

# Lifetime Prevalence of Learning Disability Among US Children

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## ABSTRACT

**OBJECTIVE.** Our goal was to examine the lifetime prevalence of learning disability by sociodemographic and family-functioning characteristics in US children, with particular attention paid to the children with special health care needs.

**METHODS.** By using data from the National Survey of Children's Health, we calculated lifetime prevalence of learning disability using a question that asked whether a doctor or other health care or school professional ever told the survey respondent that the child had a learning disability. Children with and those without special health care needs were classified on the basis of how many of 5 definitional criteria for children with special health care needs they met (0–5). Bivariate and multivariate statistical methods were used to assess independent associations of selected sociodemographic and family variables with learning disability.

**RESULTS.** The lifetime prevalence of learning disability in US children is 9.7%. Although prevalence of learning disability is lower among average developing children (5.4%), it still affected 2.7 million children compared with 3.3 million (27.8%) children with special health care needs. As the number of definitional criteria children with special health care needs met increased from 1 to 5, so did the prevalence of learning disability (15.0%, 27.1%, 41.6%, 69.3%, and 87.8%, respectively). In the adjusted logistic regression model, in addition to the number of definitional criteria the children met, variables associated with the increased odd ratios of learning disability were lower education, all categories of poverty <300% of the federal poverty level, being male, increasing age, having a 2-parent step-family or other family structure, being adopted, presence of a smoker, respondent's higher responses on aggravation in parenting scale, sharing ideas with the child less than very well, and never, rarely, or sometimes discussing serious disagreements calmly.

**CONCLUSIONS.** Although more than half of lifetime prevalence of learning disability occurred in children with special health care needs, it is a significant morbidity in average-developing children as well. Learning disabilities represent important comorbidities among children with special health care needs.

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### Key Words

learning disability, national estimates, prevalence, children with special health care needs, family functioning

### Abbreviations

LD—learning disability  
MCHB—Maternal and Child Health Bureau  
CSHCN—children with special health care needs  
SHCN—special health care need  
NSCH—National Survey of Children's Health  
FPL—federal poverty level  
DHHS—Department of Health and Human Services  
OR—odds ratio  
CI—confidence interval  
NHIS—National Health Interview Survey

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**L**EARNING DISABILITY (LD) is a term used to describe a constellation of disorders manifested by significant difficulties in listening, speaking, reading (either reading skill or reading comprehension), writing, reasoning, mathematics (either in mathematical calculation or mathematical reasoning), foreign languages, coordination, spatial adaptation, memorization, and social studies.<sup>1-3</sup> These difficulties can occur alone or in varying combinations and can range from mild to severe difficulties.<sup>4</sup> Although LD cannot be cured, the underlying conditions can be treated and managed so that children with LD adapt, achieve academic success, and live productive, fulfilling lives.<sup>4</sup>

The Maternal and Child Health Bureau (MCHB) defines children with special health care needs (CSHCN) as those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.<sup>5</sup> In light of this definition, all children with LD could be classified as CSHCN. However, given the complexity of difficulties involved in LD and measurement issues involved in screening for CSHCN, it is possible that many children with LD are not identified as CSHCN.

Family functioning is a critical component of children's well-being and development. Although only a handful of studies examined it, several studies noted poorer family functioning in families with children with LD.<sup>6-8</sup> Our aim was to address paucity of epidemiologic studies of LD and associated sociodemographic and family characteristics.

The objective of this study was to produce estimates of LD from a large-scale, nationally representative survey and be first to examine the association between lifetime prevalence of LD by sociodemographic and family-functioning characteristics in US children <18 years old in 2003, with particular attention paid to the child's special health care need (SHCN) status.

## METHODS

### Data Source

Data for this study were derived from the 2003 National Survey of Children's Health (NSCH). More details about the survey are provided by Kogan and Newacheck<sup>9</sup> in this issue; more in-depth information can be found elsewhere.<sup>10</sup> All children were included in this study.

### Study Variables

Lifetime prevalence of LDs was measured by a question that asked: "Has a doctor, health professional, teacher or school official ever told you [child] has a learning disability?" Answers were available for children aged 3 to 17.

The CSHCN Screener<sup>11</sup> was incorporated in the NSCH.<sup>10</sup> We used those screening questions to compute

our CSHCN variables. These screening questions were developed by using the MCHB definition of CSHCN as the underlying conceptual framework.<sup>5,11</sup> Screening questions can be grouped on 5 definitional criteria for CSHCN: prescription medication use, above-average services use, functional limitations, use of mental health services, and use or need for specialized therapies. We constructed 5 variables, 1 for each criterion, if a child met the criterion because of any medical, behavioral, or other health condition lasting or expected to last at least 12 months. Furthermore, because many CSHCN children meet >1 definitional criterion, we created a variable that counts how many of 5 possible criteria a child met. We also computed a global dichotomous (yes/no) CSHCN variable on the basis of whether a child met at least 1 of the 5 criteria.

Sociodemographic variables included were child's gender, highest education attained by anyone in the household (less than high school, high school, more than high school), poverty expressed as percentage of federal poverty level (FPL) based on Department of Health and Human Services (DHHS) guidelines (FPL: \$18 400 for a family of 4 in 2003), employment (yes/no) was coded "yes" if anyone in the household was employed at least 50 of the past 52 weeks, primary language spoken (English or Spanish), Latino ethnicity (yes/no), race (white, black, mixed, or other). Family structure was categorized into 4 groups: 2-parent (other than step) family, 2-parent stepfamily, single mother (no father present), and other. Children were considered adopted if they lived in a household with an adoptive but no biological parent. Presence of a smoker in the household was coded as "yes" if anyone in the household used cigarettes, cigars, or pipe tobacco.

Relationship with the child was measured with a question that asked, "Is your relationship with child very close, somewhat close, not very close or not close at all?" Sharing ideas with the child was measured with a question that asked, "How well can you and [child] share ideas or talk about things that really matter?", with answer options very well, somewhat well, not very well, and not very well at all. Ate meals together in the past week was measured with a question that asked "During the past week on how many days did all family members who live in the household eat a meal together?" Answers were categorized into 3 groups: every day (7 days), frequently (3-6 days), and never and rarely (0-2 days).

Aggravation in parenting was measured with the Aggravation in Parenting Scale, which was derived from the Parental Stress Index<sup>12</sup> and the Parental Attitudes about Childrearing scale.<sup>10,13</sup> It consists of 4 questions that asked respondents how often during the past month they felt child was harder to care for than most children their age, they felt child did things that really bothered them a lot, they felt they were giving up more of their life to meet child's needs, and they felt angry with child,

with answers recorded on 4-point Likert scale (never, sometimes, usually, and always) and had standardized item  $\alpha = .63$ . A scale average was computed where higher scores indicated higher aggravation. Several questions were available on ways families deal with serious disagreements, with answers recorded on a 5-point Likert scale (never to always). The questions had the same stem "When you have a serious disagreement with your household members, how often do you" and asked about following: just keep your opinions to yourself; argue heatedly or shout; or end up hitting or throwing things. These 3 variables were dichotomized so that the sometimes, usually, and always group was compared with the never and rarely group. Discussing serious disagreements calmly variable, based on the question "When you have a serious disagreement with your household members, how often do you discuss your disagreements calmly?" was dichotomized so that the never, rarely, and sometimes group was compared with the usually and always group. The above categorizations were performed because the prevalence of LD was similar among these answers.

### Data Analysis

Bivariate analyses were used to compare demographic and family characteristics of children with and without LD. Logistic regression was used to calculate crude and adjusted odd ratios (ORs) and 95% confidence intervals (CIs) for LD. Differences were considered significant at the .05 level (2-tailed test). All variables significantly associated with LD at the bivariate level were entered into multivariate logistic regression, and those not significant were removed to obtain the most parsimonious model. Data analyses were done by SAS-callable SUDAAN, which allowed us to account for the complex survey design and calculate accurate variance statistics.<sup>14</sup> Survey weights provided by the data-collection agency were used to produce valid national population estimates.<sup>10</sup>

### Human Subjects

Because data used in analyses are publicly available and contain no personal identifying information, this study qualified for and received exempt review from the institutional review board at the University of Alabama at Birmingham.

## RESULTS

### Lifetime Prevalence of LD

Overall lifetime prevalence of LD in US children in 2003 was 9.7% (95% CI: 9.4–10.1), meaning that an estimated 6 million US children age <18 years ever had LD. Lifetime prevalence of LD increased with age from just >2% in children age 3 and 4, to 3.8% in children age 5, to 5.9% in children age 6, to 8.4% in children age 7, to

8.9% in children age 8, to 10.3% in children age 9 and leveling off at the 12% to 14% range in children age 10 to 17 years. Demographic characteristics are presented in Table 1, in the first column as a percentage of the total study sample, and next as a percentage of children with LD. Lifetime prevalence of LD was significantly higher in boys, those speaking English as a primary language, living in a household with lower education, living in poverty, and living in a household where nobody was employed at least 50 of the past 52 weeks. Prevalence of LD was about the same among white, black, and mixed race children but was significantly lower among children of other races. Latino ethnicity was not related to LD.

### Lifetime Prevalence of LD by SHCN Status

CSHCN represented 17.6% (95% CI: 17.2–18.0) of US children in 2003. Lifetime prevalence of LD in CSHCN was 27.8% (95% CI: 26.6–29.0) compared with 5.4% (95% CI: 5.1–5.7) in non-CSHCN. However, the prevalence varied by the type of definitional criteria for CSHCN a child met, with the lowest prevalence in CSHCN with prescription medication use (23.9%; 95% CI: 22.7–25.2), followed by CSHCN with above-average services use (43.4%; 95% CI: 41.4–45.4), functional limitations (49.8%; 95% CI: 46.8–52.7), use of mental health services (51.7%; 95% CI: 49.2–54.2), and use or need for specialized therapies (63.8%; 95% CI: 60.6–66.9). These categories are not mutually exclusive; quite the contrary, nearly half of CSHCN (45.6%) met  $\geq 2$  definitional criteria. The prevalence of LD increased dramatically as the number of criteria met increased, from 15.0% in CSHCN who met only 1 criterion to 86.8% in CSHCN who met all 5 criteria (Fig 1).

### Lifetime Prevalence of LD by Family Characteristics

Family characteristics are also presented in Table 1. Children from 2-parent families (other than stepfamilies) had lower lifetime prevalence of LD (7.5%) than children with different family structures (11.8%–14.0%). Significantly more adopted children had LD than non-adopted children (20.4% vs 9.3%, respectively). Lifetime prevalence of LD was statistically significantly higher if there was a smoker in a household, if the relationship with a child was not very close, if they did not share ideas very well, if they ate meals together rarely or never in the past week, if they seldom discussed serious disagreements calmly, and if in dealing with serious disagreements they argued heatedly or shouted and ended up hitting or throwing things sometimes to always. Mean aggravation in parenting score was 1.64 (95% CI: 1.64–1.65) in the total sample, and among children with lifetime LD it was statistically significantly higher than in those without (1.88, 95% CI: 1.85–1.90 vs 1.62, 95% CI: 1.61–1.63), indicating that families of children with LD experience higher aggravation in parenting.

**TABLE 1 Sociodemographic and Family Characteristics of US Children Aged < 18 Years in 2003, According to Lifetime LD Prevalence**

Variables	Total			With LD		SE	$\chi^2$	df	P
	%	95% CI	SE	%	95% CI				
Gender									
Male	51.1	50.6–51.7	0.28	12.2	11.7–12.8	0.28			
Female	48.9	48.3–49.4	0.28	7.1	6.7–7.6	0.23	202.6	1	<.001
Primary language									
English	87.3	86.9–87.7	0.22	10.0	9.6–10.4	0.19			
Spanish	12.7	12.3–13.2	0.22	8.0	6.9–9.2	0.58	10.7	1	.001
Ethnicity									
Latino	17.5	17.1–18.0	0.23	9.7	9.4–10.1	0.53			
Not Latino	82.5	82.0–82.9	0.23	9.8	8.9–10.9	0.19	0.05	1	NS
Race									
White	74.7	74.1–75.2	0.28	9.8	9.4–10.2	0.20			
Black	16.5	16.0–16.9	0.23	11.1	10.0–12.3	0.58			
Multiple race	3.7	3.5–3.9	0.10	10.8	9.0–12.9	1.00			
Other race	5.2	4.9–5.6	0.18	5.8	4.7–7.2	0.63	38.9	3	<.001
Highest education in the household									
Less than high school	7.9	7.5–8.2	0.19	13.4	11.7–15.2	0.90			
High school	26.5	26.0–27.0	0.26	12.3	11.5–13.2	0.41			
More than high school	65.7	65.2–66.2	0.28	8.3	7.9–8.7	0.19	100.9	2	<.001
Poverty <sup>a</sup>									
<100%	17.9	17.4–18.4	0.26	14.8	13.6–16.1	0.65			
100% to <133%	7.9	7.5–8.2	0.17	12.5	11.0–14.2	0.80			
133% to <150%	4.0	3.8–4.3	0.13	10.3	8.5–12.5	1.03			
150% to <185%	7.3	7.0–7.7	0.16	10.3	9.0–11.9	0.72			
185% to <200%	3.7	3.5–3.9	0.10	11.1	9.3–13.3	1.02			
200% to <300%	17.5	17.1–17.9	0.21	9.5	8.7–10.4	0.42			
300% to <400%	15.1	14.7–15.5	0.20	7.5	6.8–8.2	0.37			
≥400%	26.7	26.2–27.1	0.24	6.9	6.4–7.4	0.27	182.2	7	<.001
Anyone in the household employed at least 50 of the past 52 wk									
Yes	89.8	89.5–90.2	0.19	9.1	8.7–9.5	0.18			
No	10.2	9.8–10.6	0.19	15.5	14.1–17.0	0.74	69.6	1	<.001
Family structure									
2 parents, other than stepfamily	63.5	63.0–64.1	0.28	7.5	7.2–7.9	0.20			
2 parents, stepfamily	8.6	8.3–8.9	0.16	14.0	12.6–15.4	0.70			
Single mother, no father present	23.4	23.0–23.9	0.25	12.4	11.6–13.3	0.44			
Other	4.5	4.2–4.7	0.12	11.8	10.3–13.5	0.82	175.6	3	<.001
Adopted									
Yes	1.7	1.6–1.9	0.06	20.4	17.5–23.5	1.53			
No	98.3	98.1–98.4	0.06	9.3	9.0–9.7	0.18	48.7	1	<.001
Smoker in the household									
Yes	29.5	29.0–30.0	0.26	13.5	12.7–14.2	0.38			
No	70.5	70.0–71.0	0.26	8.9	8.5–9.4	0.22	107.9	1	<.001
Relationship with the child									
Very close	85.7	85.1–86.1	0.24	10.9	10.5–11.4	0.23			
Somewhat close	13.4	13.0–13.9	0.23	14.9	13.6–16.3	0.69			
Not very close	0.7	0.6–0.9	0.07	17.1	11.7–24.2	3.17			
Not at all close	0.2	0.1–0.3	0.03	13.3	7.2–23.3	4.01	33.5	3	<.001
Sharing ideas									
Very well	75.2	74.7–75.8	0.29	9.9	9.4–10.3	0.23			
Somewhat well	22.9	22.3–23.5	0.29	15.2	14.2–16.2	0.51			
Not very well	1.5	1.3–1.7	0.09	30.2	24.5–36.6	3.11			
Not at all well	0.4	0.3–0.4	0.04	43.0	34.1–52.4	4.73	157.3	3	<.001
Ate meals together in the past week									
Rarely or never (0–2 d)	15.2	14.8–15.6	0.20	10.8	10.0–11.8	0.46			
Frequently (3–6 d)	37.5	37.0–38.1	0.26	9.4	8.9–10.0	0.27			
Every day (7 d)	47.2	46.7–47.8	0.28	9.6	9.1–10.2	0.28	7.3	2	<.05
When you have a serious disagreement, how often do you:									
Discuss your disagreements calmly									
Never, rarely, or sometimes	29.3	28.8–29.8	0.27	11.9	11.2–12.7	0.38			
Usually or always	70.7	70.2–71.2	0.27	8.8	8.4–9.2	0.20	53.3	1	<.001

**TABLE 1 Continued**

Variables	Total			With LD		SE	$\chi^2$	df	P
	%	95% CI	SE	%	95% CI				
Keep your opinion to yourself									
Sometimes, usually, or always	42.9	42.3–43.5	0.28	10.1	9.6–10.7	0.28			
Never or rarely	57.1	56.5–57.6	0.28	9.4	9.0–9.9	0.24	3.8	1	.05
Argue heatedly or shout									
Sometimes, usually, or always	38.7	38.2–39.3	0.28	11.2	10.6–11.8	0.30			
Never or rarely	61.3	60.7–61.8	0.28	8.7	8.3–9.2	0.22	41.9	1	<.001
End up hitting or throwing things									
Sometimes, usually, or always	2.9	2.7–3.1	0.11	14.0	11.5–17.0	1.41			
Never or rarely	97.1	96.9–97.3	0.11	9.6	9.2–10.0	0.18	9.7	1	.002

NS indicates not significant.

<sup>a</sup> Percent FPL is based on DHHS guidelines.

**Lifetime Prevalence of LD: Adjusted Multivariate Results**

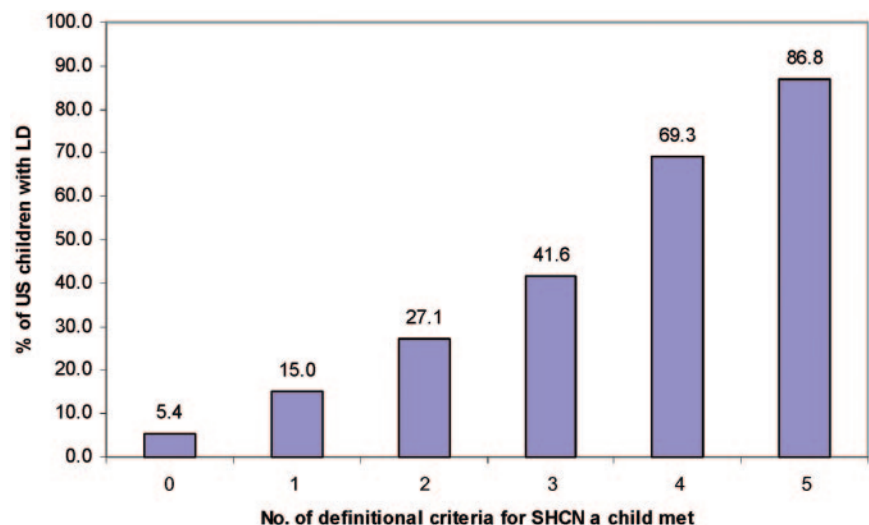
The results of multivariate logistic regression confirmed that number of CSHCN definitional criteria had the strongest association with LD. Both unadjusted and adjusted ORs and 95% CIs are presented in Table 2. In the adjusted logistic regression model, sociodemographic variables associated with the increased odds of lifetime prevalence of LD were increasing age, male gender, lower household education, and all categories of poverty <300% of FPL. Family variables associated with increased odds of lifetime prevalence of LD in the adjusted model were having a 2-parent stepfamily or other family structure, being adopted, presence of a smoker in the home, sharing ideas with the child less than very well, survey respondent’s higher responses on aggravation in parenting scale, and never, rarely, or sometimes discussing serious disagreements calmly.

**DISCUSSION**

Our results indicate that LD is a common chronic condition among US children, affecting ~1 in 10 overall. This is slightly higher than estimate of 8% reported using 2003 National Health Interview Survey (NHIS) data,

where a similar question was used to measure LD.<sup>15</sup> Although more than half of lifetime prevalence of LD occurred in CSHCN, it is a significant morbidity in average-developing children as well, affecting ~1 in 20, which translates into nearly 3 million US children. Among CSHCN, the prevalence of LD increased as the number of definitional criteria for CSHCN a child met increased, from 15.0% for 1 criterion to 86.8% for children who met all 5 criteria. This indicates that LD is an important comorbidity among CSHCN, especially those with multiple needs or using multiple kinds of services. It has been noted that children with LD have other difficulties or mental health disorders.<sup>4,16</sup> Analysis of NHIS data indicated that a greater percentage of children with LD had cognitive, sensory, and other chronic condition compared with children without LD or attention-deficit disorder.<sup>17</sup> However, our study is the first, to our knowledge, to examine and report on a dramatic increase in prevalence of LD in CSHCN with multiple needs or using multiple kinds of services.

In our study we have shown the prevalence of LD rises with child’s increasing age, reaching stable levels during adolescence. Most children get an LD diagnosis



**FIGURE 1**  
Lifetime prevalence of LD in US children aged <18 years in 2003 according to the number of definitional criteria for SHCN that a child met.

**TABLE 2 Multiple Logistic Regression Results for Lifetime Prevalence of LD and Sociodemographic and Family-Functioning Variables**

Variables	Unadjusted		Adjusted <sup>a</sup>	
	OR	95% CI	OR	95% CI
No. of definitional criteria for SHCN a child met (of 5)				
0	1.00		1.00	
1	3.10	2.75–3.49	2.97	2.60–3.40
2	6.54	5.68–7.53	5.64	4.78–6.65
3	12.49	10.68–14.59	9.53	7.86–11.54
4	39.63	31.98–49.11	24.57	18.81–32.10
5	115.45	78.32–170.17	75.00	46.02–122.24
Age	1.11	1.10–1.12	1.08	1.06–1.09
Gender				
Male	1.82	1.67–1.98	1.67	1.51–1.85
Female	1.00		1.00	
Highest education in the household				
Less than high school	1.71	1.45–2.01	1.42	1.13–1.80
High school	1.56	1.42–1.70	1.37	1.21–1.55
More than high school	1.00		1.00	
Poverty <sup>b</sup>				
<100%	2.34	2.06–2.67	1.88	1.55–2.29
100% to <133%	1.93	1.63–2.27	1.52	1.21–1.90
133% to <150%	1.56	1.23–1.96	1.42	1.07–1.89
150% to <185%	1.56	1.31–1.85	1.29	1.02–1.62
185% to <200%	1.69	1.36–2.10	1.37	1.05–1.78
200% to <300%	1.42	1.25–1.61	1.34	1.16–1.54
300% to <400%	1.09	0.95–1.24	1.06	0.91–1.24
≥400%	1.00		1.00	
Family structure				
2 parents, other than stepfamily	1.00		1.00	
2 parents, stepfamily	1.99	1.75–2.26	1.32	1.12–1.56
Single mother, no father present	1.74	1.58–1.92	1.03	0.90–1.17
Other	1.64	1.40–1.94	1.29	1.04–1.61
Adopted				
Yes	2.49	2.06–3.01	1.54	1.17–2.03
No	1.00		1.00	
Anyone in the household smoking				
Yes	1.59	1.46–1.73	1.16	1.04–1.30
No	1.00		1.00	
Sharing ideas				
Very well	1.00		1.00	
Somewhat well	1.63	1.49–1.79	1.18	1.05–1.33
Not very well	3.95	2.95–5.30	1.42	0.92–2.19
Not at all well	6.90	4.71–10.11	1.38	0.89–2.15
Aggravation in parenting	2.58	2.39–2.78	1.32	1.18–1.47
Discuss serious disagreements calmly				
Never, rarely, or sometimes	1.41	1.29–1.54	1.16	1.03–1.29
Usually and always	1.00		1.00	

<sup>a</sup> The adjusted model contained all variables presented.

<sup>b</sup> Percent FPL is based on DHHS guidelines.

during early to mid adolescence; however, LD does not develop during adolescence; they have had it all along. Several authors comment on hidden, invisible, and seemingly benign nature of an LD, even calling it its most socially significant feature.<sup>4,7,18</sup> LDs are difficult to diagnose, and as a group of disorders are poorly understood.<sup>16,18</sup> It was shown that on average there is a 3.5-year gap between the child's age at LD diagnosis and mother's first suspicion of a problem.<sup>18</sup> The treatment of LD focuses on educational interventions, and early interventions are most desirable.<sup>4,16</sup> Therefore, it is important to identify LD as soon as possible.

Consistent with other reports, in our adjusted analyses we found LD to be associated with male gender<sup>15,19,20</sup> and poverty.<sup>15,20</sup> We also found that lower household education was associated with higher odds of LD. NHIS data indicated increased association of LD with lower maternal education.<sup>20</sup> Even after adjusting for CSHCN status, age, gender, household education, and poverty, several family variables were related to increased prevalence of LD, underlying the importance of family factors. In our study, the odds of LD in single-mother, no father-present family was no different from 2-parent family (other than stepfamily); this differs from the NHIS

result where more LD was observed in single-mother families.<sup>17</sup> However, we reported higher prevalence of LD among children living in 2-parent stepfamilies and other family structures (other than 2-parent or single-mother family). It is of a particular note that ~1 in 5 adopted children have a LD, a significantly higher number than in children who are not adopted, and this relationship persists in the adjusted logistic regression model. This is the first study, to our knowledge, to report on prevalence and ORs of LD among adopted children. Furthermore, survey respondents from families with an LD child were more likely to report that they could not share ideas or talk about things that really matter with an LD child very well. Moreover, they were more likely to report higher aggravation in parenting and that they seldom discuss serious disagreements with household members calmly, indicating higher familial strain.

## CONCLUSIONS

This study uses a nationally representative sample of US children, so our results are generalizable to the uninstitutionalized civilian US children. Our main limitation lies in the measurement of our dependent variable, LD. We only have a rather crude measure of lifetime LD, based on answers to the question if a doctor, health professional, teacher, or school official ever told the survey respondent that the child had a LD. We do not have any details about it, such as what specific diagnosis was made, how severe this disability is, what kind of LD-related services or special education a child is receiving, etc. Some of this information might be collected in 2007 NSCH and will allow us to perform more detailed analyses and deepen understanding of LD among US children. Yet, despite this limitation, our results represent a conservative estimate of the true prevalence of LD among US children because it is based on survey respondent's report of LD by an objective third party, an expert, a health or educational professional, and knowing that there is a significant time lag before diagnosis.

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