absent, with absent nipple, laterality unk
757601	Breast - Absent, with absent nipple, left
757602	Breast - Absent, with absent nipple, right
757603	Breast - Absent, with absent nipple, unilateral NOS
757604	Breast - Absent, with absent nipple, bilateral
757610	Breast - Hypoplastic, with hypoplastic nipple, laterality unk
757611	Breast - Hypoplastic, with hypoplastic nipple, left
757612	Breast - Hypoplastic, with hypoplastic nipple, right
757613	Breast - Hypoplastic, with hypoplastic nipple, unilateral NOS
757614	Breast - Hypoplastic, with hypoplastic nipple, bilateral
757620	Breast - Accessory, with nipple, laterality unk
757621	Breast - Accessory, with nipple, left
757622	Breast - Accessory, with nipple, right
757623	Breast - Accessory, with nipple, unilateral NOS
757624	Breast - Accessory, with nipple, bilateral
757630	Nipple - Absent, laterality unk
757631	Nipple - Absent, left
757632	Nipple - Absent, right
757633	Nipple - Absent, unilateral NOS
757634	Nipple - Absent, bilateral
757640	Nipple - Small or hypoplastic, laterality unk
757641	Nipple - Small or hypoplastic, left
757642	Nipple - Small or hypoplastic, right
757643	Nipple - Small or hypoplastic, unilateral NOS
757644	Nipple - Small or hypoplastic, bilateral
757680	Breast - Other specified anomalies, laterality unk

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

757681	Breast - Other specified anomalies, left
757682	Breast - Other specified anomalies, right
757683	Breast - Other specified anomalies, unilateral NOS
757684	Breast - Other specified anomalies, bilateral
757800	Skin - Other specified anomalies
757900	Skin - Unspecified anomalies
757910	Hair - Unspecified anomalies
757920	Nail - Unspecified anomalies
757990	Integument - Unspecified anomalies
758000	Trisomy 21 - karyotype documented
758010	Trisomy G, NOS - karyotype documented
758020	Translocation trisomy 21
758030	Translocation trisomy G, NOS
758040	Mosaic trisomy 21 syndrome
758090	Trisomy 21, NOS
758100	Trisomy 13 - karyotype documented
758110	Trisomy D, NOS
758120	Translocation trisomy 13
758130	Translocation trisomy D, NOS
758190	Trisomy 13, NOS
758200	Trisomy 18 - karyotype documented
758210	Trisomy E, NOS
758220	Translocation trisomy 18
758230	Translocation trisomy E, NOS
758290	Trisomy 18, NOS
758295	Edwards phenotype with normal karyotype
758300	Antimongolism syndrome/clinical antimongolism syndrome with karyotype partial or total deletion of 21 or a G-group chromosome, NOS
758310	Cri du chat syndrome / clinical Cri du chat syndrome with karyotype deletion of 5 or a B-group chromosome, NOS
758320	Wolff-Hirschorn syndrome / clinical Wolff-Hirschorn syndrome with karyotype deletion of 4 or a B-group chromosome, NOS
758330	Deletion of long arm of 13 / deletion of long arm of a D-group, NOS
758340	Deletion of long arm of E / deletion long arm of 17 or 18
758350	Deletion of short arm of E/deletion short arm of 17 or 18
758360	Monosomy G mosaicism
758370	Deletion in band 11 of long arm of chromosome 22
758380	Other loss of autosomal material / microdeletion
758390	Unspecified autosomal deletion syndromes
758400	Balanced autosomal translocation in normal individual
758500	Trisomy 8
758510	Trisomy C - Other
758520	Trisomy - Other total
758530	Trisomy - Partial
758540	Translocation - Other
758580	Autosomes - Other specified anomalies, NOS
758585	Polyploidy
758586	Triploidy
758590	Autosomes - Unspecified anomalies
758600	Turner phenotype - Karyotype 45,X or 45,XO
758610	Turner phenotype - Variant karyotypes.
758690	Turner syndrome - Unspecified karyotype
758790	Klinefelter syndrome, NOS
758800	Sex chromosome - Mosaic XO/XY
758810	Sex chromosome - Mosaic XO/XX
758820	Sex chromosome - Mosaic XY/XXY
758830	Sex chromosome - Mosaic that includes XXXXY
758840	Sex chromosome - XYY in a male
758850	Sex chromosome - XXX in a female
758860	Sex chromosome - Additional, NOS
758880	Sex chromosome - Other specified anomaly
758890	Sex chromosome - Unspecified anomaly
758900	Chromosome - Mosaicism, NOS
758910	Chromosome - Additional, NOS
758920	Chromosome - Deletion, NOS
758930	Chromosome - Duplication, NOS
758990	Chromosome - Unspecified anomaly
759000	Spleen - Absence
759005	Ivemark syndrome
759010	Spleen - Hypoplasia
759030	Spleen - Misshapen
759040	Spleen - Accessory, laterality unk
759041	Spleen - Accessory, left
759042	Spleen - Accessory, right
759043	Spleen - Accessory, unilateral NOS
759044	Spleen - Accessory, bilateral
759050	Spleen - Ectopic, laterality unk
759051	Spleen - Ectopic, left
759052	Spleen - Ectopic, right
759053	Spleen - Ectopic, unilateral NOS
759054	Spleen - Ectopic, bilateral
759080	Spleen - Other specified anomalies
759090	Spleen - Unspecified anomalies
759100	Adrenal gland - Absence, laterality unk
759101	Adrenal gland - Absence, left
759102	Adrenal gland - Absence, right
759103	Adrenal gland - Absence, unilateral NOS
759104	Adrenal gland - Absence, bilateral
759110	Adrenal gland - Hypoplasia, laterality unk

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Table S2: CDC/BPA Codes to Identify Non-Cardiac Congenital Anomalies

759111	Adrenal gland - Hypoplasia, left
759112	Adrenal gland - Hypoplasia, right
759113	Adrenal gland - Hypoplasia, unilateral NOS
759114	Adrenal gland - Hypoplasia, bilateral
759120	Adrenal gland - Accessory, laterality unk
759121	Adrenal gland - Accessory, left
759122	Adrenal gland - Accessory, right
759123	Adrenal gland - Accessory, unilateral NOS
759124	Adrenal gland - Accessory, bilateral
759130	Adrenal gland - Ectopic, laterality unk
759131	Adrenal gland - Ectopic, left
759132	Adrenal gland - Ectopic, right
759133	Adrenal gland - Ectopic, unilateral NOS
759134	Adrenal gland - Ectopic, bilateral
759180	Adrenal gland - Other specified anomaly, laterality unk
759181	Adrenal gland - Other specified anomaly, left
759182	Adrenal gland - Other specified anomaly, right
759183	Adrenal gland - Other specified anomaly, unilateral NOS
759184	Adrenal gland - Other specified anomaly, bilateral
759190	Adrenal gland - Unspecified anomaly, laterality unk
759191	Adrenal gland - Unspecified anomaly, left
759192	Adrenal gland - Unspecified anomaly, right
759193	Adrenal gland - Unspecified anomaly, unilateral NOS
759194	Adrenal gland - Unspecified anomaly, bilateral
759200	Pituitary gland anomalies
759210	Thyroid gland anomalies
759220	Thyroglossal duct anomalies
759230	Parathyroid gland anomalies, laterality unk
759231	Parathyroid gland anomalies, left
759232	Parathyroid gland anomalies, right
759233	Parathyroid gland anomalies, unilateral NOS
759234	Parathyroid gland anomalies, bilateral
759240	Thymus anomalies
759280	Endocrine gland, other - Specified anomalies
759290	Endocrine gland, other - Unspecified anomalies
759300	Dextrocardia with complete situs inversus
759310	Situs inversus with levocardia
759320	Situs inversus thoracis
759330	Situs inversus abdominis
759340	Kartagener syndrome
759390	Situs inversus - Unspecified
759400	Conjoined twins - Dicephalus (two heads)
759410	Conjoined twins - Craniopagus (head-joined)
759420	Conjoined twins - Thoracopagus (thorax-joined)
759430	Conjoined twins - Xiphopagus (xiphoid- and pelvis-joined)
759440	Conjoined twins - Pygopagus (buttock-joined)
759480	Conjoined twins - Other specified
759490	Conjoined twins - Unspecified
759500	Tuberous sclerosis
759600	Peutz-Jeghers syndrome
759610	Angiomatosis - Encephalocutaneous
759620	Von Hippel-Lindau syndrome
759630	Gardner syndrome
759680	Hamartoma - Other specified hamartoma
759690	Hamartoma - Unspecified
759700	Multiple congenital anomalies, NOS
759800	Congenital malformation syndromes affecting facial appearance
759820	Congenital malformation syndromes associated with short stature
759840	Congenital malformation syndromes involving limbs
759860	Congenital malformation syndromes with other skeletal changes
759870	Congenital malformation syndromes with metabolic disturbances
759890	Other specified anomalies
759900	Umbilical anomalies
759910	Embryopathy, NOS
759990	Congenital anomaly, NOS
760710	Fetal alcohol syndrome (FAS)
760750	Fetal hydantoin (Dilantin) syndrome
771000	Infection, congenital - rubella
771090	Infection, congenital - TORCH unspecified
771100	Infection, congenital - cytomegalovirus (CMV)
771210	Infection, congenital - toxoplasmosis
771220	Infection, congenital - herpes simplex
771230	Infection, congenital - Zika virus
771280	Infection, congenital - other specified
774480	Hepatitis, neonatal - specified
774490	Hepatitis, neonatal - NOS
999999	Other, unspecified diagnostic code

NOS: Not otherwise specified; Unk: Unknown

SUPPLEMENTAL MATERIAL
Table S3: Global Physical Health and Global Mental Health Items

Items contributing to global **physical** health:

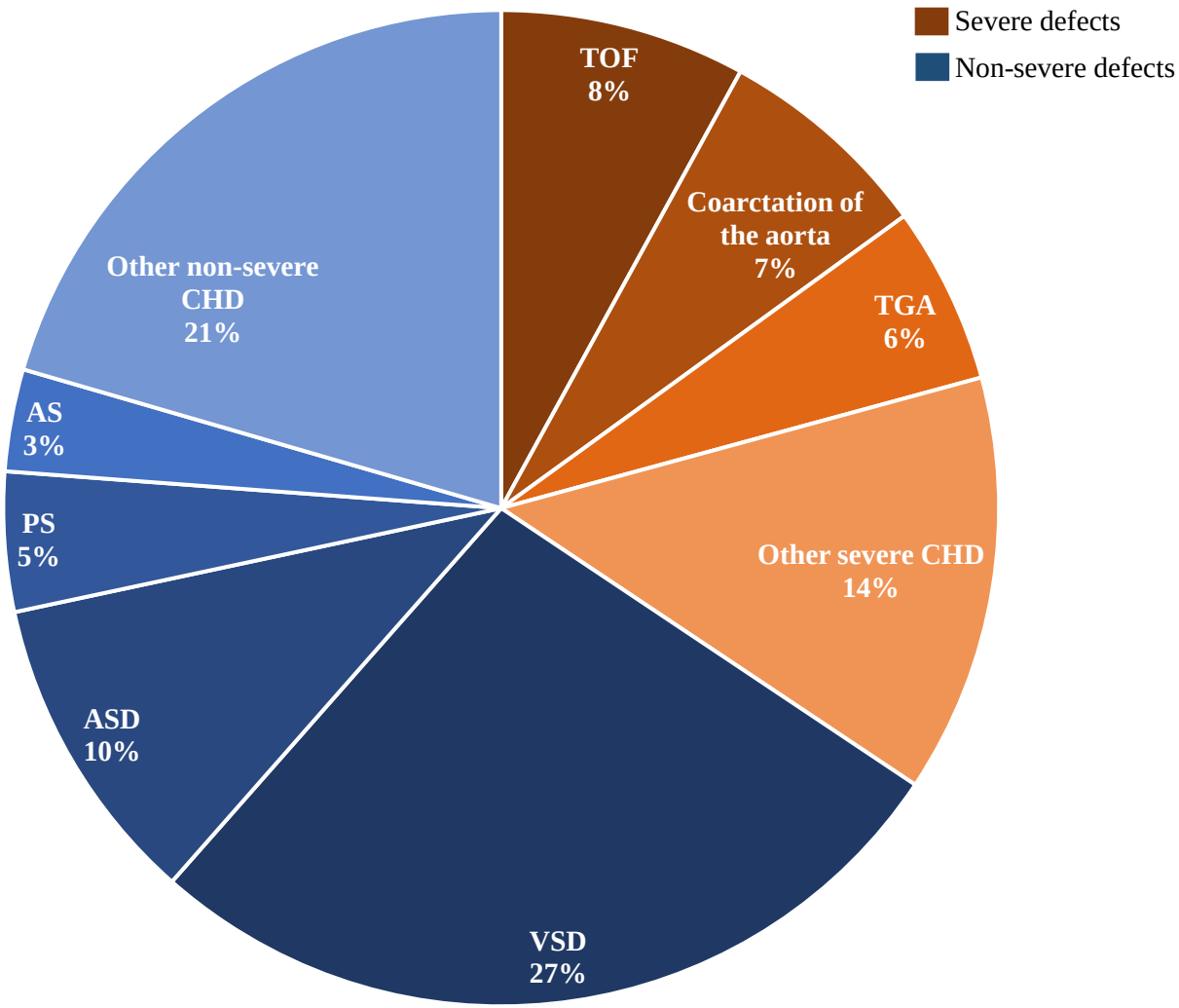
In general, how would you rate your physical health?	Excellent	Very Good	Good	Fair	Poor
To what extent are you able to carry out your everyday physical activities such as walking, climbing stairs, carrying groceries, or moving a chair?	Completely	Mostly	Moderately	A little	Not at all
In the past 7 days, how would you rate your pain on average?	0 No Pain	1 2 3 4 5 6 7 8 9			10 Worst Pain Imaginable
In the past 7 days, how would you rate your fatigue on average?	None	Mild	Moderate	Severe	Very Severe

Items contributing to global **mental** health:

In general, would you say your quality of life is:	Excellent	Very Good	Good	Fair	Poor
In general, how would you rate your mental health, including your mood and your ability to think?	Excellent	Very Good	Good	Fair	Poor
In general, how would you rate your satisfaction with your social activities and relationships?	Excellent	Very Good	Good	Fair	Poor
In the past 7 days, how often have you been bothered by emotional problems such as feeling anxious, depressed or irritable?	Never	Rarely	Sometimes	Often	Always

SUPPLEMENTAL MATERIAL

Figure S1. Distribution of CHD diagnoses in the CH STRONG analytic sample



AS=Aortic Stenosis; ASD=Atrial Septal Defect; CHD=Congenital Heart Defect; PS=Pulmonary Stenosis; TGA=Transition of the Great Arteries; TOF=Tetralogy of Fallot; VSD=Ventricular Septal Defect

SUPPLEMENTAL MATERIAL

Figure S2. Standardized Prevalence of Disability among Adults with Severe and Non-severe CHD in 2016-2019 Congenital Heart Survey to Recognize Outcomes, Needs, and well-beinG Compared to 2017 ACS Participants – Excluding 567 CH STRONG participants with non-cardiac congenital anomalies or proxy-reported surveys.