WOODCOCK INSTITUTE FOR THE ADVANCEMENT OF NEUROCOGNITIVE RESEARCH AND APPLIED PRACTICE & TEXAS WOMAN'S UNIVERSITY

Multidisciplinary Assessment, Rehabilitation, and Intervention Services for Children With Long COVID

Dr. Ann Leonard-Zabel

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DR. ANN LEONARD-ZABEL

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Dr. Ann Marie Leonard-Zabel is a Full Professor of Psychology and Department Coordinator at Curry College. She received awards from Curry College involving Person of the Year, Excellence in Teaching, Excellence in Research, Excellence in Partnership Collaboration and Woman of Inspiration.

She is a frequent speaker and keynote at national and international conferences involving School Psychology, School Neuropsychology, Disability Analysis, Homeland Security, Violence-Aggression, Forensic Examining, Autism, Trauma, A-D/HD, COVID-19 Effects on Pediatric Learning, Ethics, and Addictions. In addition, she owns a private international practice specializing in evaluations and consultation for neuro-behavioral learning disabilities, neuro-developmental disorders, emotional-behavioral disorders, forensic examiner evaluations and substance use/abuse disorder. Dr. Leonard-Zabel has written training programs in Autism, Mental Heath, Learning Disabilities, Telepractice Therapy, Diversity-Equity-Inclusion, as well as chapters in Ethics, TBI, Addictions, and Forensics. Dr. Leonard-Zabel is a Board of Director for the Learning Disabilities Worldwide Congress and a is one of the Global Goodwill Ambassadors-USA for the Global Goodwill Ambassador Foundation focusing on the UN SDG 3 - Good Health and Well-Being (strengthen the prevention, assessment and treatment of substance use disorder) and SDG 4 - Quality Education (disabilities and human rights) and SDG 16 - Promote Peaceful and Inclusive Societies (decrease violence and abuse of children).

She received the Lifetime Achievement award in School Neuropsychology and the Distinguished Lifetime Career Achievement award from the American Board of Disability Analysts. For the past 16 years, she has served as a clinical instructor and supervisor for a Post-Graduate/Post-Doctoral Hybrid Model Program for the School Neuropsychology Institute Post-Graduate Certificate Program. She assists with training professionals in the United States and abroad to be a board-certified Diplomate by the American Board of School Neuropsychology.

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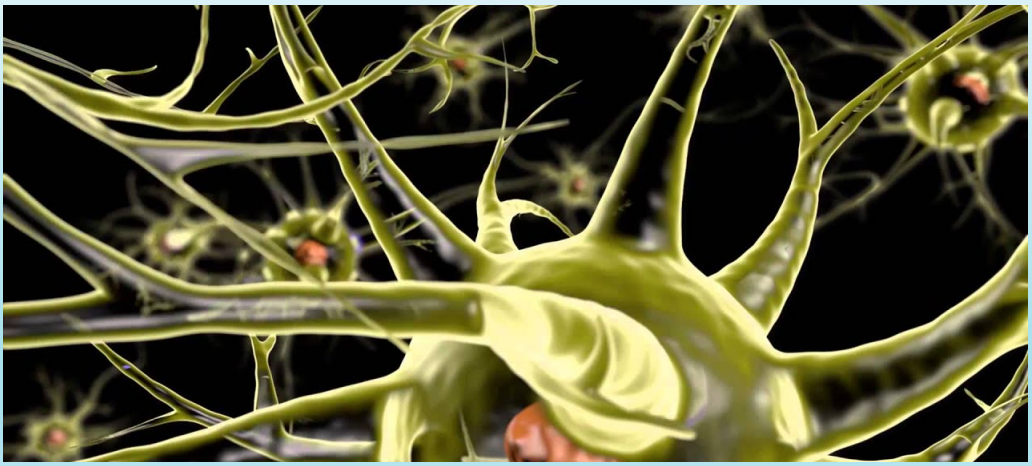
PERMISSION RESTRICTIONS



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INSPIRATION DESPITE LONG COVID

"YOU ARE BRAVER THAN YOU BELIEVE, STRONGER THAN YOU SEEM, AND SMARTER THAN YOU THINK."

CHRISTOPHER ROBIN, WINNIE THE POOH

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Presenter: Dr. Ann Marie Leonard-Zabel

GOALS:

1.) **WILL REVIEW WHAT EDUCATORS AND ASSESSMENT SPECIALISTS NEED TO MODIFY IN THEIR DEVELOPMENTAL AND MEDICAL HISTORY TAKING TO SCREEN FOR CHILDREN AND YOUTH WHO ARE EXPERIENCING LONG-COVID SYMPTOMS.**

2.) **WILL DISCUSS WHAT NEUROCOGNITIVE AND SOCIAL-EMOTIONAL ASSESSMENT AREAS MAY NEED TO BE COVERED IN FORMAL ASSESSMENTS TO FULLY EVALUATE THE EFFECTS OF LONG-COVID.**

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WORLD HEALTH ORGANIZATION(WHO) DECEMBER 2022 DEFINITION

- **Definition (December 2022).**
- **Post COVID-19 condition is defined as the continuation or development of new symptoms 3 months after the initial SARS-CoV-2 infection, with these symptoms lasting for at least 2 months with no other explanation. Symptoms include fatigue, shortness of breath and cognitive dysfunction. It is noted that over 200 different symptoms are reported worldwide and can impact everyday functioning.**
- **Numbers affected**
- **The WHO reports that studies show around 10–20% of people infected by SARS-CoV-2 may also go on to develop symptoms that can be diagnosed as Long COVID. Although it is not fully known about the exact numbers of those living with the condition, it is believed that more than17 million people across the WHO European Region may have experienced it during the 2020 and 2021 pandemic eruption.**

https://www.who.int/news-room/events/detail/2022/08/17/default-calendar/post-covid-19-condition--children-and-young-persons

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PART 1: WHAT WE KNOW AND DON'T KNOW ABOUT PEDIATRIC LONG-COVID

- Let's review what educators and assessment specialists need to modify in their developmental and medical history taking to screen for children and youth who are experiencing long-COVID symptoms.

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CHILDREN AND YOUTH WITH POST ACUTE SEQUELAE OF SARS-COV-2 INFECTION (PASC)

Developmental Histories of Children and Youth typically review for interview(s) of parents/guardians and school professionals, academic records for grades including teacher comments, classroom observations, and other qualitative and quantitative sources of medical history.

However, since the impetus of COVID-19 as of March 2020, many children and youth worldwide have experienced and suffered the ramifications of PASC.

This presentation will suggest areas to look further beyond a standard developmental history to include various aspects of psycho-educational, neuro-educational, along with medical co-morbidities, that may impact a youngster's return to learning.

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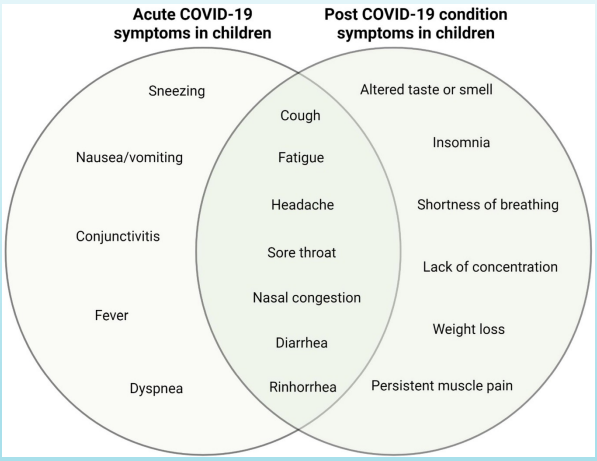
REVIEW OF DIFFERENTIAL SYMPTOMS OF POST-COVID-19 CONDITION IN CHILDREN AND ADOLESCENTS TO FACILITATE DIAGNOSIS.



(Izquierdo-Pujol, J., Moron-Lopez, S., Dalmau, J., Gonzalez-Aumatell, A., Carreras-Abad, C., Mendez, M., Rodrigo, C., & Martinez-Picado, J., 2022).

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THE LONG COVID NATIONAL RESEARCH ACTION PLAN (2022)

According to the National Research Action Plan on Long COVID penned on April 5, 2022, "President Biden issued the Memorandum on Addressing the Long-Term Effects of COVID-19 outlining actions needed to support the American people in addressing the longer-term effects of COVID-19."

The National Research Action Plan further reports that "the end of the COVID-19 public health emergency will not signal the end of the effects of the pandemic. These lingering effects may impact the health of the nation for years to come."

"Recovery from COVID-19, can vary from infected individuals. Most recover quickly and completely with no significant residual effects."

However, the National Research Action Plan reports that "some individuals experience symptoms that persist or emerge weeks or even months after the initial phase of the infection has passed, even when the infection was asymptomatic. These sets of conditions are often referred to as Long COVID."

The term Long COVID was made widely known by patients and is used in the National Action Plan on Long Covid 2022. "The Plan also recognizes the importance of two technical terms, Post-COVID-19 conditions, or PCC, broadly equivalent to Long COVID, and Post-acute Sequalae of SARS-CoV-2 infection, focused on the direct effects of the virus."

For the sake of this talk, we will focus on the term Post-acute Sequalae of SARS-CoV-2 infection know as the acronym PASC.

https://www.covid.gov/assets/files/National-Research-Action-Plan-on-Long-COVID-08012022.pdf

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LET'S BEGIN AS TO WHAT AREAS MAY BE NECESSARY FOR EDUCATORS AND ASSESSMENT SPECIALISTS TO REVIEW IN THEIR DEVELOPMENTAL AND MEDICAL HISTORY TAKING TO SCREEN FOR CHILDREN AND YOUTH WHO ARE EXPERIENCING LONG-COVID SYMPTOMS.

FIRST, LET'S REVIEW THE RESEARCH FINDINGS.

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ARTICLE TITLE: NEUROPSYCHOLOGICAL EVALUATION OF COGNITIVE DISORDERS IN CHILDREN AFTER COVID-19 FROM TROITSKAYA ET AL, 2022

- **"The article presents the results of neuropsychological remote and face-to-face testing of 25 children aged 12 to 17 years in the nearest (during and 1-2 weeks after the treatment) and later period (2-12 months) after COVID-19 infection with predominant respiratory tract infection, organized in Ekaterinburg in the State Autonomous Institution "Children's Hospital № 8". Indication of family contact with patients with a new coronavirus infection was found in all patients, a positive nasopharyngeal swab for SARS-CoV-2 RNA by PCR was found in 58%, non-focal neurological complaints were found in 54% of children. The control group consisted of 25 pupils of Moscow comprehensive schools (14 girls and 11 boys) aged between 12 and 16 years who were examined before the pandemic."**
- **"The methods included: investigation of the kinesthetic, spatial, dynamic, graphic praxis; auditory-motor coordination; visual, object-constructive gnosis; auditory-speech, visual memory; voluntary attention; and thinking. Significant differences with the results of neuropsychological tests performed in children in the control group were found, allowing us to assert impairment of memory, attention, visual gnosis, visual-spatial function, kinesthetic and dynamic praxis, verbal and non-verbal component of thinking. According to A.R. Luria's theory, the topic of the disorders involves the temporo-parieto-occipital, mediobasal, frontotemporal parts of the brain, the reticular formation and limbic structures. This necessitates the development of corrective educational programs and an in-depth diagnostic algorithm that determines the morphological substrate of cognitive disorders in children, who have undergone COVID-19."**

Neuropsychological evaluation of cognitive disorders in children after COVID-19 - PMC (nih.gov)

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ARTICLE TITLED: PERSISTENT NEUROCOGNITIVE PROBLEMS RELATED TO COVID-19 IN CHILDREN AND ADOLESCENTS FROM MUTLU AND TAŞPOLAT, 2022

According to Mutlu and Taşpolat, 2022 "Clinical studies are still exploring the long-term effects of COVID-19. The reports are conflicting regarding its prevalence, duration, and impact on daily life. Childhood is a critical period of life for acquiring social, behavioral, and educational development. Parents need to be informed about the cognitive effects of COVID-19. It is significant that teachers, psychiatrists, and pediatricians collaborate on cognitive impairments. Pediatric cases with neurocognitive signs raise concerns about the potential for health sequelae to affect child and family functioning over many life years".

"Early diagnosis is a substantial point for long-COVID in children. After COVID-19, children and adolescents may be followed up by outpatient services for a while. Doctors may assess the neurocognitive complaints. A multidisciplinary approach will be beneficial in this issue. More knowledge on long-term sequelae of COVID-19 in children and adolescents needs to be collected. Further studies are required to provide greater insight into the neurocognitive effects of COVID-19 on developing brain."

HTTPS://JAG.JOURNALAGENT.COM/CSMEDJ/PDFS/CSM_2_2_38_48.PDF

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ARTICLE TITLED:

BRIEF REPORT-
COGNITIVE DIFFICULTIES, PSYCHOLOGICAL SYMPTOMS, AND LONG-LASTING SOMATIC COMPLAINTS IN ADOLESCENTS WITH PREVIOUS SARS-COV-2 INFECTION: A TELEHEALTH CROSS-SECTIONAL PILOT STUDY

(TARANTINO, GRAZIANO, CARDUCCI, GIAMPAOLO AND CAPITELLO, 2022)

HTTPS://WWW.NCBI.NLM.NIH.GOV/PMC/ARTICLES/PMC9332506/PDF/BRAINSCI-12-00969.PDF

From the conclusion of this study, they found the following, "Cognitive, psychological, and somatic symptoms may be very common among the adolescents recovered from COVID-19. Our data reveal a substantial prevalence of depression and anxiety in adolescents following COVID-19 infection."

"The symptoms, such as fatigue, brain fog, or self-reported memory problems, may be associated with both anxiety and depression, but also with low performance on memory or executive function tasks. Because of the potential impact that SARS-CoV-2 infection may have on adolescents' long-term health, a systematic evaluation of adolescents recovered from COVID-19 should include both a neuropsychological and a psychological screening."

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LET'S REVIEW A LONG COVID PASC "STANDARD" DEVELOPMENTAL HISTORY

I.) Presenting Concerns from Parents/Guardians-Referral Questions

II.) Review of Symptoms of PASC in Children and Adolescents

Fatigue – review of exercised tolerance vs. intolerance

Review of Sleep Disturbances

How often are fevers-random or consistent

(AAPM & R, 2023)

III.) Mental Health/Psychiatric:

Anxiety and/or Depression – what types via DSM V-TR

Mild/Moderate/Severe somatic symptom

School Refusal or Avoidance

Regression of academic, psycho-social and/or psycho-neurological milestones

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LONG COVID DEVELOPMENTAL HISTORY-PASC

IV.) Autonomic/Neurological Difficulties

Vertigo/dizziness and/or lightheaded

Nausea-sick to the stomach

Syncope

Headaches, numbness, brain fog, weak attention span, inconsistent concentration and memory difficulties

(AAPM & R, 2023)

V.) Respiratory/Pulmonary/ Cardiac

Difficulty breathing-catching breath

Coughing hard resulting in thoracic pain

Exercise fatigue-lack of stamina

Tachycardia, chest pain

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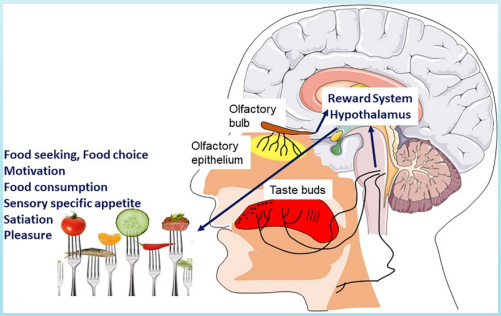
LONG COVID DEVELOPMENTAL HISTORY PASC



(AAPM & R, 2023)

VI.) ENT, Musculoskeletal, and Gastrointestinal

No or partial smell and/or taste

Muscle, bone, joint and connective tissue weaknesses

Nausea/vomiting/reflux, abdominal pain, bowel movements irregularities, diarrhea, weight loss due to lack of appetite

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NOW LET'S S REVIEW A SUGGESTED "EXTENDED" DEVELOPMENT HISTORY INVOLVING PASC

- Begin with establishing rapport with active listening skills.

Please Ask the following questions:

- How did COVID-19 affect the youth and family? Who was ill in the immediate family? How did they recover? Did the family experience death(s) of a loved one or someone close to the youth and/or family? How was the grieving process supported by family, friends, work, school, community?
- Get specific dates as to when the youth experienced COVID-19. What treatments were recommended or implemented? If hospitalized, how long was the duration? Was the youth intubated and how long? Is the youth currently on medications? If so, what are the names, dosages, and what they are designed to treat?
- Ask parents/guardians their views with specific questions surrounding how the youth performed in school, and now with PASC? How was remote learning? How hard was it for the youth to transition back to an on-ground classroom setting and learning? What was the workload and the grading percentages for the subjects studied.

(Leonard-Zabel, 2023)

- Did the youth receive any mental health diagnoses as a result of the COVID-19 experience? If the youth was diagnosed with mental health concerns prior to COVID-19, did the symptoms escalate during COVID-19 illness and/or PASC?
- Do you have any records from the school and/or from the hospital/pediatrician for review purposes of this evaluation?
- Did or does the youth receive special education and/or an ADA 504 plan? Do you have copies of these documents for review purposes of this evaluation?
- If receiving modifications and/or accommodations via an IEP and/or a 504 plan, what was the service delivery like then and now?

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OBSERVATIONS FROM FAMILY & EVALUATOR

(BENJAMIN & LAUTERBACH,2016; EASTMAN ET AL, 2019; LEONARD-ZABEL, 2023)

Appearance Age appropriate/weight inline with height, hair thinning, spotted hair loss. Slouching when sitting and/or standing.	**Mood** Anxious, depressed, vacillating mood, dysphoric, elated, hostile either verbally or physically or both, enraged, silent and flat.	**Empathy and Perspective Taking** Able to relate to the professional(s) who provide care, able to relate to other's one knows and/or does not know. Demonstrate Theory of Mind, demonstrate empathy and/or compassion toward self and others, awareness of one's own strengths and challenges, awareness of social cues, able to understand verbal and nonverbal communicative behaviors, understand personal space and others need for personal space.
Demeanor Eye Contact-sustained, fleeting, limited to none, engages with others or not at all, cooperation with others, reserved or limited impulsive control, indifferent, appears motivate or lacks motivation, guarded or aggressive, appears apathetic, or helplessness.	**Affect** How one hold body-posture, standing, leaning on walls/chairs/tables, facial expression-typical for age or expansive or sullen, anxious, appears fearful, disgusted or satisfied easily, annoyed or angry, pathological laughing, wining.	**Insight and Judgement** Level of insight. Awareness of one' own illness and symptoms, awareness of the effect on others involving one's illness, judgment for self-care, approach to medical treatment(s), socially appropriate insight and judgement.
Level of Consciousness/Awareness Alert x 4, responses to stimuli, pain, noise, smell, touch, to commands asked of one. Aware of surroundings, knows where one is physically at, ability to self-monitor, aware of environment.	**Verbal Production/Thought Process** Good pacing and thinking with logical thought process, slow in speed of thought, rapidity of thought, thoughts meaningful and connected, thoughts disconnected, word salad, rhythm and sound of speech, poverty of speech, racing thoughts, accent that is not typically of one's speech tone, cursing, echolalia.	**Thought Content** Delusions-paranoid, religiosity, grandiose behavior, delusions, passivity, experience thoughts spoken out loud, obsession, phobic behavior, confabulation, vague responses. 

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PROPOSED ADDITIONS TO A TRADITIONAL DEVELOPMENTAL HISTORY (PLEASE NOTE: NOT LIMITED TO THE FOLLOWING)

- Prenatal, Perinatal and Postnatal development. Family History-extended as far back as 2 to 3 generations
- Any congenital infections: Zika Fever, HIV, Rubella, Toxoplasmosis, Herpes, Cytomegalovirus, etc.
- Developmental Milestones-according to new CDC guidelines
- Enuresis, encopresis, elimination disorders
- Pica, sensory integration, rumination
- Review all grade level report cards, repeated grads(s), 504 ADA, IDEA.
- Learning & communication concerns
- Motor-fine and gross, handedness, ambidextrous, early life forced handedness changes
- Psycho-Social-relationships, etc.
- Substance Use/Abuse-substance(s) of choice. Licit vs. Illicit use. Legal involvement history

(BENJAMIN & LAUTERBACH 2016; EASTMAN ER AL, 2019; LEONARD-ZABEL,, 2023)

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PROPOSED ADDITIONS TO A TRADITIONAL DEVELOPMENTAL HISTORY -PLEASE NOTE: NOT LIMITED TO THE FOLLOWING)

- Psychiatric/Psychological/Counseling – outpatient vs. hospitalization(s), suicide ideation, attempted suicide(s), self-injurious behavior(s). Trauma-current/history. Religiousity, dark thoughts, delusions, hallucinations, preoccupations, thoughts spoken outload, distortions, derealization, catatonia, depersonalization
- Attentional, oppositional defiant, or conduct issues. Hurting others or animals, cruel behaviors, fire setting history
- Medical – abnormalities, coordination, balance and gait, involuntary movement (tics), mirror movements, neurological soft signs
- Sleep Issues: insomnia, sleep interruptions-medically based, sleep hygiene, parasomnias-nightmares, night terrors, bruxism, hypersomnia
- Seizure-onset, frequency, duration, triggers, aura, automatisms, perseverative, déjà vu, forced thinking, time distortion

(BENJAMIN & LAUTERBACH 2016; EASTMAN ET AL, 2019; LEONARD-ZABEL, 2023)

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PROPOSED ADDITIONS TO A TRADITIONAL DEVELOPMENTAL (HISTORY-PLEASE NOTE: NOT LIMITED TO THE FOLLOWING)

"LOST AGGRESSION"

Episodes

- Established and/or new aggressive behavior(s)
- Person not fully aware of why feeling aggressive-impulsive feeling-crawling out of one's skin
- Feels lost and out of control and lacks or is confused trying to rational feelings to control anger.
- Therefore, medical workup warranted

Prodrome

- Length
- Time of day
- Environmental Triggers
- Other person(s) instigating triggers
- Stress, anxiety building up, loss of cognitive flexibility

- Deprive restorative sleep, depression, panic, psychomotor agitation/ excitement.
- Increased rituals, pattern of aggression toward self/ objects/others/property

Overall, results in directed or nondirected purpose(s) to decrease anger, frustration, and induce release of tension

(BENJAMIN & LAUTERBACH 2016; LEONARD-ZABEL, 2023)

COVID 19 KIDS 3 TO 12.PDF

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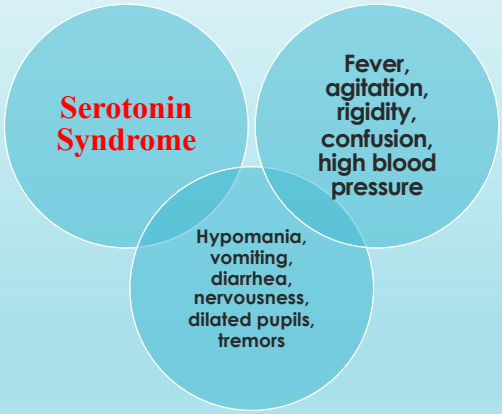
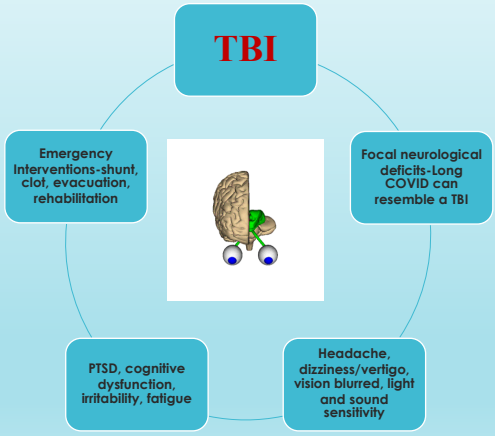
PROPOSED ADDITIONS TO A TRADITIONAL DEVELOPMENTAL POSSIBLY MIMIC PASC

(HISTORY-PLEASE: NOTE NOT LIMITED TO THE FOLLOWING)





(BENJAMIN & LAUTERBACH 2016; LEONARD-ZABEL, 2023)

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PART 2: WHAT WE KNOW AND DON'T KNOW ABOUT PEDIATRIC LONG-COVID

- Discuss (suggest) what neurocognitive and social-emotional assessment areas need to be covered in formal assessments to fully evaluate the effects of long-COVID.
- Let's review additional research.

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ARTICLE TITLED: THE CSHQ-DE QUESTIONNAIRE UNCOVERS RELEVANT SLEEP DISORDERS IN CHILDREN AND ADOLESCENTS WITH LONG COVID. FROM WERNER ET AL, 2022

- **Abstract: "Acute SARS-CoV-2 infections in children and adolescents are usually mild. However, they can suffer from ongoing symptoms, generally referred to as long COVID. Sleep disorders are one of the most frequent complaints in long COVID although precise data are missing. We assessed the sleep behavior of children and adolescents who presented at our outpatient clinic between January 2021 and May 2022 with the Children's Sleep Habits Questionnaire (CSHQ-DE). We compared the sleep behavior at three different time points: pre-COVID-19; post-COVID-19 at the initial presentation; and post-COVID-19 at re-presentation. Data from 45 patients were analyzed. Of those, 64% were female and the median age was 10 years (range: 0–18 years). Asymptomatic or mild COVID-19 disease was experienced in 89% of patients; 11% experienced moderate disease."**

"The initial presentation occurred at a median of 20.4 weeks (6 weeks–14 months) after the infection. The CSHQ-DE score increased significantly from pre-COVID-19 (45.82 ± 8.7 points) to post-COVID-19 (49.40 ± 8.3 points; $p \leq 0.01$). The score then normalized at re-presentation (46.98 ± 7.8; $p = 0.1$). The greatest changes were seen in the CSHQ-DE subscale score "daytime sleepiness". Our data showed that children and adolescents with long COVID often suffer from sleep disturbances. For most children and adolescents, these sleep disorders decreased over time without any further medical intervention aside from a basic sleep consultation."

HTTPS://WWW.NCBI.NLM.NIH.GOV/PMC/ARTICLES/PMC9497557/

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ARTICLE TITLED: SOCIAL, ACADEMIC AND HEALTH STATUS IMPACT OF LONG COVID ON CHILDREN AND YOUNG PEOPLE: AN OBSERVATIONAL, DESCRIPTIVE, AND LONGITUDINAL COHORT STUDY FROM GONZALEZ-AUMATELL ET AL, 2022

Abstract: "There is a lack of evidence of the health impacts due to long COVID among children and young people (CYP). The objective of this study is to determine the main clinical characteristics of long COVID in CYP and to investigate the academic, social, and health status impacts of long COVID in this population. An observational, descriptive, and longitudinal study on CYP who presented COVID-19 symptoms for more than twelve weeks after SARS-CoV-2 infection was performed between December 2020 and May 2021. Fifty CYP were included, with a median age of 14.1 years, 33 (66%) were female, and 17 (34%) had a relative diagnosed with long COVID."

"Since the initial infection and up to the first visit, CYP had persisting symptoms for a median of 4.1 months, and for 18 (36%) CYP these symptoms persisted for more than 6 months. Fatigue (100%), neurocognitive disorders (74%), muscular weakness (74%), and headache (72%) were the most reported symptoms. A total of 9 (18%) CYP could not attend school, 17 (34%) had a reduced schedule, 33 (66%) showed a decreased school performance, and 68% had stopped extracurricular activities. This preliminary study shows the impact that long COVID has on the health, academic, and social life of CYP."

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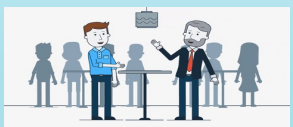

FILE:///C:/USERS/DRAMLZ%20-%20CURRY%20-%20SNP/DOWNLOADS/CHILDREN-09-01677-V2-1.PDF

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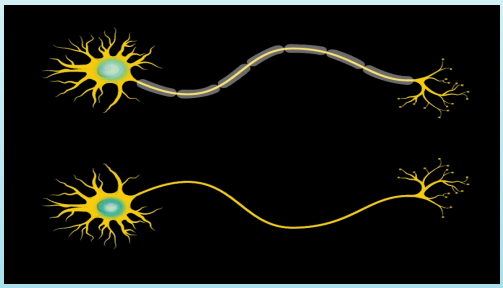
ARTICLE TITLED: COGNITION AND MENTAL HEALTH IN PEDIATRIC PATIENTS FOLLOWING COVID-19 FROM AVITTAN, H., & KUSTOVS, D., 2023



COGNITION AND MENTAL HEALTH IN PEDIATRIC PATIENTS (1).PDF

Abstract: "The global coronavirus pandemic has significantly impacted public health and has been a research subject since its emergence. The acute phase of the disease leads to pulmonary and non-pulmonary manifestations, which in some individuals may progress to long-lasting symptoms. In this article, we conducted a narrative review of the current literature to summarize current knowledge regarding long COVID syndrome in children, focusing on cognitive symptoms. The review included a search of three databases (PubMed, Embase, and Web of Science) using the key phrases "post COVID-19 cognitive pediatric", "long COVID pediatric", "mental health long COVID children", and "COVID-19 cognitive symptoms". A total of 102 studies were included. The review revealed that the main long-term cognitive symptoms following COVID-19 were memory and concentration deficits, sleep disturbances, and psychiatric states such as anxiety and stress. In addition to the direct physiological effects of a viral infection, there are psychological, behavioral, and social factors contributing to cognitive impairment, which should be addressed regarding the pediatric population. The high prevalence of neurocognitive symptoms in children following COVID-19 emphasizes the importance of understanding the mechanisms of nervous system involvement."

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ABSTRACT TITLED: POST-COVID-19 CONDITIONS IN CHILDREN AND ADOLESCENTS DIAGNOSED WITH COVID-19 FROM KOSTEV ET AL, 2022

ABSTRACT:

"**BACKGROUND: This study aimed to investigate the prevalence and the factors associated with post-COVID-2019 condition in COVID-19 children and adolescents in Germany."**

"**METHODS: The present retrospective cohort study used data from the Disease Analyzer database (IQVIA), and included patients aged <18 years who were diagnosed with COVID-19 in one of 524 general and 81 pediatric practices in Germany between October 2020 and August 2021 (index date: first COVID-19 diagnosis). Post-COVID-19 condition was assessed between the index date and November 2021. Covariates included age, sex, type of practice, and chronic conditions documented in at least 1% of the population."**

"**RESULTS: There were 6568 children and adolescents included in this study (mean [SD] age 10.1 [4.9] years; 49.2% girls). The prevalence of post-COVID-19 condition was 1.7% in the population. Patients aged 13–17 years were more likely to be diagnosed with post-COVID-19 condition compared with those being aged ≤5 years (RR = 3.14). Anxiety disorders (RR = 2.53), somatoform disorders (RR = 2.11), and allergic rhinitis (RR = 2.02) were also significantly associated with post-COVID-19 condition."**

"**CONCLUSION: Post-COVID-19 condition was rare in COVID-19 children and adolescents in Germany. Data from other settings are warranted to confirm these findings."**

"**IMPACT:**
- **The prevalence of post-COVID-19 condition was 1.7% in this population of children and adolescents.**
- **Older children and adolescents were more likely to be diagnosed with post-COVID-19 condition than their younger counterparts.**
- **Anxiety disorders, somatoform disorders, and allergic rhinitis were significantly associated with post-COVID-19 condition.**
- **More data from other settings and countries are warranted to corroborate or refute these findings."**

https://doi.org/10.1038/s41390-022-02111-x

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POST-COVID-19 CONDITIONS IN CHILDREN AND ADOLESCENTS FROM AMERICAN ACADEMY OF PEDIATRICS-SEPTEMBER 2022

Definition: Cognitive Fogginess or Fatigue. **"Brain fog" (a generic term that refers to unclear or "fuzzy" thinking, inattention, difficulty with concentration or memory) is a frequent neurologic complaint in adults following SARS-CoV-2 infection. School aged-children and adolescents may also complain about neurocognitive changes following SARS-CoV-2 infection as compared with baseline function. These changes can manifest as inattentiveness, seeming to be more forgetful to a parent, slower in reading or processing, requiring more repetition in learning, and less endurance and/or requiring more breaks when reading or performing other cognitive tasks. It is critical to treat any behaviors that may potentially impact cognitive functioning, including but not limited to getting adequate nighttime sleep, maintaining a consistent sleep/wake schedule with daily activities, avoiding alcohol and drugs, or addressing stressors. For cognitive complaints that persist and result in functional impairment, a targeted neuropsychological evaluation can identify the basis for these signs or symptoms and guide the development of an appropriate, often multidisciplinary, treatment plan. School accommodations, such as a 504 plan, should also be discussed."**

HTTPS://WWW.AAP.ORG/EN/PAGES/2019-NOVEL-CORONAVIRUS-COVID-19-INFECTIONS/CLINICAL-GUIDANCE/POST-COVID-19-CONDITIONS-IN-CHILDREN-AND-ADOLESCENTS/

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LET'S EXPLORE THE NEURO-COGNITIVE APPROACHES INVOLVING MEMORY, ATTENTION, VISUAL GNOSIS, VISUAL-SPATIAL FUNCTION, KINESTHETIC AND DYNAMIC PRAXIS, VERBAL AND NON-VERBAL COMPONENT OF THINKING FOR CASE CONCEPTUALIZATION.

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PERFORMING A BRIEF SUGGESTED TARGETED NEUROPSYCHOLOGICAL ASSESSMENT

(TO START FOR CASE CONCEPTUALIZATION)

- Be cognizant of any significant neuro-cognitive changes
- Note if accommodations and/or compensatory strategies still are needed after several month of implementation
- If the Individual was in an intensive care unit during acute COVID-19 or had multisystem inflammatory syndrome then…
- Refer to pediatric neurologist for developmental regression and…
- Secure permission for brief, targeted neuropsychological assessment

(MALONE ET AL, 2022)

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IN ADDITION, BELOW ARE VARIOUS ASPECTS OF NEURO-COGNITIVE APPROACHES TO FORMULATE AN ASSESSMENT BASED ON RESEARCH PRESENTED THUS FAR IN THIS PRESENTATION

Memory	Attention	Visual Gnosis	Visual-Spatial	kinesthetic and dynamic praxis	Verbal/Nonverbal Component of Thinking
Is the ability to store and retrieve information. Involves working memory, episodic memory, semantic memory and prospective memory.	Is the behavior an individual uses to focus the senses from sight to hearing and even smell. It is also the concentration of awareness on some phenomenon to the exclusion of other stimuli.	Is the ability to recognize different stimuli (objects, faces, colors, shapes) by sight and giving meaning to them.. When one is unable to do so it is known as agnosia or a disorder of recognition.	Is the ability to tell where objects are in space. Examples include locating, orienting, dimension shifting, path-finding, modeling, diagramming, map-making, and designing.	Refers to the ability to perform complex learned motor actions. Requires basic motor skills, knowledge of representations of movement, and transcoding representations into movement plans.	Verbal component is the content of one's messages, the choices and arrangements of their words. Nonverbal component is the message(s) we say and the tone, pacing, and volume of our voices impacting what we say.

(TROITSKAYA ET AL, 2022; LEONARD-ZABEL, 2023)

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PROPOSED THREE PRONG INDEXES TO ASSIST WITH NEURO-COGNITIVE CONCEPTUALIZATION WHEN FORMULATING AN ASSESSMENT FOR LONG COVID 19 FOR CHILDREN &YOUTH

Physical Index

- Prenatal, Perinatal and Postnasal histories. Any evidence of brain injuries causing various combinations of non-progressive issues with disturbed connectivity.
- TBI, neurosurgical interventions, post-concussive symptoms, other accidents, injuries, substance use related, any family history or diseases with CNS involvement.

Neuro-Cognitive Index

- Verbal, nonverbal, fluid reasoning; executive functioning with specifics on planning ability and cognitive flexibility; attention-span, auditory vigilance, mental control, perseverance tasks, spatial attention/visual neglect, motor impersistence; memory systems, fund of knowledge, verbal & nonverbal recall, suspraspan auditory and visual recall curves.
- Neurocognitive issues – note if significant or modest (mild) in the areas of complex attention, executive functioning, learning and memory, language, perceptual-motor, social pragmatics.

Psycho-Social Index

- Frontal Lobe involvement associated with unmotivated, psychomotor slowing, preservative, weak problem-solving, child-like euphoria, social disinhibition, impaired tact or social niceties, impulsive/distractible, labile affect, concrete with social processing, left/right discrimination, gets lost easily, difficulty with setting priorities and important things to do, sensitive to understanding puns, idioms, and playful teasing, tendency to reoccurring depressive/anxious feelings, emotional instability, pain and/or vertigo may impact engaging in socialization.

(BENJAMIN & LAUTERBACH, 2016 & LEONARD-ZABEL, 2023)

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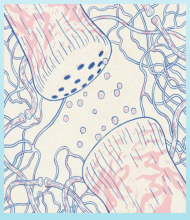
ABSTRACT: NEUROCOGNITIVE AND PSYCHOSOCIAL CHARACTERISTICS OF PEDIATRIC PATIENTS WITH POST-ACUTE/LONG-COVID: A RETROSPECTIVE CLINICAL CASE SERIES BY NG, R. ET AL, 2022.

These areas explored in the study

- Overall, Memory
- Working Memory
- Processing Speed
- Auditory Attention
- Verbal Fluency and
- Cognitive Flexibility
- Attention
- Social-Emotional
- Effort Testing



Conclusion: "To our knowledge, this case series is the first study of pediatric long COVID patients to utilize a combination of clinical interview, performance-based cognitive tests, and standardized rating scales. Overall, a sizeable proportion of our heterogeneous clinical sample of children with long COVID showed difficulty on attention testing. It remains to be seen whether this is due to direct effects of COVID, physical symptoms, and/or to co-occurring attention, mood, or anxiety concerns. Findings highlight the importance of obtaining a detailed medical and mental health history in the assessment of cognitive functioning and in treatment considerations among affected individuals."

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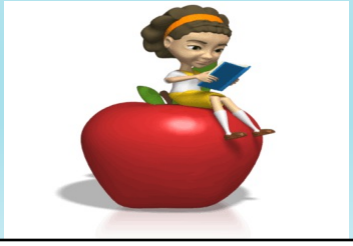
SAMPLE TESTS (BUT NOT LIMITED) TO USE TO DEVELOP AN ASSESSMENT BATTERY DEPENDING ON THE LEVEL OF LONG COVID-19 SYMPTOMS

- Cognitive Assessment System: Rating Scale-Normative Update CAS-2-NU)
- Comprehensive Test of Nonverbal Intelligence-2nd Ed. (CTON-2)
- Reynolds Intellectual Assessment Scales-Second Edition (RIAS-2)
- Tests of Nonverbal Intelligence-4th Ed. (TONI-4)
- Universal Nonverbal Intelligence Test-2nd Ed. (UNIT-2)
- Wechsler Intelligence Scale for Children-5th Ed (WISC-V)
- Wechsler Preschool and Primary Scale of Intelligence (WPPSI-V)
- Woodcock-Johnson IV Tests of Cognitive Abilities WJ-V (WJ-V ACH)



- Weschler Individual Achievement Test-4th Ed (WIAT-4)
- Woodcock-Johnson IV tests of Achievement (WJ-4 Ach)
- Feifer Family of Assessments-Reading, Writing and Mathematics.
- Tests of Orthographic Competence-2nd Ed. (TOC-2)
- Child and Adolescent Memory Profile (ChAMP)
- Wide Range Assessment of Memory and Learning-3rd Ed. (WRAML-3)
- A Developmental Neuropsychological Assessment – Second Edition (NEPSY-II)
- Delis-Kaplan Executive Functioning System (DKEFS) (new version coming)
- Behavior Rating Inventory of Executive Functioning – 2 (BRIEF-2)
- Scales of Emotional Disturbance-Third Edition (SAED3)
- DAP:SPED: Draw A Person; Screening Procedure for Emotional Disturbance (DAP:SPED)

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SAMPLE TESTS (BUT NOT LIMITED) TO USE TO DEVELOP A ASSESSMENT BATTERY DEPENDING ON THE LEVEL OF LONG COVID-19 SYMPTOMS

- Adaptive Behavior Assessment System-3rd Ed. (ABAS-3)
- Behavior Assessment System for Children-3 (BASC-3)
- Emotional Disturbance Decision Tree (EDDT)
- Reynolds Child Depression Inventory-2nd Ed. (RCDS-2)
- Screen for Child Anxiety Related Disorders –SCARED (U of Penn)
- Becks Anxiety Inventory (BAI)

- Adolescent Substance Abuse Subtle Screening Inventory (SASSI-3)
- Trauma Symptom Checklist for Children™ Screening Form (SCC™-SF)
- Children's Aggression Scale (CAS)
- Developmental Profile 3 (DP-3)
- Pediatric Behavior Rating Scale TM (PBRS™)

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ADDITIONAL TOOLS OF INTEREST

Neuro-QoL™ Measures for Pediatric Self-Report (ages 8-17)

Intro to Neuro-QoL (healthmeasures.net)

NIH Toolbox® for Use in Educational Settings

https://www.nihtoolbox.org/education/

PHQ-9 (Patient Health Questionnaire) The Patient Health Questionnaire Modified for Teens (PHQ-Modified) can be used with patients between the ages of 12 and 18

https://www.patienttools.com/index.php/screening-interviews/phq9-youth/

Levine Protocol_Microsoft Word CHOP_Modified_Dallas_POTS_Exercise_Program.docx (dysautonomiainternational.org)

PROMIS-Patient Proxy Short Form
http://www.healthmeasures.net

Generalized Anxiety Scale-

https://novopsych.com.au/wp-content/uploads/2022/11/Generalised-Anxiety-Disorder-Assessment-GAD-7-scoring-online-platform_v2.pdf

Children's Sleep Habits Questionnaire (CSHQ-DE)

https://njaap.org/wp-content/uploads/2016/04/Childrens-Sleep-Habits-Questionnaire.pdf

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NOW, LET'S BRIEFLY WEAVE ASSESSMENT APPROACHES USED WITH THE CASE OF "JOE"

Data should assist with wrap around services

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"HOPE IS LIKE THE SUN, WHICH, AS WE JOURNEY TOWARD IT, CASTS THE SHADOW OF OUR BURDEN BEHIND US."

SAMUEL SMILES

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THANK YOU

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