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Remote Delivery of Allied and Behavioral Healthcare During COVID-19 for Children With Developmental Disabilities

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Objective: Many children with autism spectrum disorder (ASD) and other developmental disabilities (DD) transitioned to telehealth services due to the COVID-19 pandemic. Our objectives were to describe reductions in allied and behavioral healthcare services and receipt of caregiver training to deliver services at home because of COVID-19 for children with ASD and other DD, and factors associated with worse response to remote delivery of services for children with ASD.

Method: Prior to the pandemic, children 2 to 5 years of age were enrolled in a multi-site case-control study and completed a developmental assessment. Caregivers completed questionnaires on child behavior problems and ASD symptoms. Children were classified as having ASD vs another DD based on standardized diagnostic measures. Subsequently, caregivers completed a survey during January to June 2021 to assess how COVID-19 affected children and families.

Results: Caregivers reported that most children with ASD and other DD had a decrease in service hours (50.0%-76.9% by service type) during the COVID-19 pandemic. Children with ASD were significantly more likely to experience reduced speech/language therapy than children with other DD. Receipt of caregiver training to deliver services at home ranged from 38.1% to 57.4% by service type. Among children with ASD, pre-pandemic problems with internalizing behaviors and social communication/interaction were associated with worse response to behavioral telehealth but no other common therapies.

Conclusion: Our study demonstrates the caregiver-reported impacts of COVID-19 on remote delivery of allied and behavioral healthcare services for children with ASD and other DD. Considerations for caregiver support and remote delivery of services are provided.

Key words: autism; COVID-19; developmental; disabilities; telehealth

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Developmental disabilities are a group of conditions that present in early childhood and affect behavior, language, learning, movement, and independent living.¹ Some examples of developmental disabilities are autism spectrum disorder (ASD), cerebral palsy, and intellectual disability. Symptoms associated with developmental disabilities typically last throughout life, although the type and severity can change with development. Approximately 1 in 6 children in the United States has a developmental disability, representing more than 10 million youth.² Of these, about 25% see an allied health professional, such as a speech therapist or occupational therapist, to address their specific healthcare needs.² Services

delivered by these therapists improve developmental skills, empower children and families, and reduce economic burden by decreasing the need for special education.³

The COVID-19 pandemic affected service delivery for many children with developmental disabilities.⁴⁻¹² Up to 42% of these children lost access to all services from March 2020 to June 2021,⁴ and up to 78% had a reduced number of service hours.⁵ Moreover, many children with developmental disabilities switched from receiving in-person services to remote delivery of services via a telehealth device.^{4,7-9} Telehealth for children with developmental disabilities has been associated with both benefits and challenges prior to the COVID-19

pandemic. Some documented benefits are increased access to services and decreased costs and wait times.^{13,14} Documented challenges are the need for technology and reliable Internet connections, and few evaluation studies that use randomized controlled designs.¹³⁻¹⁴

ASD is a developmental disability that affects about 1 in 39 school-age children, and is defined by social communication deficits, restricted interests, and repetitive behaviors (RRB).^{15,16} Children with ASD tend to have more behavior problems, daily living skill deficits, and early learning deficits than children with other developmental problems,¹⁷ which could influence their response to telehealth. Moreover, some studies implicate RRB as a potential factor that could influence telehealth, especially given that many children with ASD thrive on routine and can become disorganized when their routines are disrupted.^{10,18} Children with ASD benefit from behavioral therapy, which is not commonly delivered in telehealth formats.⁸ Consequently, the behavioral presentation and treatment needs associated with ASD may warrant different telehealth considerations than for children with other developmental disabilities.¹⁸

During the pandemic, some caregivers of children with ASD and other developmental disabilities (other DD) reported that they were unable to use telehealth^{4,9} and/or assumed some responsibility for delivery of their child's services.^{11,12} They also reported the need for additional supports during the initial phase of the pandemic response.^{11,12} To add to this discussion, the first objective of this study was to describe reductions in specific allied healthcare service hours, including behavior therapy, for children with ASD and other DD due to the COVID-19 pandemic. The second objective was to describe caregiver-reported receipt of training to deliver services at home. The third and fourth objectives were to examine whether caregiver training or certain phenotypic characteristics in the child were associated with a worse response to telehealth vs in-person visits for individuals with ASD.

METHOD

Data were from the Study to Explore Early Development—Phase 3 (SEED3) and the SEED3 COVID-19 Impact Assessment. SEED3 is a multi-site case-control study on the risk factors and behavioral phenotypes associated with ASD in early childhood, funded by the Centers for Disease Control and Prevention (CDC). SEED3 was launched in 2017 in 6 sites located in Colorado, Georgia, Maryland, Missouri, North Carolina, and Wisconsin, and was approved by the Institutional Review Board at CDC and each study site. Three groups of children were targeted for enrollment: children diagnosed with ASD, children

diagnosed with another DD, and children from the general population (POP). Children with ASD and other DD were recruited via clinic and education partners at each study site; children in the POP group were selected randomly via state birth certificate records. All children were 2 to 5 years of age at the time of enrollment and received the Social Communication Questionnaire (SCQ).¹⁹ The SCQ is a standardized 40-item caregiver questionnaire used to detect children with symptoms of ASD. Caregivers provided verbal informed consent at study enrollment and written informed consent during an in-person evaluation of their child. Additional information on SEED recruitment and enrollment procedures can be found in Schendel et al.²⁰

Caregivers (97.4% mothers) were asked to complete a telephone interview on their health and pregnancy history and early development of the study child. Children with a prior diagnosis of ASD or an SCQ score of ≥ 11 points were asked to attend an in-person clinic visit prior to March 2020 to assess child early learning abilities. The Mullen Scales of Early Learning (MSEL) was administered for this purpose. The MSEL is a standardized assessment of expressive language, receptive language, fine motor, and visual reception abilities in children birth through 5 years of age.²¹ The MSEL yields an early learning composite score with a mean of 100 points and an SD of 15 points. Children with an MSEL composite score of < 70 points were defined as having well-below-average early learning abilities. The MSEL was administered by clinicians who established and maintained administration fidelity and scoring reliability with a doctorate-level supervisory group.

Caregivers who attended a clinic visit were asked to complete the Child Behavior Checklist 1½-5 years of age (CBCL) and Social Responsiveness Scale (SRS). The CBCL is a standardized caregiver questionnaire that assesses behavior problems in young children.²² The CBCL has 2 domains: the externalizing behavior domain and the internalizing behavior domain. The externalizing behavior domain comprises child attention problems and aggressive behaviors. The internalizing behavior domain comprises child emotional reactivity, anxiety/depression, somatic complaints, and withdrawn behaviors. The CBCL yields *t* scores for both domains with a score of ≥ 60 indicating risk for behavior problems.

The SRS is a standardized caregiver questionnaire that assesses the severity of ASD symptoms in a child compared to those in the general population.²³ The SRS yields a total score and 2 scale scores compatible with the *DSM-5*, namely, the social communication/interaction scale and the RRB scale. The SRS yields *t* scores with scores < 65 indicating mild impairment and scores ≥ 65 indicating moderate to severe impairment.

The MSEL, CBCL, and SRS have all been validated in general population and clinical samples, and have adequate psychometric properties for the age range of children in this study.

The SEED3 ASD classification was based on results of 2 standardized instruments commonly used to diagnose ASD in clinic and research settings. The Autism Diagnostic Interview–Revised (ADI-R) is a semi-structured caregiver interview that gathers information on child development, social interaction skills, language skills, and RRB.²⁴ The Autism Diagnostic Observation Schedule–Second edition (ADOS-2) is a child observation of social communication and interaction skills and RRB during structured play activities.^{25,26} The results of the ADI-R and ADOS-2 determined whether the child met study criteria for ASD as defined by Wiggins *et al.*²⁷ If the child did not complete the clinic visit because of low ASD risk (ie, no prior ASD diagnosis and SCQ score <11 points) or did not meet study criteria for ASD, they were classified as other DD or POP comparison, depending on recruitment source. Children classified as other DD were precluded from analyses testing the association between child characteristics and response to remote services, as they were not systematically asked to complete the clinic visit. Children classified as POP comparison were excluded from these analyses because of the low frequency who received developmental therapies.

COVID-19 Impact Assessment

Recruitment and in-person clinic visits for SEED3 were suspended in March 2020 because of the COVID-19 pandemic and community mitigation efforts. SEED3 investigators collaboratively developed the SEED3 COVID-19 Impact Assessment to learn how the pandemic affected the following: developmental, healthcare, and school services; child behaviors; and child and family emotional, financial, and physical health, among other outcomes.

The SEED3 COVID-19 Impact Assessment was developed between April 2020 and October 2020 and was approved by the CDC Institutional Review Board in December 2020. Potential participants were families who completed the SEED3 study protocol prior to March 31, 2020, received a final classification of ASD, DD, or POP, and consented to be contacted for future studies. Enrollment for the COVID-19 Impact Assessment began in January 2021 and ended in June 2021.

Questions used for this analysis focused on use of developmental therapies, caregiver training to deliver developmental therapies at home, and child response to remote delivery of developmental therapies after March 2020. For the first objective, caregivers were asked

“Pre-COVID, in January or February of 2020, did the study child receive *any* of the following services?” Services listed included behavior therapy (BT), occupational or sensory therapy (OT), physical therapy (PT), social skills training (SOC), and speech or language therapy (SLT). Caregivers who answered “yes” were then asked the following question about each individual service: “In 2020, due to changes in the delivery of service related to COVID, how did the total hours of <specific type of therapy previously noted> therapy change for the study child?” Response options of no change, increased, and increased and decreased at different times were combined and compared to “decreased.”

For the second objective, caregivers were asked the question “Sometimes children receive therapy or interventions from providers, other times parents receive ‘parent training’ to support their children at home. In 2020, because of changes related to COVID, did you receive parent training, in person or by video or phone, to support the study child at home?” Positive endorsement of parent training was considered if the caregiver answered “yes” to any of the developmental services reported in this paper.

For the third and fourth objectives, we assessed whether (1) receipt of caregiver training to deliver services at home or (2) child early learning abilities, behavior problems, and ASD symptoms measured prior to March 2020 were associated with a worse response to telehealth vs in-person visits for children with ASD. The outcome variable was defined by the question “Compared to in-person <specific type of therapy previously noted> therapy, was remote delivery better for the child, worse for the child, or was there no difference when conducted remotely with video or conducted remotely without video?” Any endorsement of worse response to remote delivery (ie, with or without video) was considered worse response for the child. Response options of better and no difference were combined to compare “not worse” to “worse.” Response options of not applicable were coded as missing.

Statistical Analyses

p Values were derived from χ^2 tests for comparing children with ASD to children with other DD for the first 2 objectives. Specifically, χ^2 tests were used to compare distributions of decreases in services hour and caregiver training to deliver services at home. We used an individual testing approach for all null hypotheses in this study; therefore, the *a priori* alpha level for all χ^2 comparisons was $p = .05$.

Modified Poisson regression was used to assess whether caregiver training or child characteristics were associated with worse response to remote delivery of services for children with ASD. Modified Poisson regression corrects for overestimation that can occur when Poisson regression is

applied to binomial data. Models were adjusted for child age at clinic visit, child race/ethnicity, child sex, household income relative to federal poverty threshold, maternal education, and study site. Adjusted prevalence ratios and 95% CI were derived. Adjusted prevalence ratios (aPR) indicate how strongly a child characteristic was associated with worse response to remote delivery of services relative to better or no different response to remote delivery of services, adjusting for stated factors.

RESULTS

A total of 274 children with ASD and 368 children with other DD completed SEED3 and the subsequent COVID-19 Impact Assessment. The most common diagnoses reported for children in the DD sample were language delay (53.7%) and motor delay (13.1%). Characteristics of the sample are provided in Table 1.

A substantial percentage of children with ASD and other DD had caregiver-reported decreases in service hours due to the COVID-19 pandemic (Table 2). The largest percentage of caregivers reporting decreases were for PT (76.9% for ASD and 70.0% for other DD) and SOC (73.1% for ASD and 75.5% for another DD). Even the smallest decreases in BT were reported for 66.4% of children with ASD and 50.0% of children with other DD. Significantly more children with ASD had decreases in SLT than children with other DD (66.8% and 52.0%, respectively; $p = .004$).

Up to 10.9% of caregivers of children with ASD and other DD who used allied or behavioral healthcare services reported that they were unable to use telehealth for their child. Reasons for the inability to use telehealth were not recorded.

Among children with ASD, between 38.1% (SOC) and 57.5% (BT) of their caregivers received training to deliver services at home. Among children with other DD, between 40.7% (SLT) and 56.3% (PT) of their caregivers received training to services therapies at home. There were no statistically significant differences in the percentage of caregivers who received training to deliver services between study groups. Percentages of caregiver training for each developmental service are provided in Table 3.

Approximately 80% of caregivers of children with ASD who used telehealth services reported that their child had a worse response to remote compared to in-person services due to COVID-19. Receipt of caregiver training to deliver services at home was not associated with child response to remote delivery of any service (Table 4).

There was no evidence of multicollinearity among child early learning abilities, behavior problems, and ASD

TABLE 1 Sample Characteristics of Children With Autism Spectrum Disorder (ASD) or Other Developmental Disability (DD) and Their Caregivers Who Completed the Study to Explore Early Development—Phase 3 and COVID-19 Impact Assessment

	ASD n = 274	DD n = 368
	Median	Median
Child age at clinic visit, mo	46.0	49.0
Child age at COVID-19 Impact Assessment, mo	75.0	77.0
	%	%
Child early learning abilities well below average	69.2	27.0
Child externalizing behavior problems	55.7	55.6
Child internalizing behavior problems	70.3	54.0
Child moderate/severe restricted interests/repetitive behaviors	64.3	43.6
Child moderate/severe social communication/interaction deficits	65.5	34.4
Child race/ethnicity		
Non-Hispanic White	57.7	66.0
Non-Hispanic Black	15.0	11.7
Hispanic	12.8	11.4
Other	14.6	10.9
Child sex		
Male	79.2	63.0
Female	20.8	37.0
Household income relative to federal poverty threshold		
≤100%	10.5	5.6
101%-200%	15.4	11.2
201%-300%	13.9	11.8
301%-399%	19.2	14.9
≥400%	41.0	56.5
Maternal education		
High school or less	18.7	9.8
Some college	29.7	17.2
College graduate/advanced degree	51.6	73.0
Study site		
Colorado	14.2	14.1
Georgia	11.3	16.0
Maryland	14.2	9.5
Missouri	21.5	16.6
North Carolina	15.7	21.2
Wisconsin	23.0	22.6

Note: Developmental data available for a subset of children with other DD (n = 64).

TABLE 2 Percentage of Children With Autism Spectrum Disorder (ASD) or Other Developmental Disability (DD) Who Had Caregiver-Reported Decreases in Allied and Behavioral Healthcare Service Hours Due to COVID-19: Study to Explore Early Development—Phase 3 and COVID-19 Impact Assessment

	ASD	DD	p
	%	%	
Behavioral therapy	n = 137	n = 34	
Decreased (%)	66.4	50.0	.076
Occupational or sensory therapy	n = 161	n = 89	
Decreased (%)	68.9	59.6	.134
Physical therapy	n = 52	n = 50	
Decreased (%)	76.9	70.0	.428
Social skills training	n = 93	n = 53	
Decreased (%)	73.1	75.5	.755
Speech or language therapy	n = 220	n = 150	
Decreased (%)	66.8	52.0	.004

Note: Decreases in service hours were compared to a composite variable comprising no change, increased, and increased and decreased at different times.

symptoms measured prior to March 2020 (ie, all variance inflation factors <2.0, tolerances >0.7, and correlation coefficients <0.5). Analysis of child factors associated with worse response to telehealth services for children with ASD was limited to the most common therapies (BT, OT, SLT) because of sample size constraints. None of the child factors examined were associated with worse response to remote delivery of OT or SLT. Child internalizing behavior problems (aPR = 1.41; 95% CI = 1.09-1.83; *p* = .010) and moderate-to-severe social communication/interaction deficits (aPR = 1.49; 95% CI = 1.15-1.92; *p* = .003) were

TABLE 3 Percentage of Caregivers of Children With Autism Spectrum Disorder (ASD) or Other Developmental Disability (DD) Who Reported Training to Deliver Allied and Behavioral Healthcare Services at Home: Study to Explore Early Development—Phase 3 and COVID-19 Impact Assessment

	ASD	DD	p
Behavioral therapy	n = 134	n = 33	
Caregiver training (%)	57.5	48.5	.352
Occupational or sensory therapy	n = 155	n = 83	
Caregiver training (%)	44.5	51.8	.283
Physical therapy	n = 51	n = 48	
Caregiver training (%)	41.2	56.3	.134
Social skills training	n = 84	n = 43	
Caregiver training (%)	38.1	44.2	.508
Speech or language therapy	n = 210	n = 145	
Caregiver training (%)	40.0	40.7	.896

TABLE 4 Association Between Caregiver Training and Worse Response to Remote Delivery of Services for Children With Autism Spectrum Disorder (ASD): Study to Explore Early Development—Phase 3 and COVID-19 Impact Assessment

	Adjusted prevalence ratio ^a	95% CI	P
Behavioral therapy	1.17	0.94-1.46	.153
Occupational or sensory therapy	1.03	0.85-1.26	.762
Physical therapy	1.01	0.90-1.13	.877
Social skills training	1.06	0.77-1.46	.707
Speech or language therapy	1.17	0.98-1.38	.076

Note: ^aAnalyses adjusted for child age at clinic visit, child race/ethnicity, child sex, federal poverty level, maternal education, and study site.

significantly associated with worse response to remote delivery of BT. There was a marginal association between moderate to severe RRB and worse response to BT (aPR = 1.34; 95% CI = 1.00,1.80; *p* = .052). Adjusted prevalence ratios and 95% CI are shown in Table 5.

DISCUSSION

Our study demonstrates the significant impact of the COVID-19 pandemic on allied and behavioral healthcare service delivery for children with ASD and other DD. Up to 76.9% of the children in our sample had a decrease in caregiver-reported service hours due to COVID-19, which supports previous research.⁵ Caregivers of children with ASD reported significantly more instances of reduced hours in SLT than children with another DD. Up to 10.9% of caregivers were not able to use telehealth for their child, and between 38.1% and 57.4% received training to deliver developmental therapies at home. Caregiver training was not associated with worse response to remote delivery of services for children with ASD. Internalizing behavior problems and moderate to severe social communication/interaction deficits were significantly associated with worse response to behavioral telehealth but not to other common therapies for children with ASD. These findings have implications for future telehealth efforts and ways to support caregivers of children with ASD.

Children with developmental disabilities, including ASD, benefit from developmental therapies designed to address their specific healthcare needs.³ Developing long-term strategies for telehealth may prevent future service disruptions due to public health emergencies, along with the added benefit of reaching traditionally underserved children

TABLE 5 Child Factors Associated With Caregiver Report of Worse Response to Telehealth Compared to In-Person Services for Children With Autism Spectrum Disorder: Study to Explore Early Development—Phase 3 and COVID-19 Impact Assessment

	Adjusted prevalence ratio ^a	95% CI	P
Behavioral therapy			
Early learning abilities well below average	0.83	0.60-1.66	.249
Externalizing behavior problems	1.15	0.92-1.14	.224
Internalizing behavior problems	1.41	1.09-1.83	.010
Moderate/severe restricted interests/repetitive Behaviors	1.34	1.00-1.80	.052
Moderate/severe social communication/interaction deficits	1.49	1.15-1.92	.003
Occupational or sensory therapy			
Early learning abilities well below average	0.99	0.79-1.25	.957
Externalizing behavior problems	0.97	0.81-1.16	.756
Internalizing behavior problems	1.06	0.85-1.33	.584
Moderate/severe restricted interests/repetitive Behaviors	1.01	0.82-1.26	.900
Moderate/severe social communication/interaction deficits	1.24	0.95-1.62	.112
Speech/language therapy			
Early learning abilities well below average	0.87	0.72-1.05	.143
Externalizing behavior problems	1.01	0.86-1.19	.889
Internalizing behavior problems	1.06	0.89-1.26	.508
Moderate/severe restricted interests/repetitive behaviors	1.02	0.87-1.20	.795
Moderate/severe social communication/interaction deficits	1.11	0.95-1.30	.187

Note: Analyses limited to most common therapies for children with autism spectrum disorder because of sample size constraints.
^aAnalyses adjusted for child age at clinic visit, child race/ethnicity, child sex, federal poverty level, maternal education, and study site.

and decreasing costs and wait times.^{8,9} Yet, some families may not be able to use telehealth because of factors such as limited resources and/or unstable Internet connections. Moreover, some children may naturally respond better to

in-person therapy, and not all providers (as well as service types) may be as flexibly transitioned to remote delivery. Allied health professionals can work with caregivers to determine the service delivery option best suited for the child, family, and provider. If telehealth is agreed upon, resources and strategies to support the transition to telehealth for children with developmental disabilities may be needed to ensure continuity of care.

The largest proportions of families reporting decreases in service delivery hours were for PT and SOC for children with ASD and other DD. The adoption of PT and SOC telehealth has been slow. For instance, prior to the COVID-19 pandemic, only 2% of physical therapists offered these services via a remote platform.²⁸ Thus, a lack of previous experience with telehealth could account for a higher number of children receiving decreased PT and SOC hours after March 2020 than other types of therapies. The American Physical Therapy Association now recommends that physical therapists develop long-term strategies for telehealth.²⁸ There are some promising models for remote delivery of PT and SOC for young children with developmental disabilities, including therapist-supported activities that target locomotor delays²⁹ and caregiver training to improve social communication skills (eg, functional communication training and naturalistic developmental behavioral interventions such as the Early Start Denver Model, pivotal response training, and ImPACT online).^{30,31} These and other models of care may become essential as the role of telehealth expands for youth with special needs.

Speech or language therapy was the most common developmental service delivered to children with ASD and other DD in our sample. Caregivers of children with ASD significantly more often reported decreases in remote delivery of SLT than children with other DD. This finding is notable because children with ASD tend to have more language delays than children with other DD, and at least 1 study found that language skills were negatively correlated with COVID-19 impact on services.¹⁰ Advanced preparation for remote delivery of SLT when 1:1 therapies are not available may thus be an important component of a comprehensive care plan for children with ASD.

Many caregivers did not receive training to deliver developmental therapies at home. Receipt of caregiver training to deliver services at home was not associated with worse response to remote delivery of services for children with ASD in this sample. However, numerous factors could have an impact on worse response to remote delivery of services during COVID-19 (eg, child and caregiver stress and uncertainty), and the benefits of caregiver training and

its influence on other outcomes have been documented extensively in other studies. For instance, caregiver training has been found to increase self-efficacy and to decrease child behavior problems and negative caregiver–child interactions.^{32,33} Caregiver training can be effective when delivered via telehealth for families in diverse settings, including low-resource and urban and rural communities around the world.^{34,35} Caregiver involvement is therefore a critical component of early interventions for children with ASD and other DD. Future research could explore the types of training programs and caregivers supports associated with positive response to telehealth delivery of allied and behavioral healthcare services for children with special needs.

Internalizing behavior problems, such as anxiety and depression, and moderate to severe social communication/interaction deficits were associated with worse response to remote delivery of BT but not to other common therapies for children with ASD that we considered. These results align with previous studies and highlight the need to screen and to treat behavior problems in children with ASD who receive remote services.^{10,11} Remote caregiver support programs such as Family-Based Cognitive-Behavior Therapy and the Coaching Approach and Leading by Modeling (CALM) Program can be effective in treating child internalizing behavior problems.³⁶ Moreover, remote caregiver support programs can be effective in treating social communication deficits³⁷ as well as disruptive behaviors³⁸ in children with ASD. Additional research is needed on remote caregiver training programs that are effective in reducing RRB, which was marginally associated with worse response to BT among children with ASD in our analyses.

There are limitations to this study. We relied on caregiver report for data collection. There were limitations in the survey itself in that depth was sacrificed for breadth (ie, the survey covered a broader range of topics rather than collected detailed information on certain topics). Structured interviews, focus groups, or response options with added gradation may have provided more detailed information for analysis and can be considered in future studies. We did not gather follow-up information on certain topics, such as reasons for not being able to use telehealth services or the telehealth device used for remote delivery of services. Exclusion of these topics could have had an impact on whether caregivers received training to deliver developmental therapies at home. We also did not gather information on caregiver supports other than training to deliver developmental therapies at home. We could not explore child behavior problems associated with worse response to remote delivery of developmental

therapies for children with other DD because these data were not collected. Sample size restrictions prevented some multi-variable analyses because most caregivers (~80%) reported worse response to remote delivery of services (eg, exploring child behavior problems associated with worse response to PT and SOC telehealth among children with ASD). Finally, other factors not included in this study could have contributed to worse response to remote delivery of services.

Despite these limitations, ours is one of the most comprehensive studies of response to remote delivery of developmental therapies delivered during the COVID-19 pandemic among children with ASD and other DD. We were able to examine caregiver-reported changes in service hours and response to remote delivery of specific therapies. We were also able to compare children with ASD to children with other DD. Describing caregiver training received during the pandemic and associations between ASD characteristics and worse response to behavioral telehealth were novel components of this study that may be helpful when designing telehealth programs.

In conclusion, we found that up to 76.9% of children with ASD and up to 75.5% of children with other DD had a reduction in allied or behavioral healthcare services due to COVID-19. Children with ASD had greater reduction in SLT than children with other DD. Up to 10.9% of caregivers of children with ASD and other DD reported that they were unable to use telehealth services for their child, and between 38% and 57% received training to deliver services at home. Caregiver training was not associated with worse response to remote vs in-person visits for children with ASD. Pre-pandemic internalizing behavior problems and moderate-to-severe social communication/interaction deficits were associated with worse response to behavioral telehealth vs in-person visits for children with ASD.

Given these findings, we encourage the following considerations for remote delivery of developmental therapies for children with ASD and other DD: (1) develop long-term strategies for telehealth to prevent service disruption and to improve service access; (2) consider the family's ability to access and use telehealth services, and provide resources and supports if needed; (3) provide caregiver training to deliver developmental therapies to support both the caregiver and child; (4) monitor child response to telehealth, and develop strategies when children show worse response to telehealth; and (5) engage in supported decision making with caregivers to determine the service delivery option best suited for the child, family, and provider. Additional considerations for children with ASD are (1) to prepare for remote delivery of SLT services

when 1:1 therapies are not available as part of a comprehensive care plan, and (2) to screen for and treat child behavior problems and social communication/interaction deficits to mitigate a negative response to behavioral telehealth.

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Dr. Tian served as the statistical expert for this research.

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Supervision: Wiggins, Pazol
Validation: Powell
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