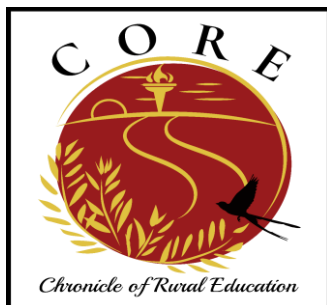




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Retrospective Analysis of Appalachian Children with Disabilities during COVID-19: Learning from Crisis

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Keywords

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Children in rural Appalachia have higher rates of disability, which makes them more vulnerable when crises occur. Using a retrospective review of Appalachian caregiver reports, the study provides a descriptive analysis of how youth with different types of disabilities fared when compared to their nondisabled peers across multiple domains of functioning. Results suggest that youth who had disabilities exhibited more difficulties, although important exceptions exist. Youth with physical disabilities did not demonstrate significantly elevated rates of aggression, hyperarousal, etc., in comparison to non-disabled peers. These findings have significant implications for school-based crisis teams and mental health providers in rural Appalachia—particularly school psychologists—who can play a key role in guiding policymakers and school staff in recognizing risk factors for traumatic stress and implementing appropriate crisis intervention strategies during future emergencies.

Introduction

Although the COVID-19 crisis has passed, its impact continues to reverberate across select groups, particularly among vulnerable populations such as children with disabilities. The pandemic exposed critical gaps in support systems, educational access, and mental health

services, offering an opportunity to reflect on the unique needs of individuals with preexisting conditions when crises occur. As we move forward, it is essential to apply the lessons learned to strengthen preparedness for future public health emergencies. By doing so, we can ensure that children with disabilities are not disproportionately affected in times of crisis and that school psychologists, educators, and policymakers are equipped to respond with resilience and equity. This paper investigates the impact of COVID-19 on Appalachian children with disabilities emotionally, interpersonally, academically and physically.

Children in rural central Appalachia counties are more likely to live in poverty than those living in metro Appalachian counties and children living outside the Appalachian region, as a whole (Srygley et al., 2025). Relative to the national average of 15%, 22% of children in West Virginia, a state entirely situated in central Appalachia, live in poverty (Annie E Casey Foundation, 2026). Statistics further show that children in poverty are more likely to have special needs (U.S. Census Bureau, 2019), with children in Appalachia having a greater risk of disability when compared to the rest of the United States (McDaniel et al., 2019). For example, administrative child count data reveal that West Virginia has the highest percentage of school-age children and adolescents with intellectual disabilities (ID) in the nation (USDE, 2015). A study examining 2017 through 2023 indicated that West Virginia's number of students enrolled in special education expanded to 20% identified with exceptionalities (Workman, 2024). Autism, developmental delays, other health impairments, and specific learning disabilities have seen the sharpest increase in the number of children with individual education plans (Workman, 2024).

Literature Review

Children with Disabilities and Crisis

Crises, including COVID-19, highlight the multiplicative effect of problems for individuals with pre-existing issues. Evidence has shown that COVID-19 had a disproportionate effect on low-income individuals, the elderly, children, and students with disabilities (Gadó et al., 2022; Sharma et al., 2020; Sideropoulos et al., 2022). The impact of COVID-19 on individuals with disabilities was significant with an increase in worries about money, social and physical health, and the shift to online learning, and increased isolation (Patel, 2020; Toquero, 2020). Some students with special needs had intensified isolation due to obstacles interacting with their peers through phones, social media or internet gaming which can be more accessible to students without disabilities (Tso et al., 2023). COVID-19 interrupted access to healthcare, education, and therapy for children with disabilities (Ray & Miller, 2020; Toquero, 2020; Varengue et al. 2021). A review of the literature on the effects of COVID-19 on children with disabilities indicated increased mood disturbances, sleep difficulties, and decreased physical activity for children with physical disabilities (Lebrasseur et al., 2021). Children with pre-existing mental health and physical disabilities were most at risk for mental illnesses due to the increased stress, anxiety, sleeplessness, and isolation during the pandemic (Patel, 2020). Some students with disabilities/health concerns faced accessibility problems with online learning or communication tools, and their stress was increased by environmental changes (Patel, 2020). Students with special needs may not have been able to decipher the moving parts of the pandemic, yet they did understand their needs were not being met (Houtrow, et al., 2020). Even after school reopening, children with special education needs

continued to experience more emotional and behavioral difficulties than their peers (Tso et al., 2023).

Families raising special needs children experience more stress even without a crisis (McConnell & Savage, 2015; McStay et al., 2014). When schools closed due to COVID-19, families were not equipped to teach their children with disabilities even when teachers were available virtually to support them. Additionally, the specialized instruction did not always translate well to online learning (Asbury et al., 2020; Kelly et al., 2023; Nelson, 2020). Teachers and parents were trying to quickly learn how to teach online through a trial-and-error strategy, finding that the strategies they were trying did not always work with children with disabilities (Nelson, 2020). It was also more difficult to deliver some needed interventions online such as physical therapy and speech/language therapy (Alonazi, 2021; Tohidast et al., 2020). Additionally, during COVID-19 many students with difficulties were not evaluated due to limitations in assessment. This resulted in no opportunities for initial evaluations or re-evaluations which assist education professionals in determining needed changes in instruction (Nelson, 2020).

Psychological Triage and Crisis Intervention

Realizing that children's disabilities can impact outcomes for children, it is important to examine how crisis events, such as a pandemic, differentially affect these groups, so appropriate crisis planning can occur. In fact, these variables involve two of the five psychological trauma risk factors the authors of the PREPaRE Model (Brock et al., 2016; Brock, 2025) contend are essential for evaluating risk during and after a crisis event. The five risk factors are: 1) physical proximity to crisis; 2) emotional proximity to crisis; 3) pre-trauma internal vulnerabilities; 4) pre-trauma external vulnerabilities; and 5) threat perceptions. Although the two proximity risk factors are not the primary focus of the present study, they are tantamount in psychological evaluation and triage. Children who are either physically situated in or about the crisis event or have immediate family members or other loved ones who have been injured or deceased due to a crisis event have the highest likelihood of developing post-traumatic stress. Yet, research also shows that a child's circumstances or characteristics *before* the crisis event occurs can also render risk. The pre-trauma vulnerabilities include factors like a child's coping style, trauma history, self-efficacy, and pessimism levels. They also include physical and mental health disabilities, discussed above, as well as developmental level, which can be impaired in children with ID and other developmental disabilities. Lower developmental levels can hinder children's understanding of the event and lead to problems with adaptive coping strategies. The external vulnerabilities include poverty, poor family functioning, parents' mental or physical disabilities, and a lack of other family social supports that can serve as an adversity in recovering from a crisis event. The psychological triage process during and after a crisis event then involves determining which children likely need to be offered instant access to intensive crisis support based on those risk factors and other associated warning signs and which children may be expected to be unharmed by a crisis event or recover from it based upon their own natural support systems and resiliencies (Brock et al., 2016; Brock, 2025).

Although parents, policymakers, and the general public expect crisis support for children, the topic of assisting individuals with mental or physical disabilities is mentioned only briefly in

approximately half of the planning materials provided by states to their local school districts (U.S. Government Accountability Office, 2016). Testimony by the U.S. Government Accountability Office in 2007 revealed that only 28% of the surveyed schools had procedures for students with exceptionalities in their emergency or crisis response plans (U.S. Government Accountability Office, 2007), and that rural districts often lagged behind urban districts in crisis preparedness, in general. The inclusion of students with special needs in crisis planning is limited by (a) vague and inconsistent definitions of special needs, (b) failure to distinguish between preparedness for everyday emergencies and disasters, and (c) minimal research on effective procedures for school crisis preparedness with regards to students with disabilities (Brock et al., 2016). Students with disabilities have a voice that is not always heard in normal times and even less so during a crisis (Toquero, 2020). Thus, when COVID-19 occurred, schools were not ready to intervene appropriately with students with disabilities.

Effective school planning requires several guiding principles and careful consideration to develop well-thought-out plans for students with special needs, which should involve collaboration among all stakeholders (Houtrow et al., 2020). Plans must include a method for distributing necessary information during a crisis (Brock et al., 2016). Crisis response teams can help mitigate the impact of the crisis by ensuring that school-wide procedures are in place for sharing students' medical or disability information with relevant personnel and developing strategies that build on existing accommodation plans and specific services. Personal emergency plans should include a written description of the child's academic, social, and emotional needs (Brock et al., 2016). Efforts should be made to communicate about the crisis with children in ways they can understand. For example, a high school student with an intellectual disability may not understand everything being said and may require specially designed safety instructions (Brock et al., 2016; Patel, 2020). It becomes important to keep children with physical and mental disabilities not only physically safe but also look after their psychological and emotional wellbeing (Patel, 2020). Individualized emergency plans will optimally outline strategies to minimize psychological and emotional risks for youth with disabilities during emergencies or emergency drills, including the assignment of additional personnel, accessible instructions using braille, special hand signals, or picture reminders, and repeated practice with explicit instruction (Nickerson et al., 2026).

Need for Study

The impact of COVID-19 on children with and without disabilities in Appalachia is an area that is not well studied. More research can inform future preparedness for crises in the Appalachian region, and perhaps in other rural, high-poverty areas across the nation. Specifically, this information can support parents and teachers by highlighting students who typically struggle the most, as well as identifying areas of difficulty, providing insight into ways to support them, and helping them better cope with social and emotional symptoms. We need to identify the variables in youth that signal the need for intervention during a crisis and to aid in triage efforts in school-related events where many children are involved. The present study aimed to contribute to our understanding of early warning indicators by examining the risk of cognitive, academic, physical, emotional, and behavioral/interpersonal reactions in Appalachian children and youth aged 2-22 during the pandemic, based on disability status. Specifically, we sought to quantify the differential

rate of caregiver reported symptoms among youth with learning disabilities, mental health disabilities, and/or physical disabilities, as well as nondisabled youth.

Methods

Participants

This secondary, retrospective analysis utilized data from Jennings et al., 2025 from a Qualtrics administered survey sent to parents, custodial grandparents, and guardians, hereinafter referred to as caregivers, via school personnel. Six, three, and two school districts were in West Virginia, southeast Ohio, and eastern Kentucky, respectively. All school districts were located in north-central and central Appalachia, except for one northern Appalachian Ohio school district that bordered West Virginia. Data are reported on 1,363 individuals (84.3% of respondents) who completed all items in the emotional, physical, behavioral, and cognitive symptom question sets. Like the overall Appalachian demographics in these counties, 94.3% of participants identified as white and non-Hispanic. One in every ten participants (9.6%) self-reported a mental health disorder. Two percent (1.9%) did not complete high school; 12.2% earned a high school diploma or equivalent; 32.2% obtained some college or an associate's degree; and 21.7% held a baccalaureate degree. While statistics indicate that 26.7% of Appalachian residents hold a baccalaureate degree (Srygley et al., 2024), 51.6% of respondents in the present study reported earning a minimum of a baccalaureate degree. More participants from the sample similarly held advanced degrees than the overall Appalachian population, as 25.5% of respondents earned Master's / professional degrees and another 4.4% earned doctoral degrees.

Caregivers of children, adolescents, and young adults ages 2-22 who participated were asked to report on every child, up to a maximum of six children, in their nuclear family. The 1,363 caregivers reported on 2,639 individual children aged 2-22. Of the 2,639 children, 48.8% were female and 49.0% male. Caregivers disclosed that approximately one in every five children had disabilities. Nearly 75% of all children were in the 6-17 age bracket; the mean age was 12.1 years. Most children in the sample attended school in-person, distance, or a combination of both at the time of survey. Table 1 provides additional information about the children's demographics and their schooling. Please note that caregivers were able to select all disability categories and school types that applied to each child during the survey window so the category totals exceeded 100%.

Table 1. Characteristics of Children in the Sample

Attribute	Percent of Sample	
Sex	<i>Female</i>	48.8
	<i>Male</i>	49.0
	<i>Other sex / did not specify</i>	2.2
Age in Years	<i>2-5</i>	9.2
	<i>6-11</i>	34.6
	<i>12-17</i>	39.6
	<i>18-22</i>	14.9

<i>Age not specified</i>	1.7
Disability Status	
<i>Physical</i>	1.4
<i>Mental health</i>	7.3
<i>Learning</i>	11.1
<i>Not disclosed</i>	82.9
School Type	
<i>In-person</i>	26.5
<i>Distance (virtual)</i>	30.7
<i>In-person / distance blend</i>	36.3
<i>Home school</i>	2.3
<i>Private</i>	4.0
<i>School type not indicated</i>	1.8

Apparatus/Materials

The Qualtrics survey contained demographic questions about the caregiver and their children. It additionally enabled caregivers to indicate the presence or absence of initial reactions or warning signs (also referred to as symptoms) their children experienced during the pandemic. Participants reported on the pandemic symptoms of up to six children within their nuclear family. The survey contained eight cognitive/academic; six physical; 15 emotional; and eight interpersonal/behavioral symptoms. The slightly modified items were sourced from a set of common initial crisis reactions that are included in the National Association of School Psychologists PREPaRE, Third Edition, Workshop 2 Training (Brock & Louvar Reeves, 2019; Brock et al., 2016). No ratings of severity were obtained other than the nature of the symptom or crisis reaction itself.

Procedure

School staff distributed the survey and its anonymous informed consent via electronic communications (i.e., emails, social media, and learning management systems) and other established means of communication during the pandemic from November 2020 to April 2021. Additionally, special efforts were made to distribute the survey to agencies tasked with supporting parents/guardians, specifically those assisting families with youth who have disabilities. Investigators used a snowball recruitment method, notifying participants that they may share the Qualtrics link with other custodial caregivers in Appalachia to participate. Participants used via mobile devices or computers to complete the survey.

Analysis

Qualtrics data were used in an interactive Microsoft Power BI dashboard, which allowed a filter function to obtain counts to the rate of caregiver reported crisis reactions/symptoms. The counts in PowerBI included sibling data. Thus, if a parent had six children and reported symptom data on each of those six children, the descriptive percentages account for all six children. Power BI was also used to report demographics and other status variables, including sex, age, household income, number of children in the home, and child disabilities. The caregiver-reported symptom counts generated in Power BI were further disaggregated based on child disability. The child disability construct was parsed into five groupings for the descriptive analysis: children with 1)

physical disabilities; 2) learning disabilities; 3) mental health disabilities; 4) both mental health and learning disabilities; and 5) no identified disabilities.

The statistical analysis was conducted using IBM SPSS Statistics (Version 25). Investigators produced contingency tables for each symptom (present and absent) per mutually exclusive level of the demographic status variable to render Chi-square and Cramér's V values for each symptom. See McHugh (2013) for a description. The nonparametric Chi-Square statistic determines if the odds of a caregiver-reported symptom were equally likely or significantly different among the groups based on caregiver disability status, number of children, marital status, and household income. Cramér's V, which ranges from 0 to 1, provides the strength of association (i.e., negligible, small/weak, medium/moderate, and large/strong) between the variables of interest, although these designations are contingent upon the degrees of freedom (Cohen, 1988). In the presence of one degree of freedom, the magnitude for small, medium, and large effects are .10, .30, and .50, respectively. Although variation in interpretative ranges for Cramer's V exists, investigators used Rea and Parker's (1992) thresholds for the purposes of this study, as their ranges are repeatedly referenced in research or suggested as an evaluative framework (e.g., Kotrlik & Williams, 2003; Lee, 2016; Leigh et al., 2022). Cramer's V values between 0 to <0.10 and 0.10 to <0.20 represent negligible and weak associations, respectively, whereas 0.20 to <0.40 are moderate associations. Values meeting or exceeding 0.40 in increments of 0.2 are deemed relatively strong (0.4 to <0.6), strong (0.6 to <0.8), and very strong (0.8 to 1.0) associations.

An additional step was employed, as children can have multiple disabilities, and the investigators were interested in the effect of disability type on symptom frequency. The rate of symptoms in each disability category in Table 2 was individually contrasted to the rate of symptoms for the children without disability group, engendering a dichotomous contingency table or a two-way table. Yate's Chi-square statistics and Cramér's V were employed whenever larger sample sizes were present. Meanwhile, for several comparisons with small, expected cell frequencies, Fisher's Exact Tests were used as a substitute, particularly when the assumptions for Yate's Chi-square were not met.

An important difference between the descriptive analysis with percentages and the Chi-square results is that the descriptive percentages include all child participant data. To meet the Chi-square assumptions, the data set was randomly sampled to include only one child from each family. To achieve this, all children from households with single children were maintained in the data set. Yet, for family units from households with multiple children in the survey, one child's data was randomly selected to represent the family.

Results

Disability Status of Children

As illustrated in Table 2, caregivers of children without disabilities endorsed the lowest rate of all symptoms barring five items: confusion about schoolwork, hyperarousal, risky behaviors, suicidal ideation, and bullying others. When compared to all other groups of disabled children, children with physical disabilities exhibited the fewest cognitive/academic symptoms; they also had the

lowest rates of several other physical, emotional, and interpersonal/behavioral problems, including headaches/stomach aches (18.4%), fear/anxiety/worries (39.5%), acts younger than age (23.7%), and increased aggression (15.8%). However, when taking into account only the groups with disabilities, caregivers reported that for 11 of the 15 items, children with learning disabilities had the lowest rates of emotional symptoms.

Table 2: Rate of Symptoms by Children's Disability Status

Cognitive/ Academic Symptoms	% Without Disabilities n=2190	% with Physical Disabilities n=38	% with Learning Disabilities n=293	% with Mental Health Disabilities n=193	% with Mental Health & Learning Disabilities n=56
<i>Concentration difficulties</i>	42.1	52.6	72.4	72.0	82.1
<i>Confused about school work</i>	45.7	36.8	69.6	61.1	71.4
<i>Longer time needed to complete academic tasks</i>	35.4	42.1	68.3	54.9	67.9
<i>Memory problems</i>	13.2	23.7	36.5	39.9	33.9
<i>Problems with decision making</i>	16.9	21.1	35.5	40.9	46.4
<i>Refused to engage in school related tasks</i>	19.3	23.7	40.6	39.9	57.1
<i>Increased stress with learning/ school work</i>	47.4	63.2	63.5	75.1	73.2
<i>Poor/slow academic progress</i>	28.0	39.5	52.6	53.4	58.9
Physical Symptoms	% Without Disabilities n=2190	% with Physical Disabilities n=38	% with Learning Disabilities n=293	% with Mental Health Disabilities n=193	% with Mental Health & Learning Disabilities n=56
<i>Changes in appetite</i>	16.9	28.9	21.5	35.8	28.6
<i>Fatigue</i>	20.5	31.6	24.2	49.7	41.1
<i>Hyperarousal</i>	3.4	2.6	8.9	12.4	14.3
<i>Increased headaches/ stomachaches</i>	16.8	18.4	20.8	39.9	35.7
<i>Trouble sleeping</i>	25.7	44.7	35.5	54.9	58.9

<i>Weight gain/loss</i>	18.3	26.3	24.9	39.4	37.5
				% with	% with
	% Without	% with	% with	Mental	Mental
Emotional	Disabilities	Physical	Learning	Health	Health &
Symptoms	n=2190	Disabilities	Disabilities	Disabilities	Learning
		n=38	n=293	n=193	Disabilities
<i>Grief</i>	9.9	23.7	14.3	24.9	23.2
<i>Nightmares</i>	6.4	18.4	11.6	18.1	21.4
<i>Self-harm</i>	1.1	5.3	2.0	11.4	7.1
<i>Shut down</i>	13.0	28.9	24.2	46.6	44.6
<i>Suicidal ideation</i>	2.1	5.3	1.7	17.1	7.1
<i>Panic attacks</i>	7.6	18.4	14.0	42.0	25.0
<i>Hopelessness</i>	10.6	15.8	14.7	36.3	33.9
<i>Loss of pleasure</i>	23.7	34.2	26.3	45.1	42.9
<i>Anger</i>	14.7	23.7	26.6	25.4	32.1
<i>Guilt</i>	40.6	10.5	7.5	18.1	16.1
<i>Depression</i>	24.7	52.6	32.8	67.4	55.4
<i>Helplessness</i>	13.3	21.1	22.2	32.1	32.1
<i>Irritability</i>	43.9	60.5	57.3	69.9	75.0
<i>Over-sensitive</i>	24.6	39.5	39.9	50.3	50.0
<i>Fear/anxiety/worry</i>	34.7	39.5	46.1	70.5	60.7
				% with	% with
	% Without	% with	% with	Mental	Mental
Interpersonal/	Disabilities	Physical	Learning	Health	Health &
Behavioral	n=2190	Disabilities	Disabilities	Disabilities	Learning
Symptoms		n=38	n=293	n=193	Disabilities
<i>Acts younger than</i>	9.4	23.7	37.2	28.5	50.0
<i>age</i>					
<i>Despair over lost</i>	25.9	28.9	30.0	37.8	37.5
<i>activities</i>					
<i>Increased</i>	13.9	15.8	24.6	34.7	44.6
<i>aggression</i>					
<i>Increased conflict</i>	19.0	31.6	30.7	42.0	55.4
<i>with family</i>					
<i>Socially withdrawn</i>	20.3	31.6	27.0	52.8	50.0
<i>or isolated</i>					
<i>Takes more than</i>	3.7	2.6	6.8	14.5	14.3
<i>usual risks</i>					
<i>Has been bullied</i>	6.2	15.8	15.4	18.7	17.9
<i>Is bullying others</i>	1.9	0.0	5.1	5.7	12.5

Note: Results for all participants, including siblings, are displayed.

Caregiver or parent estimates revealed the highest rates of cognitive/academic reactions among the children with both learning and mental health disabilities for most items. However, participants indicated that children with learning disabilities had high rates of memory problems (36.5%). Caregivers frequently endorsed their children with learning disabilities required more time needed to complete academic tasks (68.3%). The highest incidence of physical reactions was noted by caregivers of children with mental health disabilities in every case excluding hyperarousal and trouble sleeping, which were most elevated in children with both learning and mental health disabilities. This pattern, likewise, held with emotional symptoms. Children with mental health disorders, according to caregiver reports, experienced the most elevated rates for 12 of the 15 emotional items. Caregivers of children with mental health disorders and those with mental health and comorbid learning disabilities evenly cited helplessness at 32.1%. Nightmares (21.4%), anger (32.1%), and irritability (75.0%) were highest among children with both learning and mental health disorders. The highest rates of the behavioral/interpersonal items were split evenly between children with mental health disabilities and children with both learning and mental disabilities; the three symptoms with more striking differences include acts younger than age, increased aggression, and increased conflict with families, which yielded 22%, 10%, and 13% lower rates among children with mental health disabilities only in contrast to children with both disabilities.

Marked disparities were evident between children with mental health disabilities, both individually or when combined with a comorbid learning disorder, and children without disabilities. For example, children with mental health disabilities were 2.5 to 3 times more likely to exhibit increased aggression, grief, hopelessness, memory problems, and bullying during the pandemic. They were 3.5 to 5 times more likely to experience shutdowns, panic attacks, guilt, and take more than the usual risks. Moreover, parents of children with mental health disorders confirmed the presence of symptoms at least twice as often as caregivers of non-disabled children for 28 of the 37 crisis reactions displayed in Table 2.

As noted in the method, investigators randomly excluded siblings and conducted disaggregated Chi-square analyses to examine significance levels when individual disability categories were contrasted with the youth without disability group. The significance levels for the binary classifications are displayed in Table 3. Comparisons between children with physical disabilities and their nondisabled peers were frequently insignificant. Youth with learning disabilities in the sample exhibited rates of several reactions including fatigue, increased headaches/stomachaches, self-harm, suicidal ideation, loss of pleasure, and despair over lost activities that were relatively comparable to the nondisabled peer group. While certain emotional, behavioral, and physical symptom rates were significantly higher for the children with learning disabilities, all cognitive/academic symptoms were significantly higher at the .001 level. Some of these comparisons for children with learning disabilities produced Cramer's V values that were approaching the moderate range: longer time needed to complete tasks (0.199), memory problems (0.180), and concentration difficulties (0.172). Moreover, apart from five items, rates of symptoms in the mental health disability group were statistically significant when compared to nondisabled youth. Depression (0.263), shutdowns (0.229), panic attacks (0.357), fears/anxiety/worries (0.212), suicidal ideation (0.260), and memory problems (0.231) revealed moderate Cramer's V values.

Table 3 Chi-Square Results with Siblings Excluded: Children with Disabilities Compared to Nondisabled Peers

	Youth w Learning Disabilities vs Non-disabled Peers n=1261	Youth w Mental Health Disabilities vs Non-disabled Peers n=1200	Youth w Physical Disabilities vs Non-disabled Peers n=1142	Youth w Mental Health & Learning Disabilities vs Non-disabled Peers n=1158
Cognitive/ Academic Symptoms				
<i>Concentration difficulties</i>	36.09***	19.60***	0.52	10.68***
<i>Confused about school work</i>	24.54***	1.77	0.15	5.02*
<i>Longer time needed to complete academic tasks</i>	48.80***	10.02**	0.76	6.16*
<i>Memory problems</i>	39.09***	61.28***	0.30	7.47**
<i>Problems with decision making</i>	24.25***	30.35***	0.30	15.36***
<i>Refused to engage in school related tasks</i>	20.90***	5.84*	0.04	25.68***
<i>Increased stress with learning/ school work</i>	12.50***	18.21***	1.11	8.94**
<i>Poor/slow academic progress</i>	27.66***	17.94***	3.18	7.78**
	Youth w Learning Disabilities vs Non-disabled Peers n=1261	Youth w Mental Health Disabilities vs Non-disabled Peers n=1200	Youth w Physical Disabilities vs Non-disabled Peers n=1142	Youth w Mental Health & Learning Disabilities vs Non-disabled Peers n=1158
Physical Symptoms				
<i>Changes in appetite</i>	4.40*	13.93***	0.00	4.61*
<i>Fatigue</i>	0.43	28.59***	2.54	8.46**
<i>Hyperarousal</i>	8.01**	16.99*	0.08	18.47***
<i>Increased headaches/ stomachaches</i>	0.53	23.94***	0.00	4.89*
<i>Trouble sleeping</i>	7.86**	26.13***	3.97*	18.18***
<i>Weight gain/loss</i>	4.63*	14.66***	0.44	9.59**

	Youth w Learning Disabilities vs Non-disabled Peers n=1261	Youth w Mental Health Disabilities vs Non-disabled Peers n=1200	Youth w Physical Disabilities vs Non-disabled Peers n=1142	Youth w Mental Health & Learning Disabilities vs Non-disabled Peers n=1158
Emotional Symptoms				
<i>Grief</i>	3.89*	11.96***	6.14*	5.10*
<i>Nightmares</i>	4.86*	2.16	0.99	7.23**
<i>Self-harm</i>	2.30	48.81***	0.00	4.13*
<i>Shut down</i>	18.00***	60.54***	3.79*	11.67***
<i>Suicidal ideation</i>	0.61	75.68***	0.00	0.00
<i>Panic attacks</i>	3.49	147.90***	2.27	12.91***
<i>Hopelessness</i>	2.94	40.57***	0.80	14.84***
<i>Loss of pleasure</i>	1.41	14.75***	1.20	5.31*
<i>Anger</i>	10.64***	2.46	3.72*	2.45
<i>Guilt</i>	1.19	19.60***	0.19	0.06
<i>Depression</i>	1.53	80.49***	4.16*	9.41**
<i>Helplessness</i>	10.59***	20.33***	0.00	10.44***
<i>Irritability</i>	11.68***	16.71***	5.23*	9.29**
<i>Over-sensitive</i>	21.04***	31.32***	1.27	10.19***
<i>Fear/anxiety/worry</i>	11.67***	52.04***	0.00	5.63*
	Youth w Learning Disabilities vs Non-disabled Peers n=1261	Youth w Mental Health Disabilities vs Non-disabled Peers n=1200	Youth w Physical Disabilities vs Non-disabled Peers n=1142	Youth w Mental Health & Learning Disabilities vs Non-disabled Peers n=1158
Interpersonal/ Behavioral Symptoms				
<i>Acts younger than age</i>	49.76***	12.22***	1.14	22.44***
<i>Despair over lost activities</i>	2.66	3.73	0.00	2.63
<i>Increased aggression</i>	4.53*	10.26***	0.12	5.90*
<i>Increased conflict with family</i>	3.52	7.27**	0.38	6.74**
<i>Socially withdrawn or isolated</i>	0.00	43.71***	0.00	3.63
<i>Takes more than usual risks</i>	.061	19.90***	0.10	5.47*
<i>Has been bullied</i>	12.45*	7.67**	0.02	1.65
<i>Is bullying others</i>	0.58	0.83	0.00	0.00

Note: In the above table, the asterisk denotes significant comparisons between each respective group of youth with disabilities and their non-disabled peer group. Fishers Exact Test was used in place of Yate's Chi-Square to test for significant differences when expected cell count was too small. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Discussion

The current study represents a comprehensive descriptive analysis of youth in central Appalachia during the pandemic, with a particular focus on identified disabilities. It examines multiple dimensions, namely, youths' cognitive/academic, physical, emotional, and interpersonal/behavioral functioning, symptoms known to be important during crisis events (Brock et al., 2016; Brock, 2025).

Several findings in the present investigation affirm concepts about internal and external vulnerability (Brock et al., 2016; Brock, 2023) and key tenets of risk and resiliency research (Luthar & Cicchetti, 2000; Masten et al., 1999). In the area of disability, which is often understudied during crises or disasters (Peek & Stough, 2010), youth with pre-existing learning and mental health disabilities overwhelmingly exhibited higher levels of physical, emotional, and interpersonal/behavioral symptoms than their non-disabled peers. Additionally, caregivers reported significantly heightened levels of academic/cognitive dysfunction among their children with disabilities during the pandemic, excluding youth with physical disabilities. This is not surprising for youth with cognitive and mental health disabilities given the paucity of instructional services (McFayden et al., 2021) paired with educators' difficulty delivering virtual instruction (Cardullo et al., 2021) and the associated teacher-reported stress with online delivery and the learning that accompanies mastering new technologies (An et al., 2021).

In contrast, youth with physical disabilities, albeit a small subgroup, did not display significantly higher rates of cognitive/academic problems. In fact, the caregiver-reported rates of confusion about schoolwork were 9% higher among youth without disabilities than among youth with physical disabilities. While children with physical disabilities did exhibit significantly higher rates of trouble sleeping, shutdowns, and depression, several other symptom frequencies were more commensurate with those reported for the non-disabled group, pointing to the need to educate teachers and crisis responders about the heterogeneous nature of disabilities. Numerous children with physical disabilities and/or limitations have no comorbid learning, emotional, or behavioral difficulties. For that matter, special education eligibility criteria under IDEA (2004) necessitate no accompanying cognitive, emotional, or behavioral impairment for children to qualify for an orthopedic impairment, which includes physical disabilities like cerebral palsy, muscular dystrophy, spina bifida, etc., although an adverse effect is a requisite.

It is important *not* to understate challenges, however, as parents of youth with physical disabilities were more than twice as likely than parents of nondisabled youth to report their children experienced bullying, grief, nightmares, shut-downs, panic attacks, immaturity, and depression. While more research is needed regarding youth with physical disabilities during crisis due to the descriptive nature of this study and the small subgroup size, the findings may also be explained by protective factors and resiliencies that lessen the risk or vulnerability (Luthar & Cicchetti, 2000).

Chatlos et al.'s (2023) investigation on rural American youth showed that youth with disabilities evidenced stronger academic well-being and fewer cognitive difficulties than youth without disabilities when parent-reported pre-pandemic levels were compared to post-pandemic levels in response to remote learning. Chatlos et al. hypothesized that parents of youth with disabilities may be more flexible in adjusting to the needs of their children with disability during the pandemic, given their longstanding history of learning lags and specialized instruction. Contrarily, parents of non-disabled children were unprepared for the slippage, and they likely did not have a history with learning and cognitive struggles or the tools to remediate them.

Parenting during the pandemic was difficult for most caregivers. As one survey respondent commented, "My husband and I both work a minimum of 50 hours a week. By the time we get home we are exhausted then we have to try to learn how to do 8th grade math so that we can teach our son. My son was a straight A student till (sic) all this and now he is failing because there isn't a teacher to teach him."

Limitations

While parental surveys distributed online offer a practical and scalable method for data collection, they present several limitations when used to assess children's internalizing and externalizing behaviors. First, such reports are inherently subjective and may be influenced by parental stress, bias, or limited awareness of their child's internal experiences—particularly for internalizing symptoms like anxiety or depression, which are less observable than externalizing behaviors such as aggression or defiance. Also, stressors were high for caregivers during the pandemic due to increased responsibilities, worries about illness, and social isolation. Second, internet-based surveys may exclude families with limited digital access or literacy, introducing sampling bias and reducing the generalizability of findings, especially in underserved or rural regions like parts of Appalachia. Additionally, being able to focus on a lengthy survey may be difficult for parents with disabilities themselves or limited reading skills. Third, the lack of clinical validation or triangulation with other data sources (e.g., teacher reports, direct observation, or standardized assessments) can compromise the reliability and validity of the behavioral data collected. Finally, establishing causality is not possible in this retrospective analysis, especially so during a pandemic, when numerous confounding factors are simultaneously influencing outcomes. These limitations underscore the need for multi-informant, multi-method approaches in future research, particularly when studying vulnerable populations during or after crises.

Implications

This article was written for and by individuals who have an interest in crisis prevention and intervention among central Appalachian youth, an often-under-examined population with both incredible resiliencies and vulnerabilities. Although the pandemic was declared over five years ago, the risk factors and warning signs of traumatic stress remain relevant for crisis events that are yet to come, be they large-scale, man-made events; natural disasters, such as the flooding that ravaged several Appalachian states in September 2024; or more isolated tragedies that individual children and families experience. The risk factors enable school psychologists, counselors, and social workers to better serve as consultants for psychological safety in educational communities. Research about culture-specific risk levels is imperative to our school

mental health providers, as risk levels tell us who is at most risk and may need immediate crisis intervention and who demonstrates reduced risk and is likely to recover from a crisis event with no crisis support (Brock et al., 2016). Finally, the authors additionally hope the article 1) instills a desire to learn more about the evaluation of psychological risk for factors for children with disabilities, as variables such as crisis exposure and trauma history were not specifically examined and 2) functions as a catalyst for more grantsmanship to train school-based mental health providers in central Appalachia on evidenced-based crisis intervention and conduct research in school-based crisis prevention and intervention in this region, given its paucity.

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