The Coronavirus Impact Scale: Construction, Validation, and Comparisons in Diverse Clinical Samples

Running head: Coronavirus Impact Scale

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Abstract

Objective: This study outlines the construction and initial psychometric properties of the Coronavirus Impact Scale in multiple large and diverse samples of families with children and adolescents. The scale was established to capture the impact of the coronavirus pandemic.

Differences in impact between samples and internal structure within samples were assessed.

Method: Five hundred, seventy-two caregivers of children and adolescents or expecting mothers in diverse clinical and research settings completed the Coronavirus Impact Scale. Samples differed in developmental stage, background, inpatient/outpatient status, and primary research or clinical setting. Model free methods were used to measure the scale's internal structure and determine a scoring method. Differences between samples in specific item responses were measured by multivariate ordinal regression.

Results: The Coronavirus Impact Scale demonstrated good internal consistency in a variety of clinical and research populations. Single, immigrant, predominantly Latinx mothers of young children reported the greatest impact across groups, with elevated impact on food access and finances. Individuals receiving outpatient or inpatient care reported greater impacts on health care access. Impact was positively associated with measures of caregiver anxiety and both caregiver- and child-reported stress at a moderate effect size.

Conclusion: The Coronavirus Impact Scale is a publicly available scale with adequate psychometric properties for use in measuring the impact of the coronavirus pandemic in diverse populations.

Key Words: COVID-19, Coronavirus, mental health, adolescence, child, risk and resilience

Introduction

By March 2020, it was clear that coronavirus was resulting in profound disruptions to the lives of children and their families. The authors were all conducting studies and clinic visits which needed a brief measure by caregiver report to capture coronavirus-related impact. In addressing this need, we were guided by two principles: brevity and non-redundancy. First, the scale must be brief and a low burden for respondents. Second, the scale should avoid redundancy with previously validated clinical scales.

Initially, the scale was designed to be completed by an expecting mother or a caregiver of a child. Given the frame of the scale's construction, access to care and representations of the lives of families were selected for probes. These inclusions also correspond to major foci of research interest identified by pediatric mental health practitioners and researchers (Novins et al., 2021). Given the limited time of development, the scale was distributed without validation.

To provide initial validation, the scale was integrated in ongoing and new studies of children and their families in mental health treatment and research. The scale was evaluated in five studies of diverse samples, representing different clinical situations and patient backgrounds, to understand the scale's internal structure and preliminary concurrent associations.

The target populations of the samples included in this report are:

- Caregivers of children receiving outpatient mental health care from a large children's hospital in Colorado.
- Caregivers of children and adolescents who were being admitted to a child and adolescent psychiatric inpatient service in Baltimore, Maryland.
- Mothers of young children involved in parent-child dyadic psychotherapy in Massachusetts. The mothers are primarily Latinx immigrants with a trauma history.

- Caregivers of youth with primary diagnoses of attention deficit/hyperactivity disorder (ADHD), disruptive mood dysregulation disorder (DMDD), anxiety disorders (ADs) and youth with no history of DSM-5 diagnosis participating in research at the National Institute of Mental Health (NIMH).
- Women recruited prenatally participating in a longitudinal study of the impact of stress on pregnancy, birth outcomes, and early child development.

The goal of this manuscript is to report how the scale was constructed and test its internal consistency to provide guidance on scoring and interpretation. The main hypothesis tested was that the summative score in the scale would provide a measure of impact across samples by contemporary psychometric standards. The internal structure of the scale, e.g. how individual items cluster together, was illustrated in a model-free fashion and was not expected to be the same across all samples. In addition, differences in impact response profiles were tested across groups. Finally, to provide external validation, concurrent associations between overall impact and behavioral measures of anxiety and stress in groups were tested, where we expected positive associations to both (Czeisler et al., 2020).

Methods

Participants

Children's Hospital Colorado (CHCO). This study was reviewed and approved by the Colorado Multiple Institutional Review Board. Participants based in Colorado were adult parents of youth ages 5 through 17 who had been evaluated by the mental health ambulatory services within the 12 months prior to July 2020. These adults had electronic health record portal access, resided in the state of Colorado, and agreed to be contacted for research. 850 individuals

were invited to participate via email or text; 159 provided usable responses. After completing consent, the parents completed the Coronavirus Impact Scale, demographics, and other measures about their family and child. They were able to receive a \$5 gift card for participation. The scales were completed between 7/27/2020 and 11/11/2020.

Johns Hopkins Medical Institutions (JHMI). The scale was completed by caregivers of youth ages 7 to 17 during admission to a child and adolescent psychiatric inpatient service as part of the standard admission assessment. The scale was used to inform targeted support for families. The 15-bed unit services youth for acute treatment and stabilization with an average length of stay of 7-8 days. The majority of patients are admitted with suicidal thoughts or behavior (approximately 70%). 229 admissions occurred from April 29, 2020 and September 11, 2020, the scale was completed by caregivers of 112 admitted patients. Data was extracted from the medical record retrospectively. This study was reviewed and approved by the Johns Hopkins Medicine Institutional Review Boards.

Early Connections/Conexiones Tempranas (EC/CT), Boston University. Scales were completed (in Spanish, n=35, and English, n=6) by primarily Latinx immigrant parents of children birth through five who were participating in a community-based dyadic trauma-focused intervention (Child Parent Psychotherapy through Jewish Family & Children's Service, Center for Early Relationship Support). The families lived in a small city west of Boston, MA. Parents provided informed consent for themselves and their young children. Forty-one participants completed the measure between June 2020 and December 2020 as part of a larger evaluation questionnaire. They were compensated with gift cards worth \$20 for their participation. The study was reviewed and approved by the Boston University Institutional Review Board as an addition to an ongoing study protocol.

National Institute of Mental Health (NIMH) Intramural Research Program. This study was reviewed and approved by the NIMH Internal Review Board (IRB). The scales were completed by parents of youth ages 8 to 19 years based in the Maryland, Virginia and Washington, DC area, who had enrolled in study protocols at the NIMH within 24 months prior to March 2020. 133 participants were invited to participate, 73 provided usable responses. Of these families, 49 provided both responses from both caregivers and an adolescent in the household for concordance analysis. Caregivers provided informed consent, youth provided assent. Families were compensated for their participation. Scales were completed between 06/27/2020 and 1/05/2021.

Prospective Research on Early Determinants of Illness and Children's Health Trajectories (PREDICT). Participants were mother/infant pairs enrolled prenatally in the PREDICT study. Women were recruited in their first or second trimester of pregnancy from an obstetric practice affiliated with Johns Hopkins All Children's Hospital in South Florida. Supplemental funding was obtained to complete an additional assessment on participants after the initiation of the pandemic. Participants were compensated \$25 for completion of the Coronavirus Impact Scale and a set of other stress, social support, and well-being measures included in the ongoing PREDICT protocol. Johns Hopkins All Children's Hospital IRB approval and maternal informed consent were obtained for this supplemental data collection.

Insert Table 1 here

Measures

The Coronavirus Impact Scale is a 12-item scale assessing multiple aspects of COVID-19 related effects on children and families (Table 1). The first 8 items are indicators of COVID-19 impact across a broad array of domains to which respondents make a 4-level ordinal response on severity with anchored prompts. Items 9-11 reflect direct or familial experience with SARS-CoV-2 infection and symptoms. Item 9 is rated on a 4-level ordinal scale, while items 10 and 11 have a fifth level to indicate death due to coronavirus. The 12th item is a free response item that is not part of the scaled scores; it prompts respondents to list potential additional ways coronavirus has impacted their life. In the PREDICT cohort, for continuity with a prior wave of data collection, the question about financial income impact was asked separately, outside of the Coronavirus Impact Scale questions.

Anxiety and stress measures were available in the CHCO and PREDICT samples. For CHCO, these were three Patient-Reported Outcomes Measurement Information System (PROMIS) short forms (NIH, 2011), parent report for child (i.e., “parent proxy”) for anxiety (version 2.0, 8a), physical stress experiences (version 1.0, 8a) and psychological stress experiences (version 1.0, 8a). Physical experiences of stress include stress-associated symptoms of trouble breathing, shaking, and muscle tension, whereas psychological symptoms include feeling under pressure, concentration difficulties, and difficulties managing life. Concurrent validity measures reported here for the PREDICT sample include the PROMIS short form adult self-report for anxiety (version 2.0, 6a; NIH, 2011) and the Perceived Stress Scale (Cohen et al. 1983).

Insert Table 1 here

Scale Development

The Coronavirus Impact Scale was developed rapidly at the onset of the pandemic in a two-step process. Drs. Stoddard & Kaufman originally drafted the scale, as a supplement to the clinical interview of the Yale-Vermont Adversity in Childhood Scale (Y-VACS; Hudziak & Kaufman, 2014). Therefore, it follows the Y-VACS structure in providing respondents well-anchored response options ordered on severity. As depicted in Table 1, respondents are probed to rate the impact of coronavirus on multiple domains of life (e.g. routines, medical care access, income, etc.) using the detailed ordinal anchors.

After determining its layout and draft items, the second step involved soliciting expert opinion for item development. Over the course of two weeks, authors, clinical colleagues, and collaborators recommended a pool of items which was iteratively reviewed and condensed to the current scale by Drs. Stoddard and Kaufman. Eight items were selected to indicate impact across multiple domains of life, evident in March-April 2020. Items were selected to survey impact without a specific subscale structure in mind. Three additional items were added to probe direct or familial experience with coronavirus diagnoses. Finally, given the preliminary nature of the scale, an open-ended item was added querying about further potential impacts from the respondent. The scale was finalized on April 15, 2020 and made available on PhenX and National Library of Medicine Disaster Response sites. The scale was translated into Spanish by bilingual/bicultural staff working with Dr. Paris and is also available in French Canadian, German, and Slovene. Translations are currently underway in Turkish and the Indonesian language Bahasa.

There are two versions of the scale. The 4.15.2020 version of the scale allows ratings of items 10 and 11 on a 1-4 scale (mild symptoms to death). The more recent 5.2.2020 version

(Table 1) expands the scale of these two items to 0-4 with, making explicit a recommendation to give a score of 0 for “None,” on these two items for no symptoms or no person was ill.

Data Analysis

A major analytic goal was to measure internal consistency to determine a scoring method, for which a conservative, model-free method best suited the size of the Coronavirus Impact Scale and our sample sizes.¹ Therefore, our *a priori* primary measure of interest for internal consistency was Revelle’s β , which is the worst split-half reliability (Revelle, 1979), on polychoric correlations between the ordinal responses. Revelle’s β is more conservative than other measures of internal consistency and provides a minimum estimate of the saturation of a scale’s items on a common, i.e. general, factor (Zinbarg et al., 2005). To interpret the sum of items on a scale as adequately representing a unitary construct a common rule has been $\beta > 0.5$ (Revelle, 1979). Scale substructure was determined by an item cluster analysis (iclust) approach, a model free method of determining the internal structure of a scale which is ideal for short measures (Revelle, 1978). To aid interpretation, Cronbach’s alpha on ordinal items responses converted to integers as commonly done is also reported. This does provide some information on reliability.

Analyses were conducted using package *psych* v 2.0.12 (Revelle 2020) in the R v 4.0.3 environment (R Core Team, 2020). Nine participants from the JHMI group were missing 5 or more responses due to not completing the second page of the scale presented to them. Their

¹ For quantitative analysis, a common model-based approach uses factor analyses to explore different structure models in one portion of the data and then test the best model in a separate portion. Once a model is selected, it may be queried for an estimate of internal consistency, with the two most common model-based metrics for reliability being Cronbach’s α (which assumes tau-equivalence) and hierarchical ω (based on a bifactor structure). This method requires large samples and a scale with a sufficient number of items to determine a putative substructure.

scales were not used for further analysis. Data from the remaining 563 individuals were all complete except 26 missing one item, 22 missing two items, and 2 missing three items. Missingness was similar across the groups but more common for items 10 and 11 which indicated the number of family members ill. Item completion rate is detailed in Supplemental Table S1. Missingness was rare for items 1-8, in which only 1.4% of individuals were missing a single response. For polychoric correlations, missing responses were imputed to the overall response frequency. Deleting cases with missing responses instead of imputing missing responses did not change results. Sum scores were not computed for individuals with missing items.

For the internal structure test, the distributions of individual items were examined. A polychoric correlation matrix of reasonably well distributed items was calculated and entered into the function *splitHalf* to estimate worst split half reliability, β . The matrix was also entered into the function *iclust*. Polychoric correlations are necessary due to the ordinal nature of responses. The resultant β values calculated via *iclust* from the polychoric correlation matrix are thereby standardized (i.e. reference a latent, standard normal distribution), they represent the minimum estimate of the amount of variance in the response set associated with a general factor. The *iclust* agglomerative, hierarchical clustering method uses psychometric reliability criteria, increasing alpha and beta, to determine the number of clusters from the correlations of a set of items. This algorithm has been validated for psychometric purposes (Revelle 1979, Cooksey & Soutar, 2006). In this study, an optimal number of clusters of one would support items representing a single component. The algorithm also reveals the hierarchical structure of items within a sample. Differences in the cluster dendrograms for each sample reveal variations in response structure (see Cooksey & Soutar, 2006, for details).

Differences between samples of within-participant item ratings were tested by multivariate ordinal regression using package *mvord* v 1.1.1 using a multivariate normally distributed errors and a general covariance structure (Hirk et al. 2020). To improve interpretability, significant estimates of sample deviations from the mean response (across groups) at $p < .001$ are reported in the text, though full results can be found in Supplemental Table S2. A preliminary examination of parent-child impact score concordance was assessed via inter-class, i.e. Pearson, correlation in the NIMH sample.

Results

Participant Characteristics

The samples' distinctive characteristics are evident in self-report of demographics depicted in Table 2. The CHCO sample consisted of primary caregivers whose children were receiving outpatient mental health care. They were characterized by high educational attainment and predominantly identified their children as White. The JHMI sample consisted of caregivers whose children ($M = 14.4$, $SD = 2.1$, 39.3% Black, 72% female, 46.4% Medicaid as primary insurance) were being admitted to a psychiatric inpatient service. Approximately half the caregivers had a college degree and the majority were currently working. The EC/CT sample consisted of primarily immigrant Latinx mothers who were engaged in Child Parent Psychotherapy with their young children. The majority had household incomes of less than \$25,000, were not working outside the home, and had no more than a high school education. The NIMH sample consisted of caregivers whose children met DSM-5 criteria for primary ADHD, DMDD, ADs, or who did not meet DSM-5 diagnosis. The reported median household annual income was \$90,000-\$179,000 and caregivers predominantly identified their children as White. The PREDICT sample- comprised of women enrolled in the context of prenatal care and

surveyed when their children were in infancy to early childhood- was majority white with at least some college education; more than 20% were unmarried.

Insert Table 2 here

Internal Consistency

Items 1-8 were well distributed across all samples, allowing for further analysis of internal consistency (Supplemental Table S1). The two items 9-10 probing for direct or immediate family experience of infection were unlikely to have nonzero responses, yielding distributions too kurtotic and skewed to assess the item. In any of the five samples, the greatest percentage of nonzero responses for these items was 11.4%. As may be expected, item 11, a report of extended family or friends having a diagnosis of COVID-19, was also zero-inflated but mixed across samples in terms of acceptable distribution, with nonzero responses ranging from 15.4-46.2% (Supplemental Table S1).

Therefore, items 1-8 were carried forward as reasonably well distributed, e.g. the absolute value of skew and kurtosis < 2 across all samples, for assessment of internal consistency. Measures of internal consistency and internal structure are displayed in Table 3. Notably, in all five samples, the internal consistency of items 1-8 yielded acceptable standardized, worst split half reliabilities of $\beta=0.51-0.70$, with β values greater than 0.5 suggesting the items on a scale represent a unitary construct. They also yielded acceptable Cronbach alpha measures of reliability $\alpha=.64-.75$. This suggests the sum of these items are adequately interpretable as an overall measure of COVID-19 impact. Similarly, in support of the measure comprising a single scale, in all samples, the optimally reliable cluster solution was one, with similar loadings of items onto a single cluster (VSS Fit=0.90-0.96; see Table 3).

Insert Table 3 here

Internal Structure

Despite being adequately unidimensional for interpreting a sum score across items 1-8, there is certainly substructure in the scale. The more detailed cluster dendrograms reveal this structure (Supplemental Figures S1-S5) and demonstrate a remarkably similar structure across all groups. Across samples, items 3 (food access) and 2 (family income/employment) clustered together. Except for the EC/CT sample, items 1 (routines), 6 (access to familial/social support), and 7 (personal experience of stress) formed a subgroup. In the EC/CT sample, items 1 (routines) and 6 (support) formed a subcluster, but item 7 (personal stress) joined these items as part of a broader subgroup which included item 8 (family stress/discord) and item 5 (mental health care access).

Impact Scores and Response Profiles by Group

Overall, mean Coronavirus Impact Score (sum of items 1 through 8), differed between groups (ANOVA $F(4,550)=18.7$, $p<.001$). In Holm-Bonferroni corrected pairwise t-tests, the mean (SD) total impact score for EC/CT [12.0 (4.2)] and CHCO [11.1 (3.7)] did not significantly differ, but each were significantly greater than those of JHMI [9.5 (3.5)], NIMH [8.7 (3.3)], and PREDICT [8.2 (3.6)], all corrected p 's $<.003$. Mean Impact Score for JHMI was greater than that of PREDICT ($p=0.024$). Otherwise, there were no significant pairwise differences.

In addition to differences in total scores, there were some differences in rated items (Figure 1). In multivariate ordinal regression, some samples significantly deviated from the average ratings across all samples for an item. Highly significant deviations (all p 's $<.001$) are reported here, please see the full regression table (Supplemental Table S2) for complete results.

Impact on items 2 (family income and employment) and 3 (food access) were rated higher by those in the EC/CT group and lower for those in the NIMH group. Those in the EC/CT group also rated item 4 (medical care access) at a higher level than the mean rating of all groups. Item 5 (mental health care access) was rated higher by the JHMI and CHCO groups. Item 7 (personal stress) and 8 (family stress/discord) were rated higher by the CHCO group. The PREDICT sample rated impact less for items 1 (routines), 4 (medical care access), 5 (mental health care access), 7 (personal stress), and 8 (family stress/discord), and they rated greater impact for item 2 (income).

Insert Figure 1 here

Impact Score Associations with Infection

Though items 9-11 did not have properties allowing them to participate in a test of internal consistency, we could test their relationship to the Impact Score, the sum of items 1-8, across the sample. Across samples, Impact Scores are lesser for those reporting no personal diagnosis or no symptoms versus those reporting any level of symptoms, mean (SD) = 9.3 (3.7) and 12.4 (4.4), respectively, $t(49.7)=4.5$, $p<0.001$, Cohen's $d=0.79$ (a large standardized difference). When referencing family members or extended family/friends, no significant difference in average impact score was found for those reporting no diagnosis or symptoms versus any level of symptoms (all p 's ≥ 0.29 , Cohen's $d \leq 0.18$).

Impact Score Associations with Anxiety and Stress and Caregiver Adolescent Concordance

In the CHCO sample, Impact Score predicted parent-report of index child anxiety ($b(SE)=0.48 (0.23)$, $p=0.049$, adjusted $R^2=2.0\%$), physical stress ($b(SE)=0.96 (0.23)$, $p<0.001$, adjusted $R^2=9.7\%$), and psychological stress ($b(SE)=0.71 (0.19)$, $p<0.001$, adjusted $R^2=8.1\%$) in a multivariate linear model. Similarly, in the PREDICT sample, total impact score predicted

anxiety ($b(SE)=0.39 (0.093)$, $p<0.001$, adjusted $R^2=8.4\%$) and perceived stress ($b(SE)=0.70 (0.13)$, $p<0.001$, adjusted $R^2=12.4\%$).

In the NIMH sample, the correlation between caregiver- and adolescent-report on the same family was $r(46)=0.57$, $p<0.001$.

Discussion

This report describes the development and initial validation of the Coronavirus Impact Scale, a rapidly constructed, brief measure of coronavirus impact. Overall, there is evidence to support summing the first eight items of the Coronavirus Impact Scale to represent impact in diverse samples. For every sample, this was supported through a model free test of saturation on the common factor and an optimal cluster of one via hierarchical clustering by psychometric criteria. External validation is supported by positive associations between Impact Score and established, general measures of anxiety, stress reactions, and direct experience of infection. The study also provides evidence of which specific types of impact items co-occur and differences in specific experiences of impact across the samples. Altogether, these findings suggest acceptable psychometrics and utility of the scale for diverse samples.

Given that the sum of items 1 through 8 are interpretable, it is reasonable to sum them for a total impact score and assess within sample associations. Though there is good support of a common factor of impact across items, there is some inhomogeneity, or lumpiness, in the scale, where certain items cluster together in all samples. This is especially true of the two items representing food access and financial impact. Of note, the clustering of stress with family support is consistent with recent work suggesting that family support mitigates COVID-19 impact in families (Penner et al., 2021). Extending the use of the scale to adolescent respondents has preliminary support by the reasonably high correlation of the sum score between caregiver

and adolescent respondents. However, users should consider that the scale inquires about broad experiences of personal stress and family function and not about adolescent-specific impacts.

We did not expect insufficient support for including direct or familial experiences of COVID-19 diagnosis in the scale. The interpretation should not be that these experiences do not contribute to impact, but just that these experiences were relatively infrequent across samples. Indeed, those reporting personal or familial diagnosis of COVID-19 infection reported greater impact scores. Should data collection have occurred when direct experiences of infections were more prevalent, these items may have been analyzable for their contribution to overall impact. Consistent with this hypothesis, a recent report using this scale in a sample of adult ‘long-haulers’ found good internal consistency and external validity when including the items reflecting the degree of infection impact 9, 10b, and 11b (Jason et al. 2021).

Differences between groups in item responses emerged. A high level of impact with a concerning disparity in financial impact and food access, was experienced by Latinx, immigrant, single mothers of young children. This finding provides some quantitative evidence for such an expected disparity relative to other groups (Rothe et al. 2021). Based on direct experience of those working with the young mothers in the EC/CT sample, their immigrant status (mostly undocumented), being almost all monolingual Spanish speakers, and loss of employment/low incomes are likely factors that have led to direct impacts (e.g., language barriers for services or lack of resources) as well as stress from fears of eviction and food insecurity. This reflects the broader truth that vulnerable and marginalized groups shoulder an unequal burden of the coronavirus pandemic.

Two samples were characterized by seeking treatment in two settings outside of primary research, these were outpatients recently entering treatment (CHCO) and psychiatric inpatients

assessed at admission (JHMI). In particular, the JHMI sample's acute distress is likely reflected in the missing responses and lower reliability scores. Both samples reported relatively higher impact for mental health access. Though much work is focusing on discovering associations between impact and health outcomes, these results support identifying differential experiences which may be key indicators of specific points of intervention, such as access to care.

Limitations Considered

The cohorts included in this investigation were samples of convenience, which limits our inferences about specific factors that drive group differences. An inadequate number of Spanish speaking participants were included to evaluate the validity of the Spanish version of the scale. Tests of inter-rater reliability, with different caregivers reporting on the same household, were also not conducted.

Conclusion

This study provides psychometric validation for a well anchored, brief assessment of the impact of the Coronavirus on families and their children. In comparisons across five samples, it demonstrates clinical utility in measuring overall impact as well as demonstrating specific differences in impact between samples. It is also a useful clinical tool for identifying targets for intervention and support for families.

Key Points

- The COVID-19 Impact scale is a caregiver report scale of impact with good psychometric properties.
- Differences in experiences of impact between different clinical samples reveals vulnerability and points of intervention.

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Table 1. The Coronavirus Impact Scale

Rate how much the Coronavirus pandemic has changed your life in each of the following ways.

1. Routines:
 0. No change.
 1. Mild. Change in only one area (e.g. work, education, social life, hobbies, religious activities).
 2. Moderate. Change in two areas (e.g. work, education, social life, hobbies, religious activities).
 3. Severe. Change in three or more areas (e.g. work, education, social life, hobbies, religious activities).
2. Family Income/Employment:
 0. No change.
 1. Mild. Small change; able to meet all needs and pay bills.
 2. Moderate. Having to make cuts but able to meet basic needs and pay bills.
 3. Severe. Unable to meet basic needs and/or pay bills.
3. Food Access:
 0. No change.
 1. Mild. Enough food but difficulty getting to stores and/or finding needed items.
 2. Moderate. Occasionally without enough food and/or good quality (e.g., healthy) foods.
 3. Severe. Frequently without enough food and/or good quality (e.g., healthy) foods.
4. Medical health care access:
 0. No change.
 1. Mild. Appointments moved to telehealth.
 2. Moderate. Delays or cancellations in appointments and/or delays in getting prescriptions; changes have minimal impact on health.
 3. Severe. Unable to access needed care resulting in moderate to severe impact on health.
5. Mental health treatment access:
 0. No change.
 1. Mild. Appointments moved to telehealth.
 2. Moderate. Delays or cancellations in appointments and/or delays in getting prescriptions; changes have minimal impact.
 3. Severe. Unable to access needed care resulting in severe risk and/or significant impact.
6. Access to extended family and non-family social supports:
 0. No change.
 1. Mild. Continued visits with social distancing and/or regular phone calls and/or televideo or social media contacts.
 2. Moderate. Loss of in person and remote contact with a few people, but not all supports.
 3. Severe. Loss of in person and remote contact with all supports.
7. Experiences of stress related to coronavirus pandemic:
 0. None.
 1. Mild. Occasional worries and/or minor stress-related symptoms (e.g., feel a little anxious, sad, and/or angry; mild/rare trouble sleeping).
 2. Moderate. Frequent worries and/or moderate stress-related symptoms (e.g., feel moderately anxious, sad, and/or angry; moderate/occasional trouble sleeping).
 3. Severe. Persistent worries and/or severe stress-related symptoms (e.g., feel extremely anxious, sad, and/or angry; severe/frequent trouble sleeping).
8. Stress and discord in the family:
 0. None.
 1. Mild. Family members occasionally short-tempered with one another; no physical violence.
 2. Moderate. Family members frequently short-tempered with one another; and/or children in the home getting in physical fights with one another.
 3. Severe. Family members frequently short-tempered with one another and adults in the home throwing things at one another, and/or knocking over furniture, and/or hitting and/or harming one another.
9. Personal diagnosis of coronavirus.
 0. None.
 1. Mild. Symptoms effectively managed at home.

2. Moderate. Symptoms severe and required brief hospitalization.
 3. Severe. Symptoms severe and required ventilation.
10. Number of immediate family members diagnosed with coronavirus: ____
Rate the symptoms of the person who was most sick:
0. None.
 1. Mild. Symptoms effectively managed at home.
 2. Moderate. Symptoms severe and required brief hospitalization.
 3. Severe. Symptoms severe and required ventilation.
 4. Immediate family member died from coronavirus.
11. Number of extended family member(s) and/or close friends diagnosed with coronavirus: ____
Rate the symptoms of the person who was most sick:
0. None.
 1. Mild. Symptoms effectively managed at home.
 2. Moderate. Symptoms severe and required brief hospitalization.
 3. Severe. Symptoms severe and required ventilation.
 4. Extended family member and/or close friend died of coronavirus.
12. Other. Please tell us about any other ways the coronavirus pandemic has impacted your life:

Table 2. Sample Description¹

	CHCO (n=159)	JHMI (n=112)	EC/CT (n=41)	NIMH (n=73)	PREDICT (n=187)
CHILD CHARACTERISTICS					
Age in years Mean (SD)	12.0 (3.4)	14.4 (2.1)	2.9 (1.8)	14.0 (2.8)	3.0 (1.3)
Female natal sex	48%	72%	51%	38%	50%
Race²					
American Indian	4%	0%	0%	3%	0%
Asian	10%	4%	0%	4%	4%
Black	9%	39%	8%	10%	9%
White	86%	52%	31%	68%	84%
Other	6%	5%	51%	14%	3%
Ethnicity²					
Latinx	13%	5%	83%	14%	7%
CAREGIVER CHARACTERISTICS					
Age in years Mean (SD)	45.6 (13.3)	NA	32.0 (5.6)	NA	33.5 (5.2)
Female natal sex	NA	76%	100%	NA	100%
Marital Status					
Married	79%	51%	29%	NA	73%
Divorced	9%	20%	2%	NA	2%
Widowed	0%	5%	0%	NA	0%
Separated	4%	5%	20%	NA	0.5%
Never married	6%	20%		NA	6%
Unmarried couple	3%	0%	49% ³	NA	17%
Educational Attainment					
Less than high school	0%	3%	39%	2%	0.6%
High school or GED	3%	19%	27%	2%	11%
Some college	11%	28%	5%	8%	26%
Associate	11.4%	3%	5%	8%	11%
Bachelor's	38%	26%	22%	14%	33%
Master's	25%	15%	0%	75%	13%
Doctoral	12%	5%	0%	75%	6%
Employment					
Working now	59%	83%	51%	NA	65%
Temporary leave	3%	2%	2%	NA	0%
Unemployed ⁴	2%	6%	12%	NA	0.5%
			34%		
Retired	3%	2%	0%	NA	2%
Disabled	6%	3%	0%	NA	0%
Keeping house	23%	4%	NA	NA	29%
Student	0.6%	0%	0%	NA	0%
Other	4%	0%	0%	NA	3%

Sample Acronyms: CHCO = Children's Hospital Colorado; JHMI=Johns Hopkins Medical Institute; EC/CT= Early Connections/Conexiones Tempranas; NIMH=National Institute of Mental Health; PREDICT= Prospective Research on Early Determinants of Illness and Children's Health Trajectories.

¹Throughout, NA is used to indicate that these data were not collected for this sample.

²For the EC/CT and PREDICT sample race and ethnicity report is of the whole family, for CHCO, JHMI, and NIMH caregivers are prompted to respond about their child.

³Never married and unmarried couples are not distinguished in the EC/CT sample.

⁴Unemployed is accompanied with "looking for work" for the CHCO, JHMI, and NIMH samples. For EC/CT, unemployment has two categories. The first is "looking for work (12%) and the second is "not looking for work" (34%). This latter category cannot be distinguished from keeping house, which is probed for this sample.

Table 3. Internal consistency and structure of the COVID Impact Scale

	CHCO	JHMI	EC/CT	NIMH	PREDICT
Raw α^1	0.75	0.64	0.70	0.74	0.73
Standardized β^2	0.67	0.51	0.63	0.65	0.70
Cluster analysis					
Optimal # of Clusters ³	1	1	1	1	1
VSS Fit ⁴	0.94	0.91	0.91	0.90	0.96
Item Loadings⁵					
1. Routines	0.60	0.62	0.43	0.65	0.68
2. Income	0.52	0.48	0.55	0.38	0.47
3. Food	0.68	0.55	0.79	0.53	0.60
4. Medical Access	0.76	0.60	0.56	0.54	0.57
5. Psych Access	0.61	0.38	0.45	0.56	0.60
6. Support	0.61	0.48	0.51	0.67	0.47
7. Personal Stress	0.61	0.65	0.73	0.85	0.74
8. Family Stress	0.43	0.27	0.46	0.61	0.53

1. Raw Cronbach's alpha estimates reliability, or the expected correlation between the COVID Impact Scale and a test just like it in an identical sample. Raw values are calculations based on ordinal values converted to integers.
2. Standardized Revelle's beta, or worst split half reliability, represents the proportion of variance in responses that are attributable to a common, i.e. general, factor across items. Standardized values are derived from polychoric correlations.
3. The number of clusters optimized on both alpha and beta. Here the optimized number of clusters is one across samples, suggesting a unidimensional scale across samples.
4. Very simple structure (VSS) fit metric used by Revelle for iclust, 0 is poor and 1 is perfect.
5. These loadings may be interpreted as the loadings onto a single factor solution in factor analysis.

Figure 1. Mean ratings by sample for each of the first eight Coronavirus Impact Scale items. Items are in order of presentation in the scale (Table 1).