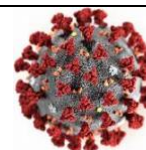


# National COVID-19 Science Task Force (NCS-TF)



<b>Type of document:</b> Assessment on request	
<b>In response to request from:</b> FDHA	<b>Date of request:</b> January 2021
<b>Expert groups involved:</b> Milo Puhan, Roman Stocker, Marcel Tanner and Public Health group, with input from multiple groups	<b>Date of response:</b> 18/1/2020
<b>Contact person:</b> Milo Puhan	
<b>Comment on planned updates:</b> at the end of January we plan to have an updated policy brief on the role of children and adolescents in the transmission of SARS-CoV-2	

## Assessment of the Science Task Force mandated by the FDHA (January 2021)

The issue of operating schools in the pandemic is very complex. From kindergarten and primary school through higher education, the risks of transmission of SARS-CoV-2 vary widely, as do educational, social, and health-related (both physical and mental) concerns. To address this complexity, we conducted a scientific assessment that accounts for differences in the epidemiological situation, level of schooling, positive and negative effects of control measures, and confidence in the evidence.





Results are presented below in two tables for each school level: an overview of the relative advantages or disadvantages of particular control measures, depending on the epidemiological situation, as well as a detailed matrix on which the overview is based. The assessments themselves do not constitute recommendations. Consequently, it is not a contradiction if school policy does not align precisely with the scientific assessment of advantages and disadvantages of control measures. Feasibility, acceptance, and other pandemic control measures (apart from schools) must be considered as a whole.

Our findings indicate that there is a wide range of control measures, some of which have been underutilized, and that the choice of measures depends on the epidemiological situation and school level. The [Ciao Corona](#) study of 2500 Zurich schoolchildren serves as a guide for decisions regarding additional measures. This study shows that with the package of measures implemented in schools by the end of October (which remain ongoing), outbreaks in schools are uncommon. If the situation worsens, a number of measures can still be implemented in a stepwise manner and coordinated across cantons. (A comprehensive selection can be found [here](#); the tables include various measures.)

It is important to note that owing to the short time available to complete this assessment, not every measure could be definitively assessed and referenced. This document will therefore be further refined after 18/1/2021. Note also that the next version will include control measures for vocational and higher education.

For the convenience of decision-makers, key results of the Science Task Force's overall assessment by school level are presented first. A detailed description of the approach and a detailed analysis of the control measures follow.

The following examples show how to interpret the assessments in the overview:

	<p>The advantages and disadvantages of a measure are balanced (circle on a balanced scale). Confidence in the evidence is low (red), so the balance of advantages and disadvantages is likely to change with additional evidence.</p>
	<p>The advantages of a measure slightly outweigh the disadvantages (one circle). Confidence in the evidence is moderate (yellow), so the balance of advantages and disadvantages may change with additional evidence.</p>
	<p>The disadvantages of a measure moderately outweigh the advantages (two circles). Confidence in the evidence is high (green), so the balance of advantages and disadvantages is unlikely to change with additional evidence.</p>
	<p>The advantages of a measure strongly outweigh the disadvantages (three circles). Confidence in the evidence is moderate (yellow), so the balance of advantages and disadvantages may change with additional evidence.</p>

## Overview of advantages and disadvantages of individual control measures for primary schools

Control measures	Epidemiological situation in a specific region or canton		
	Under control	Serious	Very serious
General measures <sup>a</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Sick teachers and sick children stay at home	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Masks for teachers	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Masks for pupils <sup>b</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
No mixing of classes <sup>c</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Testing and quarantine of close contacts or classes <sup>d</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Regular testing in schools	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Reduced class size	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Distance learning <sup>e</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages

### Notes

<sup>a</sup> General measures: Hand hygiene, no handshaking, teachers keep 1.5 meters distance from pupils, good ventilation, clean toilets and surfaces, outdoor classes, no camps or field trips, no events with non-school personnel (e.g. parents). HEPA filters should be used when adequate ventilation is not possible.

<sup>b</sup> The assessment differs slightly between primary school pupils and >12-year-olds because of possible negative effects (see detailed table) in an epidemiological situation under control.




















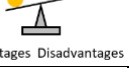







<sup>c</sup> This includes no mixing of classes in school; staggered arrival, canteen, and break times; staggered lunchtimes; additional activities and noncontact sports outdoors (possibly with masks); and other control measures, depending on the epidemiological situation.

<sup>d</sup> The extent of testing in schools with cases and instructions for quarantine should depend on the epidemiological situation (e.g. whole classes or schools if the situation is very serious, only close contacts when the situation is under control).

<sup>e</sup> As distance learning is not possible for all pupils (e.g. lack of infrastructure, no place to study, or other social problems), arrangements should always be made to teach these pupils on-site.

**Note for all school levels:** Parents may request home schooling to better protect family members at high risk. This topic was deliberately excluded among control measures in the table, because attitudes toward it vary widely and science can make only a very limited contribution. Decision-makers, however, may wish to consider this issue.

## Overview of advantages and disadvantages of individual control measures for secondary level I

Control measures	Epidemiological situation in a specific region or canton		
	Under control	Serious	Very serious
General measures <sup>a</sup>			
Sick teachers and sick children stay at home			
Masks for teachers			
Masks for pupils			
No mixing of classes <sup>b</sup>			
Testing and quarantine of close contacts or classes <sup>c</sup>			
Regular testing in schools			
Reduced class size			
Distance learning <sup>d</sup>			

### Notes

<sup>a</sup> General measures: Hand hygiene, no handshaking, teachers keep 1.5 meters distance from pupils, good ventilation, clean toilets and surfaces, outdoor classes, no camps or field trips, no events with non-school personnel (e.g. parents). HEPA filters should be used when adequate ventilation is not possible.

<sup>b</sup> This includes no mixing of classes in school; staggered arrival, canteen, and break times; staggered lunchtimes; additional activities and noncontact sports outdoors (possibly with masks); and other control measures, depending on the epidemiological situation.

<sup>c</sup> The extent of testing in schools with cases and instructions for quarantine should depend on the epidemiological situation (e.g. whole classes or schools if the situation is very serious, only close contacts when the situation is under control).

<sup>d</sup> As distance learning is not possible for all pupils (e.g. lack of infrastructure, no place to study, or other social problems), arrangements should always be made to teach these pupils on-site.

## Overview of advantages and disadvantages of individual control measures for secondary level II

Control measures	Epidemiological situation in a specific region or canton		
	Under control	Serious	Very serious
General measures <sup>a</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Sick teachers and sick children stay at home	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Masks for teachers	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Masks for pupils	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
No mixing of classes <sup>b</sup>	 Vorteile Nachteile	 Advantages Disadvantages	 Advantages Disadvantages
Testing and quarantine of close contacts or classes <sup>c</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Regular testing in schools	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Reduced class size	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages
Distance learning <sup>d</sup>	 Advantages Disadvantages	 Advantages Disadvantages	 Advantages Disadvantages

### Notes

<sup>a</sup> General measures: Hand hygiene, no handshaking, teachers keep 1.5 meters distance from pupils, good ventilation, clean toilets and surfaces, outdoor classes, no camps or field trips, no events with non-school personnel (e.g. parents). HEPA filters should be used when adequate ventilation is not possible.

<sup>b</sup> This includes no mixing of classes in school; staggered arrival, canteen, and break times; staggered lunchtimes; additional activities and noncontact sports outdoors (possibly with masks); and other control measures, depending on the epidemiological situation.

<sup>c</sup> The extent of testing in schools with cases and instructions for quarantine should depend on the epidemiological situation (e.g. whole classes or schools if the situation is very serious, only close contacts when the situation is under control).

<sup>d</sup> As distance learning is not possible for all pupils (e.g. lack of infrastructure, no place to study, or other social problems), arrangements should always be made to teach these pupils on-site.

**Description of the approach to assessing control measures in schools:**

- Primary, lower secondary, and upper secondary school levels have been considered separately. This is particularly important for secondary schools. With the transition here to adolescence and young adulthood, these pupils are regarded epidemiologically as adults (see the [policy brief on children](#)).
- The same effects were assessed for each control measure and school level, namely, reduction of SARS-CoV-2 transmission as a *positive* consequence of control measures versus impaired learning progress, social development, and mental health as *negative* consequences.
- For reasons of simplicity, we distinguished between three epidemiological situations: “Under control,” “Serious,” and “Very serious.” The epidemiological situation cannot be adequately described by a single indicator (e.g. cases per week per 100,000 inhabitants). Consequently, the situation for a canton as a whole should be assessed using a combination of indicators (e.g. case numbers, change in case numbers, hospitalizations, the value of  $R_e$ , development of new mutations), as the Task Force does in its assessment of the epidemiological situation. A situation “Under control” has sporadic outbreaks but no general increase in local transmission (e.g. as was the case in July–August 2020 in many cantons). In a “Serious” situation there is increased local transmission, and in a “Very serious” situation there is both increased local transmission and risk posed by new mutations.
- Evidence available for children and young people outside the school setting is detailed in the [policy brief on children](#). We therefore base transmission assessments on evidence that children and adolescents are being infected at similar rates to adults, and that infectivity is higher in adolescents and young adults (>12 years) than in children, and similar to adults. Moreover, adolescents and young adults have greater mobility and travel farther to school than children.
- We distinguished three levels of confidence in the evidence: low confidence when it is based primarily on expert opinion and no scientific evidence exists; moderate confidence when scientific evidence is available but is contradictory or of low quality, or only indirect evidence from outside the school setting exists; and high confidence when scientific evidence is consistent and of moderate to high quality.

**Explanation of symbols used**

It is nearly impossible to quantify the relative advantages and disadvantages of the effects of control measures. Consequently, we assessed them using simplified categories. The confidence in the evidence and the balance of advantages and disadvantages are indicated by color coding:

No effect of control measures	○, ○, ○	<p>Green: high confidence in evidence            Orange: moderate confidence in evidence            Red: low confidence in evidence</p>
Positive effect:		
small	+, +, +	
medium	++, ++, ++	
large	+++, ++, +++	
Negative effect:		
small	-, -, -	
medium	--, --, --	
large	---, ---, ---	
Advantages and disadvantages are balanced	●, ●, ●	
Advantages outweigh disadvantages or vice versa:		
slightly	●, ●, ●	
moderately	●●, ●●, ●●	
strongly	●●●, ●●●, ●●●	

## Detailed analysis for primary schools

Measures	Epidemiological situation	Reduced transmission in		Negative effects on			Balance of advantages and disadvantages
		Community / Region	Families	Learning progress	Social development	Mental health	
<b>General measures<sup>a</sup></b>	Under control	+	○				Advantage ●
	Serious	++	+	○	○	○	Advantage ●●
	Very serious	+++	++				Advantage ●●●
<b>Sick teachers and sick children stay at home</b>	Under control	+	+				Advantage ●
	Serious	++	++	○	○	○	Advantage ●●
	Very serious	+++	+++				Advantage ●●●
<b>Masks for teachers</b>	Under control	+	○				●
	Serious	++	+	-	○	○	Advantage ●
	Very serious	++	++				Advantage ●●
<b>Masks for pupils</b>	Under control	○	○				●
	Serious	+	+	-	-	-	Advantage ●
	Very serious	++	++				Advantage ●●
<b>No mixing of classes<sup>b</sup></b>	Under control	○	○				●
	Serious	+	○	○	-	○	●
	Very serious	++	+				Advantage ●
<b>Testing and quarantine of close contacts or classes<sup>c</sup></b>	Under control	+	+	○	○	○	Advantage ●
	Serious	++	+	○	○	○	Advantage ●●
	Very serious	+++	+	- <sup>d</sup>	- <sup>d</sup>	- <sup>d</sup>	Advantage ●●
<b>Regular testing in schools</b>	Under control	○	○				●
	Serious	+	+	○	○	○	Advantage ●
	Very serious	+	+				Advantage ●
<b>Reduced class size</b>	Under control	○	○				●
	Serious	○	○	○	-	○	●
	Very serious	+	+				Advantage ●
<b>Distance learning</b>	Under control	○	○				Disadvantages ●●●
	Serious	+	+	---	--	-	Disadvantages ●●
	Very serious	++	++				●

### Notes

<sup>a</sup> General measures: Hand hygiene, no handshaking, teachers keep 1.5 meters distance from pupils, good ventilation, clean toilets and surfaces, outdoor classes, no camps or field trips, no events with non-school personnel (e.g. parents). HEPA filters should be used when adequate, regular ventilation is not possible.

<sup>b</sup> This includes no mixing of classes in school, staggered arrivals and breaks, staggered lunchtimes, and other measures depending on the epidemiological situation. Additional activities and sports may be held as long as there is no mixing of classes.

<sup>c</sup> The extent of testing in schools with cases and instructions for quarantine should depend on the epidemiological situation (e.g. whole classes or schools if the situation is very serious, only close contacts when the situation is under control).

<sup>d</sup> Very serious situations may lead to repeated quarantines, which can have negative effects.

## Detailed analysis for secondary level I

Measures	Epidemiological situation	Reduced transmission in		Negative effects on			Balance of advantages and disadvantages
		Community / Region	Families	Learning progress	Social development	Mental health	
General measures <sup>a</sup>	Under control	+	○				Advantage ●
	Serious	++	+	○	○	○	Advantage ●●
	Very serious	+++	++				Advantage ●●●
Sick teachers and sick children stay at home	Under control	+	+				Advantage ●
	Serious	++	++	○	○	○	Advantage ●●
	Very serious	+++	+++				Advantage ●●●
Masks for teachers	Under control	+	○				Advantage ●
	Serious	++	+	○	○	○	Advantage ●●
	Very serious	++	++				Advantage ●●
Masks for pupils	Under control	○	○				●
	Serious	+	+	○	○	○	Advantage ●
	Very serious	++	++				Advantage ●●
No mixing of classes <sup>b</sup>	Under control	○	○				●
	Serious	+	○	○	○	○	Advantage ●
	Very serious	++	+				Advantage ●●
Testing and quarantine of close contacts or classes <sup>c</sup>	Under control	+	+	○	○	○	Advantage ●
	Serious	++	+	○	○	○	Advantage ●●
	Very serious	+++	+	- <sup>d</sup>	- <sup>d</sup>	- <sup>d</sup>	Disadvantage ●●●
Regular testing in schools	Under control	○	○				●
	Serious	+	+	○	○	○	Advantage ●
	Very serious	+	+				Advantage ●
Reduced class size	Under control	○	○				●
	Serious	○	○	○	○	○	●
	Very serious	+	+				Advantage ●
Distance learning	Under control	○	○				Disadvantages ●●
	Serious	+	+	--	-	-	●
	Very serious	++	++				Advantage ●

### Notes

<sup>a</sup> General measures: Hand hygiene, no handshaking, teachers keep 1.5 meters distance from pupils, good ventilation, clean toilets and surfaces, outdoor classes, no camps or field trips, no events with non-school personnel (e.g. parents). HEPA filters should be used when adequate, regular ventilation is not possible.

<sup>b</sup> This includes no mixing of classes at school, staggered arrivals and breaks, staggered lunchtimes, and other measures depending on the epidemiological situation. Additional activities and sports may be held as long as there is no mixing of classes.

<sup>c</sup> The extent of testing in schools with cases and instructions for quarantine should depend on the epidemiological situation (e.g. whole classes or schools if the situation is very serious, only close contacts when the situation is under control).

<sup>d</sup> Very serious situations may lead to repeated quarantines, which can have negative effects.



## Detailed analysis for secondary level II

Measures	Epidemiological situation	Reduced transmission in		Negative effects on			Balance of advantages and disadvantages
		Community / Region	Families	Learning progress	Social development	Mental health	
General measures <sup>a</sup>	Under control	+	○	○	○	○	Advantage ●
	Serious	++	+				Advantage ●●
	Very serious	+++	++				Advantage ●●●
Sick teachers and sick children stay at home	Under control	+	+	○	○	○	Advantage ●
	Serious	++	++				Advantage ●●
	Very serious	+++	+++				Advantage ●●●
Masks for teachers	Under control	+	○	○	○	○	Advantage ●
	Serious	++	+				Advantage ●●
	Very serious	++	++				Advantage ●●
Masks for pupils	Under control	○	○	○	○	○	●
	Serious	+	+				Advantage ●
	Very serious	++	++				Advantage ●●
No mixing of classes <sup>b</sup>	Under control	○	○	○	○	○	●
	Serious	+	○				Advantage ●
	Very serious	++	+				Advantage ●●
Testing and quarantine of close contacts or classes <sup>c</sup>	Under control	+	+	○	○	○	Advantage ●
	Serious	++	+				Advantage ●●
	Very serious	+++	+				Advantage ●●●
Regular testing in schools	Under control	○	○	○	○	○	●
	Serious	+	+				Advantage ●
	Very serious	+	+				Advantage ●
Reduced class size	Under control	○	○	○	○	○	●
	Serious	○	○				●
	Very serious	+	+				Advantage ●
Distance learning	Under control	○	○	- <sup>e</sup>	-	-	Disadvantage ●
	Serious	+	+				Advantage ●
	Very serious	++	++				Advantage ●●

### Notes

<sup>a</sup> General measures: Hand hygiene, no handshaking, teachers keep 1.5 meters distance from pupils, good ventilation, clean toilets and surfaces, outdoor classes, no camps or field trips, no events with non-school personnel (e.g. parents). HEPA filters should be used when adequate ventilation is not possible.

<sup>b</sup> This includes no mixing of classes at school, staggered arrivals and breaks, staggered lunchtimes, and other measures depending on the epidemiological situation. Additional activities and sports may be held as long as there is no mixing of classes.

<sup>c</sup> The extent of testing in schools with cases and instructions for quarantine should depend on the epidemiological situation (e.g. whole classes or schools if the situation is very serious, only close contacts when the situation is under control).

<sup>d</sup> Very serious situations may lead to repeated quarantines, which can have negative effects.

<sup>e</sup> A slightly smaller negative effect can be assumed for gymnasiums than at secondary level I.

## References on SARS-CoV-2 and schools

### General reviews and recommendations

ECDC review from 12/2020 (includes description of a wide range of mitigation measures in European countries) <sup>1</sup>

CDC recommendations <sup>2</sup>

Review in school guidelines in other countries <sup>3</sup>

Risk reduction in schools, Harvard School of Public Health <sup>4</sup>

Transmission clusters review (few schools among clusters) <sup>5</sup>

### Transmission in households and schools

Viner review <sup>6</sup>

Madewell review <sup>7</sup>

Krishnaratne <sup>8</sup>

Hyde <sup>9</sup>

Individual studies <sup>10-12</sup>

### Case studies on outbreaks

Outbreaks in camps <sup>13</sup>

Outbreak in Israel, <sup>14</sup> Chile, <sup>15</sup> France <sup>16</sup>

Sweden <sup>17</sup>

New Zealand <sup>18</sup>

### Contact tracing, overall prevalence, and modeling effect of closure on incidence

UK <sup>19</sup>

Germany <sup>20</sup>

Italy <sup>21</sup>

Ireland <sup>22</sup>

Australia <sup>23</sup>

Singapore <sup>24</sup>

US <sup>25-27</sup>

South Korea <sup>28,29</sup>

Japan <sup>30</sup>

Finland <sup>31</sup>

Netherlands <sup>32</sup>

### Specific measures in schools

In-person learning not associated with increased cases in US <sup>33</sup>

Preprints of modeling effect of specific school NPIs in US <sup>34,35</sup>

Modeling: reopening with reduction of contacts is safe <sup>36</sup>

### Other important studies

Gargle study in Austria <sup>37</sup>

Point-prevalence monitoring studies in UK (includes children and schools) <sup>38,39</sup>

Ecological studies of NPI effect <sup>40-43</sup>

Modeling of UK tiered lockdown and school closures <sup>44</sup>

## Impact of school closures

UNESCO position <sup>45</sup>

European Commission brief on educational inequalities <sup>46</sup>

Modeling of lifetime impact in US <sup>47,48</sup>

Maltreatment and domestic violence <sup>49,50</sup>

Mental health (see references in this article) <sup>51</sup>

Academic achievement <sup>48,52</sup>

Comments and reviews <sup>53</sup>

Social and economic impact <sup>54</sup>

Downstream effects <sup>55</sup>

Risk of obesity, <sup>56</sup> physical inactivity, sleep <sup>57,58</sup>

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## **Evidence from Switzerland**

### **Studies in schools**

Ciao Corona Testing in summer <sup>1</sup>

Ciao Corona Testing in Autumn <sup>2</sup>

Ciao Corona Acute testing in Autumn <sup>3</sup>

### **Studies in households, random samples**

Geneva study <sup>4</sup>

Geneva study – household transmission less likely from children <sup>5</sup>

Contact tracing in families with children <sup>6</sup>

### **Testing criteria for children**

BAG <sup>7</sup>

### **Other**

Learning outcomes – worse in primary than secondary schools and individual variation <sup>8</sup>

Survey on compliance with NPI in young people (largely compliant) <sup>9</sup>

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