

Impact of COVID-19 in a Large Sample of Chinese Children and their Parental Caregivers

— Testing the Psychometric Properties of Several EuroQol Instruments

Wenjing Zhou ^{1,2}, Michael Herdman ³, Zhihao Yang ⁴, Jan Busschbach ¹

¹ Erasmus University Rotterdam, ² Renji Hospital, Shanghai Jiaotong University, ³ National University of Singapore, ⁴ Guizhou Medical University

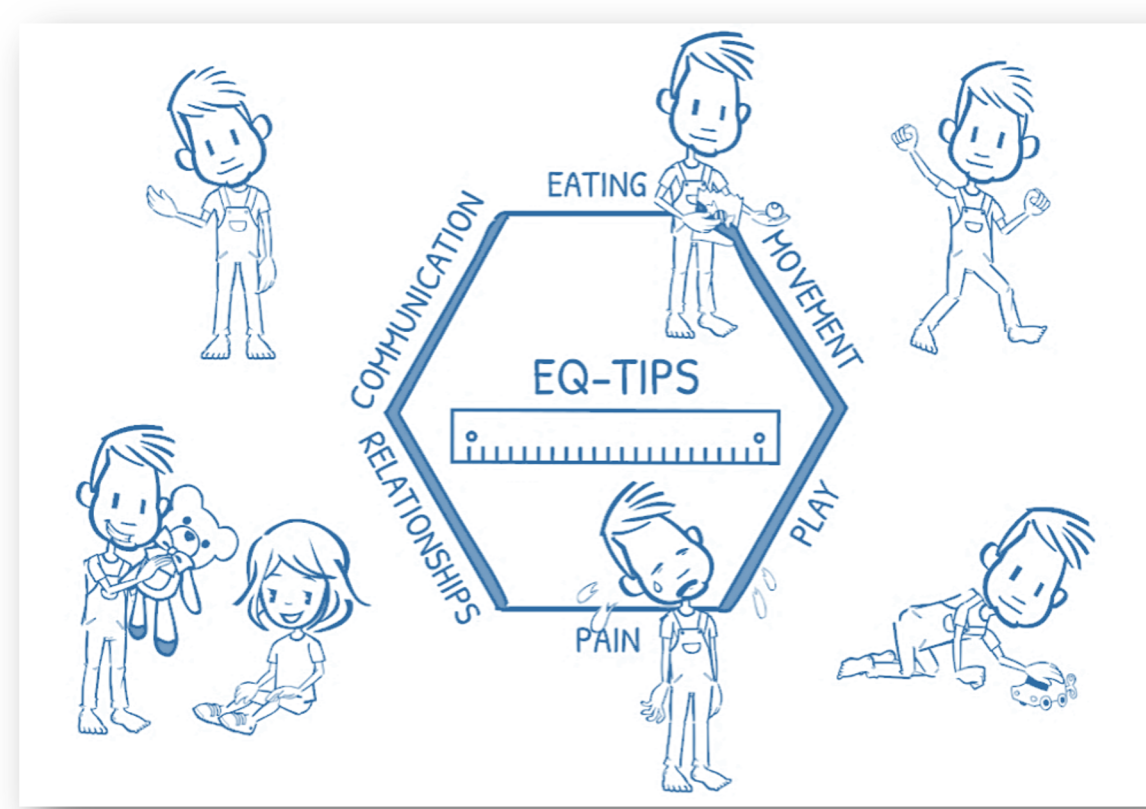


BACKGROUND & AIMS

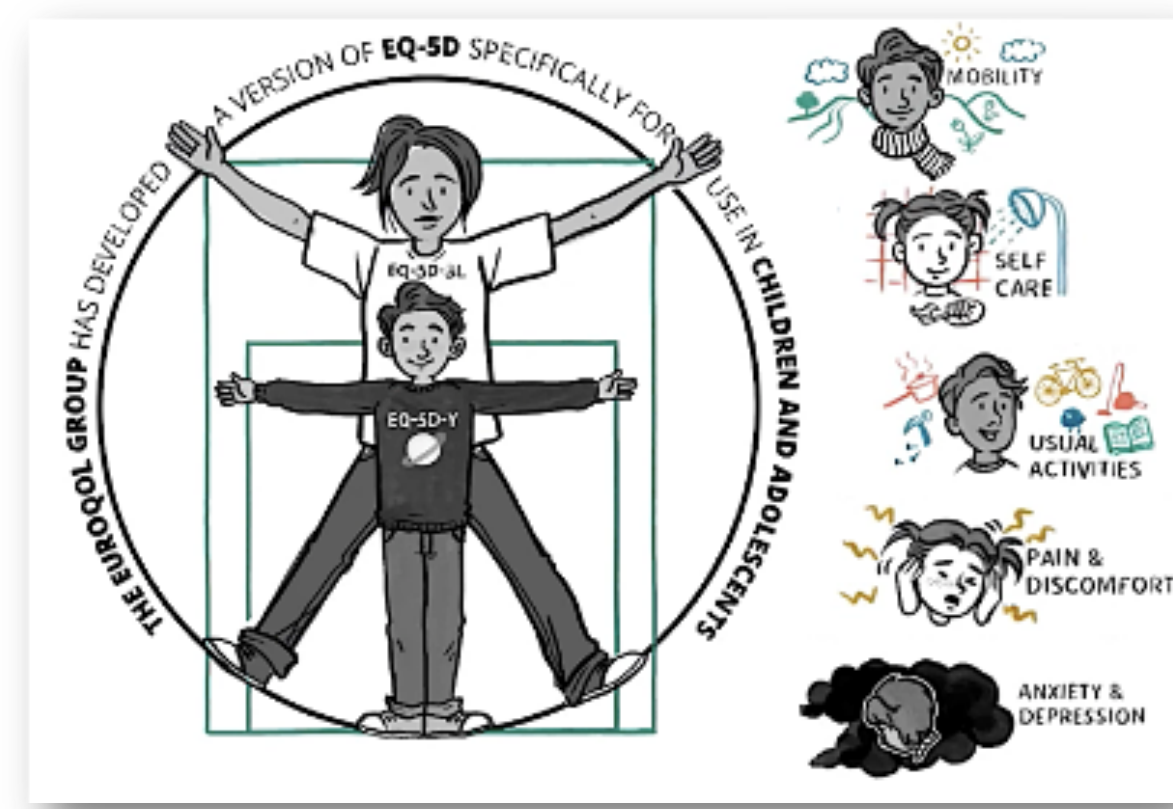
China has recently faced the serious impact of the COVID-19 pandemic. This provided a unique opportunity to test the newly published Chinese EQ-5D-Y-3L value sets and EQ-TIPS in a very large sample of young patients with COVID-19 and children affected by the lockdown, as well as the new developed EQ-HWB-S and EQ-5D-5L in their parental caregivers. Additionally, we aimed to investigate the spillover effect by comparing EQ-HWB-S and EQ-5D-5L in assessing the caregiving burden experienced by parents.

METHODS

- A longitudinal study in children with COVID-19 aged between 0-18 years and their parents: 861 dyads at baseline; 311 at follow-up (after 1-3 weeks); 231 non-infected children: controls.



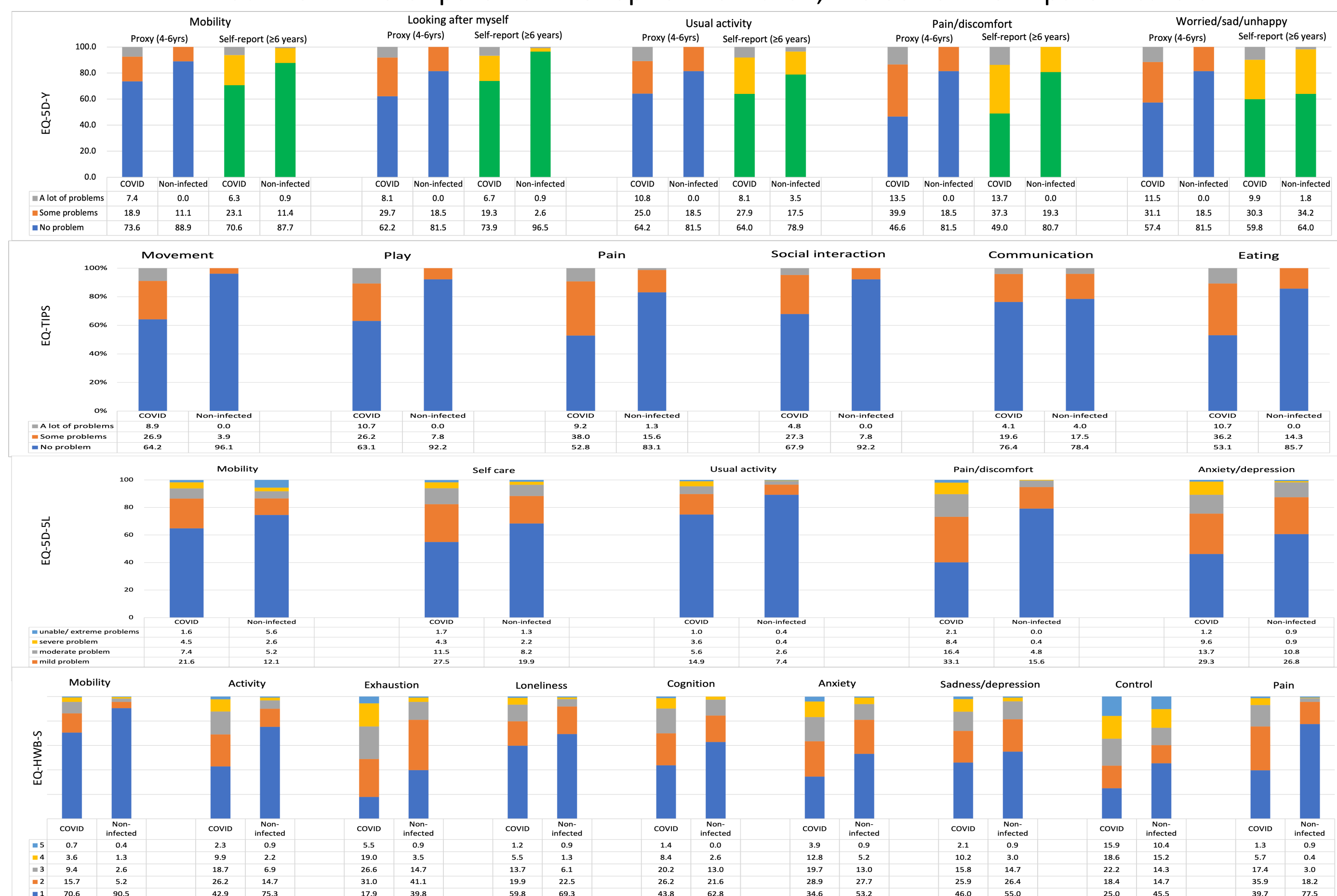
- Parents completed: EQ-TIPS, proxy EQ-5D-Y-3L, EQ-HWB-S and EQ-5D-5L. Children ≥6 years self-completed EQ-5D-Y-3L.



STATISTICS & RESULTS

- Distributional properties (Fig.1) :**
 - ✓ Children with COVID-19 experienced more problems across all dimensions compared to non-infected children, except for “communication” for EQ-TIPS;
 - ✓ Parents' physical functions were more impacted by child's infection than emotional functions;
 - ✓ EQ-HWB-S demonstrated a lower ceiling effect in dimensions that overlap with EQ-5D-5L.

Fig 1. Distributional properties, “no problem” for each dimension between children with or without COVID-19 or parents. The top row: children; the bottom row: parent carers.



- Test-retest reliability by Gwet's AC1 for each dimension and ICC for LSS, index score and EQ VAS, using data from 559 child-parent dyads at baseline:**
 - ✓ ICC: 0.866 for EQ-TIPS LSS, 0.726 for self-completed EQ-5D-Y index, 0.845 for proxy EQ VAS, 0.764 for EQ-HWB-S index, 0.769 for EQ-5D-5L index, 0.702 for parent's own EQ VAS;
 - ✓ Gwet's AC1: EQ-HWB-S: 0.33 (anxiety) to 0.79 (mobility); EQ-5D-5L: 0.41 (anxiety/depression) to 0.76 (mobility).
- Associations between patient's and lower parent's HRQoL :**
 - ✓ EQ-HWB-S: longer disease duration, more severe disease condition, with gastrointestinal problems;
 - ✓ EQ-5D-5L: longer disease duration, with COVID-19-related pneumonia or conjunctivitis;
 - ✓ EQ VAS: longer disease duration, parent contracted by COVID-19.

DISCUSSION & CONCLUSION

- The results support the reliability, validity and responsiveness for the four EQ instruments;
- The self-complete Y-3L outperformed the proxy version in known-groups validity across disease severity and yielded distinct scores, emphasizing the importance of using patient-reported outcomes to understand children's HRQoL from their perspective;
- Spillover effect: EQ-HWB-S with better known-groups validity: more fit for group comparisons and understanding the impact of caregiving on different clinical conditions; While EQ-5D-5L with better responsiveness: better suited for capturing rapid, short-term changes that often occur in the immediate aftermath of a child's illness.

STATISTICS & RESULTS

- Known-groups validity (Table 1)** by comparing the mean of LSS, index score (utilities: Chinese Y-3L/Chinese 5L/UK EQ-HWB-S), and EQ VAS across different health conditions in children using Cohen's D effect size:
 - ✓ Children with COVID-19 (and their parents), those with more severe disease, or poorer OHA reported higher EQ-TIPS LSS, lower EQ-5D-Y/EQ-HWB-S/EQ-5D-5L index scores and lower EQ VAS compared to those non-infected, with milder disease severity, or with poorer OHA;
 - ✓ Self-completed EQ-5D-Y outperformed the proxy version across various COVID severity levels;
 - ✓ EQ-5D-5L differed in relation to more child's health conditions than EQ-HWB-S.

Table 1. Known-groups validity, mean of LSS, index score and EQ VAS

With or without COVID-19				Disease Severity					OHA		
	Non-infected	Infected	ES	Mild	Moderate	Severe	ES Mild vs Moderate	ES Moderate vs Severe	Very good/ Good	Fair/Poor/ Very Poor	ES
Child											
0-4 years (proxy)	n=77	n=230		n=74	n=101	n=55			n=112	n=118	
EQ-TIPS LSS	6.70	8.77	0.84*	8.39	8.40	9.96	0.004	0.58*	7.69	9.80	0.82*
EQ VAS	85.5	67.4	0.86*	72.5	68.6	58.4	0.17	0.45*	80.8	54.7	1.39*
≥ 6 years											
Self-report	n=114	n=445		n=172	n=214	n=59			n=233	n=212	
EQ-5D-Y index	0.92	0.77	0.50*	0.87	0.74	0.57	0.44*	0.48*	0.94	0.59	1.26*
EQ VAS	86.5	72.2	0.62*	80.9	68.8	52.9	0.51*	0.61*	88.7	54.1	1.91*
Proxy	n=127	n=483		n=187	n=228	n=68			n=222	n=261	
EQ-5D-Y index	0.91	0.72	0.56*	0.81	0.70	0.52	0.32*	0.47*	0.86	0.60	0.76*
EQ VAS	87.8	69.9	0.79*	78.6	67.8	56.9	0.47*	0.44*	85.3	56.8	1.39*
Parent											
	n=231	n=861		n=311	n=389	n=161			n=234	n=212	
EQ-HWB-S index	0.88	0.74	0.67*	0.76	0.75	0.68	0.05	0.29*	0.80	0.70	0.51*
EQ-5D-5L index	0.88	0.77	0.42*	0.80	0.79	0.64	0.04	0.53*	0.85	0.70	0.55*
EQ VAS	83.6	72.2	0.74*	76.5	71.4	65.7	0.26*	0.27*	80.3	65.2	0.80*

- Responsiveness to improvements in health status using data of children with COVID-19 (Table 2)** by comparing the mean score and assessing SESs:

Table 2. Responsiveness

	COVID-19 recovery			Improved OHA		
	Baseline	Follow-up	SES	Baseline	Follow-up	SES
Child						
0-4 years (proxy)	n=69			n=64		
EQ-TIPS LSS	10.33	6.93	1.21	10.34	6.70	1.39
EQ VAS	51.6	85.2	1.56	48.4	85.8	1.75
≥ 6 years						
Self-report	n=132			n=138		
EQ-5D-Y index	0.51	0.92	1.08	0.48	0.93	1.15
EQ VAS	47.4	88.4	1.77	45.5	87.9	1.94
Proxy	n=141			n=147		
EQ-5D-Y index	0.45	0.91	1.12	0.44	0.91	1.16
EQ VAS	46.8	87.6	1.96	45.8	87.5	2.01
Parent						
EQ-HWB-S index	0.72	0.85	0.61	0.70	0.85	0.64
EQ-5D-5L index	0.69	0.92	0.75	0.68	0.93	0.83
EQ VAS	62.0	85.8	1.07	60.8	85.8	1.07

- ✓ Good responsiveness to COVID recovery, improved OHA;
- ✓ Proxy EQ-5D-Y performed better than self-completed version;
- ✓ EQ-5D-5L performed slightly better than EQ-HWB-S. EQ-HWB-S was most sensitive to the physical functions.

- Spillover effect:**
 - ✓ Both EQ-HWB-S and EQ-5D-5L could estimate spillover effects associated with child's different health conditions related to COVID-19 infection, as well as their health improvement;
 - ✓ EQ-HWB-S exhibited better discriminate ability to children with or without COVID-19, while EQ-5D-5L showed better sensitivity to child's improvement.

CONTACT

For further discussion, please contact: w.zhou.1@erasmusmc.nl