


## MICRO REPORT

# Is SARS-CoV-2 seroconversion a risk factor for severe and acute psychiatric symptoms in children?

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## ABSTRACT

**Aims:** Since the beginning of the COVID pandemic, studies reported an increase in children's mental health issues and questioned the impact of SARS-CoV-2 on psychiatric symptoms.

**Methods:** We compared COVID seroconversion in children hospitalized with acute, severe psychiatric symptoms ( $n = 52$ ) with the sex- and age-matched control group ( $n = 52$ ) living in the same low-income geographic area and sampled during the same time period.

**Results:** Contrary to our hypothesis, we observed less seroconverted children with psychiatric conditions 9.61% (95% CI, 3.59-21.80) vs 34.61% (95% CI, 22.33-49.16;  $\chi^2 = 14.7$ ,  $P = 1.24E-4$ ; OR = 0.20; 95% CI, 0.05-0.64).

**Conclusion:** This suggests a lower direct impact of SARS-CoV-2 compared with the impact of mitigation strategies on psychiatric symptom deterioration in children reported since early stages of the pandemic.

## KEYWORDS

children, mental health, pandemic, psychiatric symptoms, SARS-CoV-2

## 1 | AIM

Since the beginning of the SARS-CoV-2 pandemic, studies reported an increase in children's mental health issues.<sup>1</sup> Beyond the surge in environmental stressors such as restrictive isolation measures, the rapid **actualization** of psychiatric symptoms in children may be directly related to the SARS-CoV-2 through its neurotropism.<sup>2</sup> This could suggest children hospitalized for severe psychiatric symptoms during the early months of the pandemic would have been more infected by the SARS-CoV-2 and

thus more seroconverted than the general population sex- and age-matched controls.

## 2 | METHODS

To test this hypothesis, we included all children hospitalized from December 2020 to April 2021 (second lockdown period in France) in the child psychiatric department at the Robert Debré Hospital (Paris, France) for acute psychiatric symptoms ( $n = 52$ ). Controls

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were sex- and age-matched subjects admitted to the emergency department for nonpsychiatric and no history of apparent infection, living in the same low-income geographic area and sampled during the same time period ( $n = 52$ ).

The SARS-CoV-2 serology was assessed at the time of admission by chemiluminescent microparticle immunoassay for quantitative detection of IgG against the SARS-CoV-2 nucleoprotein (Abbott Architect instrument). Seropositivity was defined by anti-SARS-CoV-2 IgG anti-S antibodies  $\geq 55$  AU/mL.

To compare the serostatus among groups, Pearson's chi-squared test was used. Statistical analysis was performed using R studio (version 1.3.959). The independent ethics committee of the Assistance Publique-Hôpitaux de Paris Health Data Warehouse approved the study protocol. Informed consent was not required in accordance with French law regarding the retrospective use of anonymized routine data (MR-004).

### 3 | RESULTS

The sample of children with psychiatric conditions ( $n = 52$ ) was predominantly females (69.23%); mean age at admission was  $12.9 \pm 1.8$  years. Among children hospitalized for acute psychiatric symptoms, 58% reported a worsening of pre-existing psychiatric conditions (onset prior to the first lockdown in France) and 42% displayed new-onset symptoms (<3 months before inclusion) (Table 1). We observed that children with psychiatric conditions displayed significantly less positive IgG titration than matched controls 9.61% [95% CI, 3.59 to 21.80] vs 34.61% [95% CI, 22.33 to 49.16] ( $\chi^2 = 14.7$ ,  $P = 1.24E-4$ ; OR = 0.20; 95% CI, 0.05 to 0.64). According to our clinical observation, SARS-CoV-2 seroconverted children hospitalized

with psychiatric symptoms did not report unusual psychiatric symptoms compared with nonseroconverted children.

### 4 | DISCUSSION

Contrary to our hypothesis, we observed less seroconverted children with psychiatric conditions than in the age and sex controls sampled during the same period and living in the same low-income region. This result may be driven by a sampling bias of the control group, but studies conducted in a comparable vulnerable population in France and sampled at the same period reported similar high SARS-CoV-2 seroconversion.<sup>3</sup>

Our results indicate a low impact of SARS-CoV-2 in the rise of psychiatric symptoms during the earlier months of the pandemic. The observed low seroprevalence in these children may reflect their greater compliance with mitigation measures, resulting, for example, from avoidant personality traits—known at risk for maladaptive coping strategies,<sup>4</sup> or leading to a greater social isolation than controls—which in turns increases the risk for mental health deterioration.<sup>1</sup> Our results are of interest given that the proportion of infections in children is increasing, many adults are now vaccinated, and the benefits of vaccination in children under 12 are still debated. Our results are also consistent with the estimated low prevalence of long-COVID in children, <5% of those with COVID-19.<sup>5</sup> A higher prevalence of long-COVID (characterized in part by a spectrum of neuropsychiatric symptoms<sup>5</sup>) would have diminished the difference in positive IgG titration between patients and controls. Despite the growing evidence supporting the neurotropism of SARS-CoV-2, based on quantitative data for tropism, replication kinetics, and cell damage, this virus seems to cause modest neuropsychiatric manifestations in

TABLE 1 Clinical and demographic characteristics of children enrolled in the study

	Children with severe and acute psychiatric symptoms ( $n = 52$ )	Sex- and age-matched controls ( $n = 52$ )	t Test/ $\chi^2$ , P
Age (mean $\pm$ SD)	12.9 $\pm$ 1.8	12.0 $\pm$ 3.4	1.91, 0.06
Sex (male/female)	32.7%/67.3%	46.2%/53.8%	3.81, 0.05
SARS-CoV-2-positive IgG titration (mean, [95% CI])	9.61% [95% CI, 3.59 to 21.80]	34.61% [95% CI, 22.33 to 49.16]	14.7, 1.24E-4
Children with onset of psychiatric symptoms <3 mo	42.3% (22)	—	
Main psychiatric conditions requesting a hospitalization			
Suicide ideations or attempts	46% (24)	0% (0)	
Anxiety or mood disorders	42% (22)	0% (0)	
Restrictive eating disorders	38% (20)	0% (0)	
Disruptive behaviors in children with autism spectrum disorders	8% (4)	0% (0)	
Psychotic disorders	2% (1)	0% (0)	
Others	10% (5)	0% (0)	



seroconverted children.<sup>6</sup> Finally, our results support further the impact of mitigation strategies on psychiatric symptom deterioration in children reported in early stages of the pandemic.<sup>1</sup>

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#### CONFLICT OF INTEREST

Drs Ayrolles, Ellul, Trebossen, Houhou-Fidouh, and Prof Bonacorsi, Descamps, DeLorme, do not report any biomedical financial interests or potential conflicts of interest related to this work.

#### AUTHOR CONTRIBUTIONS

Drs Ayrolles, Ellul, and Pr Delorme interpreted the data, wrote the first draft, reviewed, and critiqued the manuscript. Drs Ayrolles, Trebossen, Houhou-Fidouh, and Prof Bonacorsi, Descamps collected the data. Prof Bonacorsi, Descamps reviewed and critiqued the manuscript.

#### APPROVAL OF THE RESEARCH PROTOCOL BY AN INSTITUTIONAL REVIEWER BOARD

The independent ethics committee of the Assistance Publique-Hôpitaux de Paris Health Data Warehouse approved the study protocol. Informed consent was not required in accordance with French law regarding the retrospective use of anonymized routine data (MR-004).

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Science DATA BANK at <https://doi.org/10.11922/sciencedb.01446>.

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