Cardiology in the Young

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Bullying among children with heart conditions, National Survey of Children's Health, 2018–2020

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Original Article

Cite this article: Wright BN, Glidewell MJ, Downing KF, Vagi KJ, Fundora MP, and Farr SL (2023). Bullying among children with heart conditions, National Survey of Children's Health, 2018–2020. *Cardiology in the Young*, page 1 of 9. doi: 10.1017/S1047951123004225

Received: 26 September 2023
Accepted: 22 November 2023

Keywords:
Bullying; children; CHD; heart condition; anxiety; depression

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Abstract

Children with chronic illnesses report being bullied by peers, yet little is known about bullying among children with heart conditions. Using 2018–2020 National Survey of Children's Health data, the prevalence and frequency of being bullied in the past year (never; annually or monthly; weekly or daily) were compared between children aged 6–17 years with and without heart conditions. Among children with heart conditions, associations between demographic and health characteristics and being bullied, and prevalence of diagnosed anxiety or depression by bullying status were examined. Differences were assessed with chi-square tests and multivariable logistic regression using predicted marginals to produce adjusted prevalence ratios and 95% confidence intervals. Weights yielded national estimates. Of 69,428 children, 2.2% had heart conditions. Children with heart conditions, compared to those without, were more likely to be bullied (56.3% and 43.3% respectively; adjusted prevalence ratio [95% confidence interval] = 1.3 [1.2, 1.4]) and bullied more frequently (weekly or daily = 11.2% and 5.3%; $p < 0.001$). Among children with heart conditions, characteristics associated with greater odds of weekly or daily bullying included ages 9–11 years compared to 15–17 years (3.4 [2.0, 5.7]), other genetic or inherited condition (1.7 [1.0, 3.0]), ever overweight (1.7 [1.0, 2.8]), and a functional limitation (4.8 [2.7, 8.5]). Children with heart conditions who were bullied, compared to never, more commonly had anxiety (40.1%, 25.9%, and 12.8%, respectively) and depression (18.0%, 9.3%, and 4.7%; $p < 0.01$ for both). Findings highlight the social and psychological needs of children with heart conditions.

There are an estimated 1.7 million children with a past or current heart condition in the United States.[1] Compared to children without heart conditions, children with heart conditions are more likely to be absent from school, have frequent healthcare visits, and have difficulty communicating or participating in extracurricular activities.[2,3] Children who participate in extracurricular activities may have greater social skills and are less likely to be bullied compared to children who do not participate in outside school activities.[4,5]

Bullying is defined as any repeated, unwanted aggressive behaviour(s) by another youth or group of youths and involves an observed or perceived power imbalance between perpetrators and victims.[6] Findings from recent iterations of the National Survey of Children's Health show that as many as 22.0% of United States children aged 6–17 years are bullied,[7,8] with rates slightly higher among 6–11 year olds compared to 12–17 year olds.[7,8] Among school-age children, bullying is associated with an increased risk of anxiety, depression, poor self-reported health, lower quality of life, and substance use in adulthood.[9–13]

A previous study using data from the 2016 National Survey of Children's Health examined caregiver perception of bullying among children with chronic physical conditions.[14] Among children with one or more chronic physical conditions, children who were bullied more commonly had health difficulties (e.g., recurring physical pain and cognitive difficulties) than children not bullied (62% versus 38%, respectively).[14] Having a heart condition was associated with increased odds of being bullied.[14] In previous literature, some studies suggest that children and adolescents with CHDs are more often bullied than their peers without CHD[14–16], while one study found no difference.[17] However, little is known about the frequency, risk factors, and psychological effects of being bullied among children with heart conditions. Using data from the 2018–2020 National Survey of Children's Health, our objective was to examine the prevalence and frequency of being bullied among children with heart conditions compared to those without heart conditions in a nationally representative, population-based sample of United States children aged 6–17 years. Among children with heart conditions, we also assessed demographic and health factors associated with being bullied and their mental health status.

Materials and methods

Data source and population

We performed a cross-sectional analysis of caregiver-reported data from the 2018–2020 National Survey of Children's Health. The annual survey provides data on children's health and well-being from a stratified random sample of households across all 50 states and the District of Columbia. The 2018, 2019, and 2020 surveys were administered online or by mail to households that were screened and identified as residences of children aged 17 years or younger. If more than one child lived in the home, one was randomly selected to be the subject of an age-appropriate questionnaire for that household. Up to two primary caregivers were surveyed per child. From 2018 to 2020, the overall response rate for National Survey of Children's Health ranged from 42.4 to 43.1%. Data were weighted to account for non-response bias and to produce population-based estimates.

Measures

The primary exposure of interest was presence of a heart condition in the child. Children were considered to have a heart condition if their caregiver answered "yes" to the following survey question: "Has a doctor or other health care provider ever told you that this child has a heart condition?". In 2020, National Survey of Children's Health added an additional question asking whether the child was born with the heart condition.

The outcome of interest was bullying status. Caregivers were asked how often their child was bullied, picked on, or excluded by other children in the past 12 months, and their responses were grouped into three categories: never bullied in the past year; bullied 1–2 times per year or 1–2 times per month (annually or monthly); and bullied 1–2 times per week or almost daily (weekly or daily). If the frequency changed throughout the year, caregivers were asked to report the highest frequency.

Caregivers were asked whether a doctor or other healthcare provider ever told them their child had an intellectual disability, Down syndrome, another genetic or inherited condition, was overweight, or had anxiety or depression. If the caregiver reported that the child had current anxiety or depression, the child was considered to have these conditions. Children were considered to have functional limitations if they had frequent or chronic difficulty with any of the following: breathing or other respiratory problems; eating or swallowing; digesting food, including stomach/intestinal problems, constipation, or diarrhoea; repeated or chronic physical pain, including headaches or other back or body pain; using their hands; coordination and moving around; serious difficulty concentrating, remembering, or making decisions because of a physical, mental, or emotional condition; walking or climbing stairs; dressing or bathing; doing errands alone, such as visiting a doctor's office or shopping (aged 12–17 years only); deafness or problems with hearing; blindness or problems with seeing, even when wearing glasses.

Other covariates included the child's sex (male and female), age (6–8, 9–11, 12–14, and 15–17 years), race and ethnicity (Hispanic, non-Hispanic White alone, non-Hispanic Black or African American alone, and non-Hispanic other, including Asian, Alaskan Native, American Indian, Native Hawaiian, Pacific Islander, or mixed race), the caregiver's marital status (married or not married but living with partner; never married; and divorced, separated, or widowed), caregiver educational attainment ($\leq$ high school degree or $>$ high school degree), and the family's poverty status based on United States Department of Health and Human Services Federal Poverty Level guidelines (<100%, 100–199%, 200–399%, and $\geq$ 400% of the Federal Poverty Level). Missing data on sex, race and ethnicity, and poverty status were multiply imputed by National Survey of Children's Health staff.[18]

Data analysis

Children missing data on any variables of interest were excluded. Among children with and without heart conditions, respectively, available characteristics of included and excluded children were compared using Wald chi-square tests. The prevalence and frequency of being bullied were assessed by heart condition status. The association between presence of a heart condition and being bullied was assessed using multivariable logistic regression using the predicted marginal approach to generate adjusted prevalence ratios and 95% confidence intervals. Among children with a heart condition, adjusted prevalence ratios further evaluated associations between demographic and health characteristics and bullying status. To identify whether associations were generalisable to children with heart conditions without syndromes, we conducted a sensitivity analysis excluding children with Down syndrome or other genetic conditions. Among children with a heart condition, we examined prevalence of current anxiety or depression by bullying status. Lastly, we excluded 2020 data to examine associations between heart condition status and being bullied during the 2018–2019 survey years to examine results before the COVID-19 pandemic when fewer children may have attended school in-person. All models were adjusted for child's sex, age group, race and ethnicity, and whether ever told overweight. All analyses were conducted using SAS-callable SUDAAN. Survey design parameters and weights accounted for complex sampling and non-response to produce nationally representative, population-based estimates. This analysis was exempt from human subjects review due to the de-identified nature of the data.

Results

Of the 73,849 children aged 6–17 years participating in the 2018–2020 National Survey of Children's Health, 180 children (0.2%) were excluded due to missing information on heart condition status and 928 (1.3%) children were excluded due to missing information on bullying status. Of the remaining 1,903 children with heart conditions and 70,838 children without heart conditions, 60 (3.2%) and 3,253 (4.6%), respectively, were excluded for missing data on other variables of interest. Among children with heart conditions, sex, caregiver marital status, caregiver educational attainment, and intellectual disability differed between those included and excluded from the analysis (Supplementary Table S1; $p < 0.05$). Among children without heart conditions, race and ethnicity, caregiver marital status, caregiver educational attainment, and poverty status differed between those included and excluded from the analysis ($p < 0.05$). Our analytic sample comprised 69,428 children and, of these, 1,843 (2.2%) had heart conditions. Using 2020 data (the only year for which these data were available), 91.1% of children with heart conditions were born with the condition (data not shown).

Among children with heart conditions, 53.2% were male, 26.6% were aged 15–17 years, and 59.4% were non-Hispanic White. Distributions were similar for children without heart conditions (Table 1). Compared to children without heart conditions, a larger

https://doi.org/10.1017/S1047951123004225 Published online by Cambridge University Press

Table 1. Characteristics of children by presence of a heart condition, aged 6–17 years, National Survey of Children's Health, United States, 2018–2020.

	Heart condition		No heart condition		
	N	Weighted % (95% CI)	N	Weighted % (95% CI)	Chi-square p-value
Total	1843	2.2(2.0, 2.4)	67,585	97.8(97.6, 98.0)	
Sex					0.31
Male	1006	53.2(48.7, 57.6)	35,040	50.8(50.0, 51.7)	
Female	837	46.8(42.4, 51.3)	32,545	49.2(48.3, 50.0)	
Age group (years)					0.41
6-8	368	25.8(21.6, 30.4)	13,550	24.0(23.3, 24.8)	
9-11	396	24.3(20.6, 28.5)	15,379	25.5(24.7, 26.2)	
12-14	467	23.3(20.2, 26.8)	17,416	25.7(25.0, 26.5)	
15-17	612	26.6(23.1, 30.3)	21,240	24.8(24.1, 25.5)	
Race and ethnicity[1]					<0.001
Black, non-Hispanic	117	12.1(9.5, 15.3)	4406	13.3(12.7, 13.9)	
Hispanic	195	20.3(16.0, 25.4)	8343	25.7(24.8, 26.7)	
Other, non-Hispanic[2]	205	8.2(6.5, 10.2)	8511	10.5(10.1, 11.0)	
White, non-Hispanic	1326	59.4(54.7, 64.0)	46,325	50.4(49.6, 51.3)	
Caregiver marital status					0.64
Married, not married living with a partner	1424	75.6(71.4, 79.3)	54,287	77.5(76.7, 78.2)	
Never married	114	7.9(5.7, 10.8)	3444	7.5(7.0, 8.0)	
Divorced, separated, widowed	305	16.6(13.4, 20.3)	9854	15.1(14.5, 15.7)	
Caregiver educational attainment					<0.001
High school or less	282	22.2(18.3, 26.8)	10,768	29.5(28.6, 30.4)	
More than high school	1561	77.8(73.2, 81.7)	56,817	70.5(69.6, 71.4)	
Poverty status (% FPL)[3]					0.50
<100	248	19.5(15.6, 24.1)	7663	17.9(17.1, 18.6)	
100-199	329	20.1(17.0, 23.7)	11,016	21.8(21.1, 22.6)	
200-399	590	30.8(26.8, 35.0)	20,847	28.8(28.1, 29.5)	
≥400	676	29.6(26.1, 33.4)	28,059	31.5(30.8, 32.2)	
Intellectual disability					<0.001
Yes	141	7.2(5.3, 9.7)	719	1.2(1.0, 1.4)	
No	1702	92.8(90.3, 94.7)	66,866	98.8(98.6, 99.0)	
Down syndrome					<0.001
Yes	74	3.4(2.4, 4.9)	71	0.1(0.1, 0.2)	
No	1769	96.6(95.1, 97.6)	67,514	99.9(99.8, 99.9)	
Other genetic or inherited condition					<0.001
Yes	311	14.7(12.0, 17.7)	3000	4.2(3.9, 4.5)	
No	1532	85.3(82.3, 88.0)	64,585	95.8(95.5, 96.1)	
Ever told overweight					0.01
Yes	255	14.7(12.2, 17.8)	5830	10.8(10.2, 11.4)	
No	1588	85.3(82.2, 87.8)	61,755	89.3(88.6, 89.9)	
Functional limitation[4]					<0.001
≥1	924	50.0(45.5, 54.4)	18,804	28.1(27.3, 28.9)	
None	919	50.0(45.6, 54.5)	48,781	71.9(71.1, 72.7)	

[1]CI = confidence interval; FPL = federal poverty level. Non-Hispanic Black or African American alone; Hispanic; non-Hispanic other, including Asian, Alaskan Native, and American.
[2]Indian, Native Hawaiian, Pacific Islander, or mixed race; non-Hispanic White alone
[3]Other includes respondents identified as Asian, Alaskan Native, American Indian, Native Hawaiian, Pacific Islander, or mixed race. Based on United States of America Department of Health and Human Services poverty guideline.
[4]Adapted from National Survey of Children's Health 12 functional difficulties indicator. Functional limitations are defined as having one or more of the following: serious difficulty concentrating, remembering, or making decisions because of a physical, mental, or emotional condition; serious difficulty walking or climbing stairs; difficulty dressing or bathing; difficulty doing errands alone, such as visiting a doctor's office or shopping; deafness or problems with hearing; blindness or problems with seeing, even when wearing glasses.

https://doi.org/10.1017/S1047951123004225 Published online by Cambridge University Press

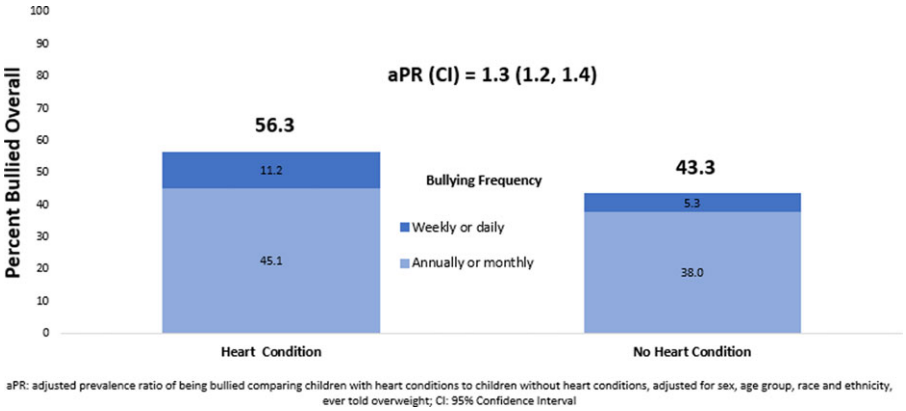

Figure 1. Prevalence of being bullied among children with and without heart conditions, aged 6–17 years, National Survey of Children's Health, United States, 2018–2020.

percentage of children with heart conditions were non-Hispanic White (59.4% versus 50.4%), had a caregiver with more than a high school education (77.8% versus 70.5%), had an intellectual disability (7.2% versus 1.2%), Down syndrome (3.4% versus 0.1%), another genetic or inherited condition (14.7% versus 4.2%), were ever overweight (14.7% versus 10.8%), or had a functional limitation (50.0% versus 28.1%; $p < 0.05$ for all).

Prevalence of being bullied among children with and without heart conditions

Children with heart conditions, compared to those without, were more likely to be bullied in the past 12 months (56.3% versus 43.3%; adjusted prevalence ratios [95% confidence interval] = 1.3 [1.2, 1.4]; Fig. 1). Among children who were bullied, children with heart conditions were bullied more frequently than children without heart conditions, respectively [weekly or daily: 11.2% and 5.3%; annually or monthly: 45.1% and 38.0%; $p < 0.001$)]. The adjusted prevalence ratio point estimates of being bullied comparing children with heart conditions to children without heart conditions did not significantly change after excluding 3,431 (4.9%) children with Down syndrome or other genetic conditions (Supplementary Figure S1) or data from 2020 (Supplementary Table S2, Supplementary Table S3).

Characteristics associated with being bullied among children with heart conditions

Children with heart conditions with the highest prevalence of weekly or daily bullying were aged 9–11 years (17.7%), those whose caregivers were never married (22.5%), those who had Down syndrome (18.9%), those who had another genetic or inherited condition (17.8%), those who were ever told overweight (17.7%), and those who had functional limitations (18.1%; Table 2). More children with heart conditions aged 6–8, 9–11, and 12–14 years were bullied annually or monthly compared to those aged 15–17 years (adjusted prevalence ratios = 1.3–1.5, although lower confidence limits for some were 1.0), and more 9–11-year-olds were bullied weekly or daily as well (3.4 [2.0, 5.7]). More children with functional limitations, compared to those without, were bullied annually or monthly (1.4 [1.2, 1.7]) and weekly or daily (4.8 [2.7, 8.5]). Fewer non-Hispanic Black children were bullied annually or monthly compared to non-Hispanic White children (0.7 [0.5, 1.0]), although the upper confidence interval was 1.0; corresponding estimates for weekly or daily bullying were limited by small sample size. For weekly or daily bullying, adjusted prevalence ratios were elevated among children whose caregivers were never married compared to those married or living with a partner (2.0 [1.0, 4.0]), children with another genetic or inherited condition (1.7 [1.0, 3.0]), and children ever overweight (1.7 [1.0, 2.8]), although lower confidence limits were 1.0. After excluding children with Down syndrome or other genetic or inherited conditions, associations with weekly or daily bullying strengthened for those aged 9–11 and 12–14 years (5.4 [3.0, 9.6] and 3.2 [1.5, 6.8], respectively) and those ever overweight (2.5 [1.5, 4.2]) (Supplementary Table S4).

Current anxiety or depression by bullying status among children with heart conditions

As frequency of bullying increased (never bullied, annually or monthly, and weekly or daily, respectively), prevalence of current anxiety (12.8%, 25.9%, and 40.1%) and depression (4.7%, 9.3%, and 18.0%) increased ($p < 0.01$; Fig. 2). Distributions did not significantly change after excluding children with Down syndrome and other genetic or inherited conditions (Supplementary Figure S2) or data from 2020 (Supplementary Figure S3).

Discussion

Using a population-based nationally representative sample of United States children, we found that over half of children with heart conditions were bullied in the past 12 months, over 1 in 10 were bullied weekly or daily, and that percentage rose to nearly 1 in 5 among children with heart conditions and functional limitations, Down syndrome, other genetic conditions, and who were ever overweight. Among children with heart conditions, being bullied weekly or daily was up to 4.8 times more prevalent among 9–11-year-olds and children with a functional limitation. Many of these associations strengthened after excluding children with Down syndrome or other genetic or inherited conditions. In addition, children with heart conditions who were bullied more commonly had anxiety or depression than those who were not bullied, and as frequency of bullying increased, the likelihood of experiencing anxiety or depression increased.

These findings contribute to a small body of literature (based on one prior National Survey of Children's Health study and international studies of ≤ 500 children) suggesting that children and adolescents with CHDs are more often bullied than their peers without CHD,[14–16] though one study found no difference.[17] We were further able to describe and compare the frequency of being bullied, potential risk factors for being bullied, and possible

https://doi.org/10.1017/S1047951123004225 Published online by Cambridge University Press

Table 2. Associations between demographic characteristics and frequency of being bullied among children with heart conditions, aged 6–17 years, National Survey of Children's Health, United States, 2018–2020.

	Bullied in the past 12 months							
	Never		Annually or monthly			Weekly or daily		
	N	Weighted % (95% CI)	N	Weighted % (95% CI)	aPR (95% CI)	N	Weighted % (95% CI)	aPR (95% CI)
Total	778	43.7 (39.3, 48.2)	876	45.1 (40.7, 49.5)		189	11.2(8.6, 14.6)	
Sex								
Male	440	45.1(39.5, 50.9)	461	45.6(39.8, 51.6)	1.0(0.8, 1.2)	105	9.2(6.9, 12.2)	0.7(0.5, 1.1)
Female	338	42.1(35.4, 49.2)	415	44.4(38.1, 50.9)	REF	84	13.5(8.8, 20.1)	REF
Age group (years)								
6–8	147	43.8(33.4, 54.7)	185	45.9(36.0, 56.1)	1.3(1.0, 1.7)	36	10.3(5.4, 18.8)	1.9(1.0, 3.5)
9–11	121	31.2(23.3, 40.3)	226	51.1(41.8, 60.4)	1.5(1.2, 2.0)	49	17.7(11.5, 26.4)	3.4(2.0, 5.7)
12–14	190	41.4(34.2, 49.1)	234	47.4(39.8, 55.0)	1.3(1.0, 1.7)	43	11.2(6.2, 19.4)	2.0(1.0, 3.7)
15–17	320	57.1(49.6, 64.4)	231	36.7(29.6, 44.4)	REF	61	6.2(4.1, 9.2)	REF
Race and ethnicity[1]								
Black, non-Hispanic	61	58.0(44.9, 70.0)	48	36.0(24.5, 49.4)	0.7(0.5, 1.0)	8	6.1(2.5, 13.8)	0.5(0.2, 1.1)
Hispanic	101	49.2(35.8, 62.8)	79	38.9(27.0, 52.3)	0.8(0.6, 1.2)	15	11.8(5.4, 24.0)	0.9(0.5, 1.8)
Other, non-Hispanic[2]	85	35.8(26.1, 46.8)	98	50.0(38.7, 61.2)	1.1(0.8, 1.3)	22	14.3(7.4, 25.8)	1.2(0.6, 2.3)
White, non-Hispanic	531	40.0(35.4, 44.8)	651	48.3(43.4, 53.2)	REF	144	11.7(8.5, 15.8)	REF
Caregiver marital status								
Never married	41	34.0(21.3, 49.5)	59	43.4(28.7 59.4)	1.1(0.9, 1.5)	14	22.5(8.9, 46.5)	2.0(1.0, 4.0)
Divorced, separated, widowed	117	44.3(33.6, 55.6)	151	45.4(34.2, 57.2)	1.0(0.8, 1.3)	37	10.3(6.5, 15.9)	1.0(0.6, 1.8)
Married, not married living with a partner	620	44.6(39.6, 49.7)	666	45.1(40.3, 50.1)	REF	138	10.3(7.5, 13.9)	REF
Caregiver educational attainment								
High school or less	139	50.9(39.7, 62.0)	114	35.8(26.5, 46.3)	0.8(0.6, 1.1)	29	13.2(7.2, 23.0)	0.9(0.5, 1.7)
More than high school	639	41.6(37.2, 46.3)	762	47.7(43.0, 52.4)	REF	160	10.7(7.9, 14.3)	REF
Poverty status (% FPL)[3]								
<100	105	51.3(38.7, 63.6)	104	34.3(24.3, 45.8)	0.8(0.6, 1.1)	39	14.5(7.5, 26.1)	1.3(0.6, 2.9)
100–199	143	47.5(38.4, 56.8)	148	38.4(30.2, 47.3)	0.8(0.7, 1.1)	38	14.1(8.0, 23.8)	1.4(0.8, 2.7)
200–399	243	39.1(32.0, 46.7)	293	50.5(42.5, 58.5)	1.1(0.9, 1.3)	54	10.4(6.4, 16.4)	1.4(0.8, 2.5)
≥400	287	40.9(34.5, 47.7)	331	51.0(44.4, 57.5)	REF	58	8.1(5.3, 12.0)	REF
Intellectual disability								
Yes	46	40.0(26.7, 55.0)	65	47.2(32.3, 62.7)	1.1(0.7, 1.5)	30	12.8(6.8, 22.9)	1.1(0.5, 2.2)
No	732	44.0(39.4, 48.7)	811	44.9(40.4, 49.5)	REF	159	11.1(8.3, 14.7)	REF

(*Continued*)

Table 2. (*Continued*)

	Bullied in the past 12 months							
	Never		Annually or monthly			Weekly or daily		
	N	Weighted % (95% CI)	N	Weighted % (95% CI)	aPR (95% CI)	N	Weighted % (95% CI)	aPR (95% CI)
Down syndrome								
Yes	33	38.3(23.4, 55.9)	30	42.8(26.1, 61.3)	1.0(0.7, 1.5)	11	18.9(8.0, 38.5)	1.8(0.8, 3.9)
No	745	43.9(39.4, 48.5)	846	45.1(40.7, 49.6)	REF	178	11.0(8.3, 14.4)	REF
Other genetic or inherited condition								
Yes	102	33.9(25.4, 43.5)	150	48.4(38.3, 58.5)	1.2(0.9, 1.4)	59	17.8(10.2, 29.1)	1.7(1.0, 3.0)
No	676	45.4(40.6, 50.3)	726	44.5(39.7, 49.3)	REF	130	10.1(7.4, 13.6)	REF
Ever told overweight								
Yes	87	38.6(29.4, 48.7)	128	43.7(34.3, 53.5)	1.1(0.9, 1.3)	40	17.7(10.5, 28.4)	1.7(1.0, 2.8)
No	691	44.6(39.8, 49.5)	748	45.3(40.5, 50.2)	REF	149	10.1(7.4, 13.7)	REF
Functional limitation[4]								
≥1	305	32.9(27.9, 38.4)	469	49.0(43.2, 54.8)	1.4(1.2, 1.7)	150	18.1(13.5, 23.8)	4.8(2.7, 8.5)
None	473	54.5(47.9, 60.9)	407	41.1(34.9, 47.7)	REF	39	4.4(2.4, 7.9)	REF

[1]CI = confidence interval; aPR = adjusted prevalence ratio of being bullied annually or monthly versus never and being bullied weekly or daily versus never. Adjusted for sex, age group, race and ethnicity, ever told overweight; FPL = federal poverty level. Non-Hispanic Black or African American alone; Hispanic; non-Hispanic other, including Asian, Alaskan Native, American Indian, Native Hawaiian, Pacific Islander, or mixed race; non-Hispanic White alone.
[2]Other includes respondents identified as Asian, Alaskan Native, American Indian, Native Hawaiian, Pacific Islander, or mixed race.
[3]Based on United States of America Department of Health and Human Services poverty guideline.
[4]Adapted from National Survey of Children's Health 12 functional difficulties indicator. Functional limitations are defined as having one or more of the following: serious difficulty concentrating, remembering, or making decisions because of a physical, mental, or emotional condition; serious difficulty walking or climbing stairs; difficulty dressing or bathing; difficulty doing errands alone, such as visiting a doctor's office or shopping; deafness or problems with hearing; blindness or problems with seeing, even when wearing glasses.

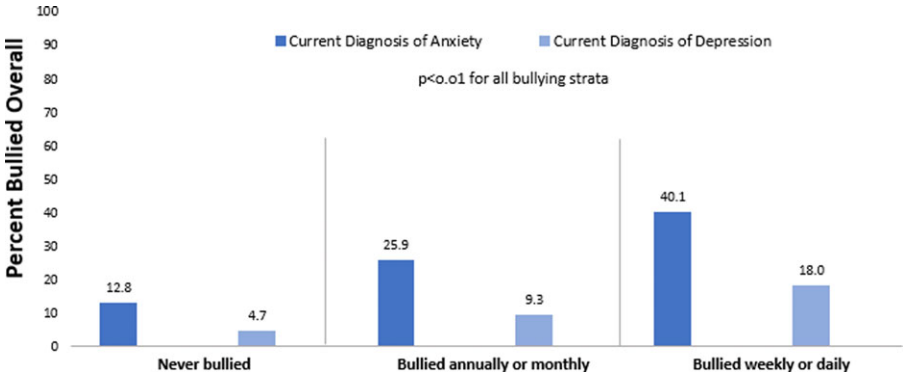

Figure 2. Having a current diagnosis of anxiety or depression among children with heart conditions aged 6–17 years, by bullying status, National Survey of Children's Health, United States, 2018–2020.

psychological outcomes of being bullied which, to our knowledge, have not yet been reported for children with heart conditions.

In this study, among children with heart conditions we found that functional limitations, including both physical and cognitive difficulties, were associated with being bullied. Similarly, one 2018 study of adults with Fontan physiology found that having physical restrictions during childhood correlated with being bullied.[15] Less information has been published on the association between cognitive limitations and being bullied among children with CHD; however, children with CHD are at increased risk of cognitive limitations,[2,3] and previous research has documented that cognitive limitations increase the risk of being bullied in the general population.[19,20]

Several existing studies report increased bullying among children with chronic illnesses. International cross-sectional studies from 2005 and 2010 reported that children with chronic conditions were 1.3–2.3 times more likely to be bullied compared to children without chronic conditions.[21–23] In a 2005–2006 cross-sectional analysis of over 55,000 children and adolescents from 11 participating countries, 13.5% of children with chronic conditions reported being bullied at least two or three times per month.[24] Additionally, in a cross-sectional analysis of over 12,000 adolescents with chronic conditions in Europe, younger children were more likely to report being bullied than older children,[23] similar to our findings. Previous studies also report instances of bullying among children with physical disabilities and chronic illnesses. In a systematic review and meta-analysis, Pinquart and colleagues found that children and adolescents with a chronic physical illness or disability were 1.7 times more likely to be bullied compared to those without.[25] Furthermore, those with a chronic physical illness or disability were 5.3 times more likely to experience illness-specific teasing compared to their peers.[25] In our analysis, children with heart conditions and at least one functional limitation were 1.4 and 4.8 times more likely to be bullied annually or monthly and weekly or daily.

Despite evidence of psychiatric disorders among children with heart conditions,[26,27] less information exists on how psychological problems may relate to bullying among children with heart conditions. Among children with heart conditions, this study found that children who were bullied more often had anxiety or depression, and prevalence of these conditions increased with more frequent bullying. Given that children with CHDs with psychological disorders can have difficulty adapting to school and social environments,[28] identifying and modifying potential risk factors, such as bullying, may improve the child's ability to thrive academically and socially, in addition to their mental health. Similar to this study, among children with heart conditions, being bullied has been associated with psychological problems in children with chronic pain and illnesses.[21,22,29] For example, Pittet et al. found that bullied adolescents with chronic conditions were 1.6 times more likely to be depressed than adolescents with chronic conditions who were not bullied.[22]

Children with heart conditions often experience frequent hospitalisations and require routine care, which might limit opportunities to attend school and interact with peers.[28,30] Evidence suggests children with limited social interaction may be more likely to be bullied than children who frequently interact with peers.[23] Therefore, instances of bullying among children with heart conditions may result, in part, from social isolation experienced due to their chronic illness.

To improve psychosocial health of children with heart conditions, the American Heart Association (AHA) recommends that mental health professionals be integrated within paediatric cardiac clinics to address young patients' psychological needs.[28] AHA also encourages paediatric CHD clinicians to collaborate and coordinate efforts with teachers and school counsellors to optimise educational, psychological, and social outcomes of school-aged patients.[28] Schools can create a safe and supportive environment by encouraging inclusion and respect for all students.[31] Healthy People 2030 objectives to promote health within schools include implementing bullying prevention techniques into school policies and curriculum, offering mental health services, and providing case management for students with chronic conditions.[32] For a review of school anti-bullying interventions, please see Fraguas et al. 2020.[33]

To our knowledge, this analysis is one of the first to evaluate the frequency of being bullied and predictors specific to children with heart conditions. Using a large, population-based sample across multiple survey years, we were able to determine the prevalence and frequency of being bullied among children with heart conditions compared to those without. However, our analysis relied on caregiver-reported information that has not been validated. We were unable to determine the onset of depression and anxiety, so it is unclear whether these conditions potentially result from bullying, increase the risk of being bullied, or both. We were also unable to clinically confirm whether a child ever had a heart condition, nor were we able to clinically confirm our additional health-related covariates. Furthermore, information on the type of heart condition was not available; however, using data from 2020, over 90% of children were born with the heart condition, indicating most heart conditions were congenital. Approximately, 3.2% of children with heart conditions were excluded for missing data, but these children were no more likely to be bullied than children included in the analysis.

https://doi.org/10.1017/S1047951123004225 Published online by Cambridge University Press

Based on 2018-2020 data, over half of United States children with caregiver-reported heart conditions were bullied in the past 12 months and over 1 in 10 were bullied weekly or daily. Among children with heart conditions, bullying was more prevalent among younger children, children who were ever overweight, children with other genetic or inherited conditions, and children with functional limitations. Children with heart conditions who were bullied more commonly had anxiety or depression. These findings highlight opportunities for paediatric cardiologists, families, and schools to work together to improve the psychosocial health of children with heart conditions.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1047951123004225.

Acknowledgements. This analysis was replicated by Amanda Dorsey and Karrie Downing.

Financial support. This project was supported in part by an appointment to the Research Participation Program at the Centers for Disease Control and Prevention, administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the United States Department of Energy and Centers for Disease Control and Prevention.

Competing interests. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

References

1. Chen M-Y, Riehle-Colarusso T, Yeung LF, Smith C, Farr SL. Children with heart conditions and their special health care needs — United States, 2016. MMWR Morb Mortal Wkly Rep 2018; 67: 1045–1049. DOI: 10.15585/mmwr.mm6738a1.
2. Razzaghi H, Oster M, Reefhuis J. Long-term outcomes in children with congenital heart disease: national health interview survey. J Pediatr 2015; 166: 119–124. DOI: 10.1016/j.jpeds.2014.09.006.
3. Farr SL, Downing KF, Riehle-Colarusso T, Abarbanell G. Functional limitations and educational needs among children and adolescents with heart disease. Congenit Heart Dis 2018; 13: 633–639. DOI: 10.1111/chd.12621.
4. Howie LD, Lukacs SL, Pastor PN, Reuben CA, Mendola P. Participation in activities outside of school hours in relation to problem behavior and social skills in middle childhood. J Sch Health 2010; 80: 119–125. DOI: 10.1111/j.1746-1561.2009.00475.x.
5. Riese A, Gjelsvik A, Ranney ML. Extracurricular activities and bullying perpetration: results from a nationally representative sample. J Sch Health 2015; 85: 544–551. DOI: 10.1111/josh.12282.
6. Gladden RM, Vivolo-Kantor AM, Hamburger ME, Lumpkin CD. Bullying Surveillance Among Youths : Uniform Definitions for Public Health and Recommended Data Elements, Version 1.0. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention and U.S. Department of Education, Atlanta, GA, 2014.
7. Lebrun-Harris LA, Sherman LJ, Limber SP, et al. National survey of children's health. J Child Fam Stud 2019; 28: 2543–2557. DOI: 10.1007/s10826-018-1170-9.
8. Lebrun-Harris LA, Sherman LJ, Miller B. State-level prevalence of bullying victimization among children and adolescents, national survey of children's health, 2016-2017. Public Health Rep 2020; 135: 303–309. DOI: 10.1177/0033354920912713.
9. Hansson E, Garmy P, Vilhjálmsson R, Kristjánsdóttir G. Bullying, health complaints, and self-rated health among school-aged children and adolescents. J Int Med Res 2020; 48: 0300060519895355. DOI: 10.1177/0300060519895355.
10. Haraldstad K, Kvarme LG, Christophersen KA, Helseth S. Associations between self-efficacy, bullying and health-related quality of life in a school sample of adolescents: a cross-sectional study. BMC Public Health 2019; 19: 757. DOI: 10.1186/s12889-019-7115-4.
11. Ngo AT, Nguyen LH, Dang AK, et al. Bullying experience in urban adolescents: prevalence and correlations with health-related quality of life and psychological issues. PLOS ONE 2021; 16: e0252459. DOI: 10.1371/journal.pone.0252459.
12. Vrijen C, Wiertsema M, Ackermans MA, van der Ploeg R, Kretschmer T. Childhood and adolescent bullying perpetration and later substance use: a meta-analysis. Pediatrics 2021; 147: e2020034751. DOI: 10.1542/peds.2020-034751.
13. Ttofi MM, Farrington DP, Lösel F, Crago RV, Theodorakis N. School bullying and drug use later in life: a meta-analytic investigation. Sch Psychol Q 2016; 31: 8–27. DOI: 10.1037/spq0000120.
14. Jackson DB, Vaughn MG, Kremer KP. Bully victimization and child and adolescent health: new evidence from the 2016 NSCH. Ann Epidemiol 2019; 29: 60–66. DOI: 10.1016/j.annepidem.2018.09.004.
15. Wolff D, van de Wiel HBM, de Muinck Keizer ME, et al. Quality of life and sexual well-being in patients with a fontan circulation: an explorative pilot study with a mixed method design. Congenit Heart Dis 2018; 13: 319–326. DOI: 10.1111/chd.12576.
16. Im YM, Lee S, Yun TJ, Choi JY. School-related adjustment in children and adolescents with CHD. Cardiol Young 2017; 27: 1349–1355. DOI: 10.1017/S1047951117000324.
17. Amedro P, Dorka R, Moniotte S, et al. Quality of life of children with congenital heart diseases: a multicenter controlled cross-sectional study. Pediatr Cardiol 2015; 36: 1588–1601. DOI: 10.1007/s00246-015-1201-x.
18. U.S. Census Bureau. 2019 National Survey of Children's Health Guide to Multiply Imputed Data Analysis. U.S. Department of Commerce, 2020. Retrieved from https://www2.census.gov/programs-surveys/nsch/technical-documentation/methodology/NSCH-Analysis-with-Imputed-Data-Guide.pdf
19. Brendli KR, Broda MD, Brown R. Children with intellectual disability and victimization: a logistic regression analysis. Child Maltreat 2022; 27: 320–324. DOI: 10.1177/1077559521994177.
20. Iyanda AE. Bullying victimization of children with mental, emotional, and developmental or behavioral (MEDB) disorders in the United States. J Child Adolesc Trauma 2022; 15: 221–233. DOI: 10.1007/s40653-021-00368-8.
21. Nordhagen R, Nielsen A, Stigum H, Köhler L. Parental reported bullying among nordic children: a population-based study. Child Care Health Dev 2005; 31: 693–701. DOI: 10.1111/j.1365-2214.2005.00559.x.
22. Pittet I, Berchtold A, Akre C, Michaud PA, Suris JC. Are adolescents with chronic conditions particularly at risk for bullying? Arch Dis Child 2010; 95: 711–716. DOI: 10.1136/adc.2008.146571.
23. Sentenac M, Gavin A, Arnaud C, Molcho M, Godeau E, Nic Gabhainn S. Victims of bullying among students with a disability or chronic illness and their peers: a cross-national study between Ireland and France. J Adolesc Health 2011; 48: 461–466. DOI: 10.1016/j.jadohealth.2010.07.031.
24. Sentenac M, Gavin A, Gabhainn SN, et al. Peer victimization and subjective health among students reporting disability or chronic illness in 11 Western countries. Eur J Public Health 2013; 23: 421–426. DOI: 10.1093/eurpub/cks073.
25. Pinquart M. Systematic review: bullying involvement of children with and without chronic physical illness and/or physical/Sensory disability-a meta-analytic comparison with healthy/Nondisabled peers. J Pediatr Psychol 2017; 1: 245–259. DOI: 10.1093/jpepsy/jsw081.
26. Abda A, Bolduc ME, Tsimicalis A, Rennick J, Vatcher D, Brossard-Racine M. Psychosocial outcomes of children and adolescents with severe congenital heart defect: a systematic review and meta-analysis. J Pediatr Psychol 2019; 44: 463–477. DOI: 10.1093/jpepsy/jsy085.
27. DeMaso DR, Calderon J, Taylor GA, et al. Psychiatric disorders in adolescents with single ventricle congenital heart disease. Pediatrics 2017; 139: 10.1542/peds.2016–2241.
28. Kovacs AH, Brouillette J, Ibeziako P, et al. Psychological outcomes and interventions for individuals with congenital heart disease: a scientific statement from the American heart association. Circ Cardiovasc Qual Outcomes 2022; 15: e000110. DOI: 10.1161/HCQ.0000000000000110.

29. Fales JL, Rice S, Aaron RV, Palermo TM. Traditional and cyber-victimization among adolescents with and without chronic pain. Health Psychol 2018; 37: 291–300. DOI: 10.1037/hea0000569.
30. Coelho R, Teixeira F, Silva AM, et al. Psychosocial adjustment, psychiatric morbidity and quality of life in adolescents and young adults with congenital heart disease. Rev Port Cardiol 2013; 32: 657–664. DOI: 10.1016/j.repce.2013.10.011.
31. U.S. Department of Health and Human Services. Build a Safe Environment. U.S Department of Health and Human Services, Washington, DC, 2017. Retrieved from https://www.stopbullying.gov/prevention/build-safe-environment.
32. U.S. Department of Health and Human Services. Healthy People 2030: Schools. Office of Disease Prevention and Health Promotion, Rockville, MD, 2021. Retrieved from https://health.gov/healthypeople/objectives-and-data/browse-objectives/schools.
33. Fraguas D, Díaz-Caneja CM, Ayora M, et al. Assessment of school anti-bullying interventions: a meta-analysis of randomized clinical trials. JAMA Pediatrics 2021; 175: 44–55. DOI: 10.1001/jamapediatrics.2020.3541.

https://doi.org/10.1017/S1047951123004225 Published online by Cambridge University Press