We drink 2-3 L of water a day.

Water can contain pathogens.

We filter our water.

We breathe 11,000 L of air.

Air can contain pathogens.

We do not filter our air. Why not?

Air Quality

Perhaps even more than the scent of the air, the quality and purity of the air impact the brain and, consequently, learning. People inhale up to 15,000 liters of air each day (Wood, Burchett, Orwell, Tarran, & Torpy, 2002). Any contaminants present in the air can have an effect. As an example, carbon dioxide (CO_2) emissions can be very harmful—they can impair cognitive and behavioral development, increase the likelihood of developing a respiratory illness, and cause multiple chronic diseases (Perera, 2017). Poor air quality hurts learning and concentration in schools, plus they are a health hazard for kids and teachers (Daisey, Angell, & Apte, 2003).

Students who attend schools in areas with high vehicular traffic experience less cognitive development than students who attend schools in less trafficked areas (Sunyer et al., 2015). Why? Because more nearby traffic creates more air pollution—both on the playground and in the classroom—and air pollution is a developmental neurotoxicant. It negatively impacts working memory, attention, and general cognition.

5 REASONS TO CARE ABOUT YOUR SCHOOL'S INDOOR AIR QUALITY

1

ILLNESS

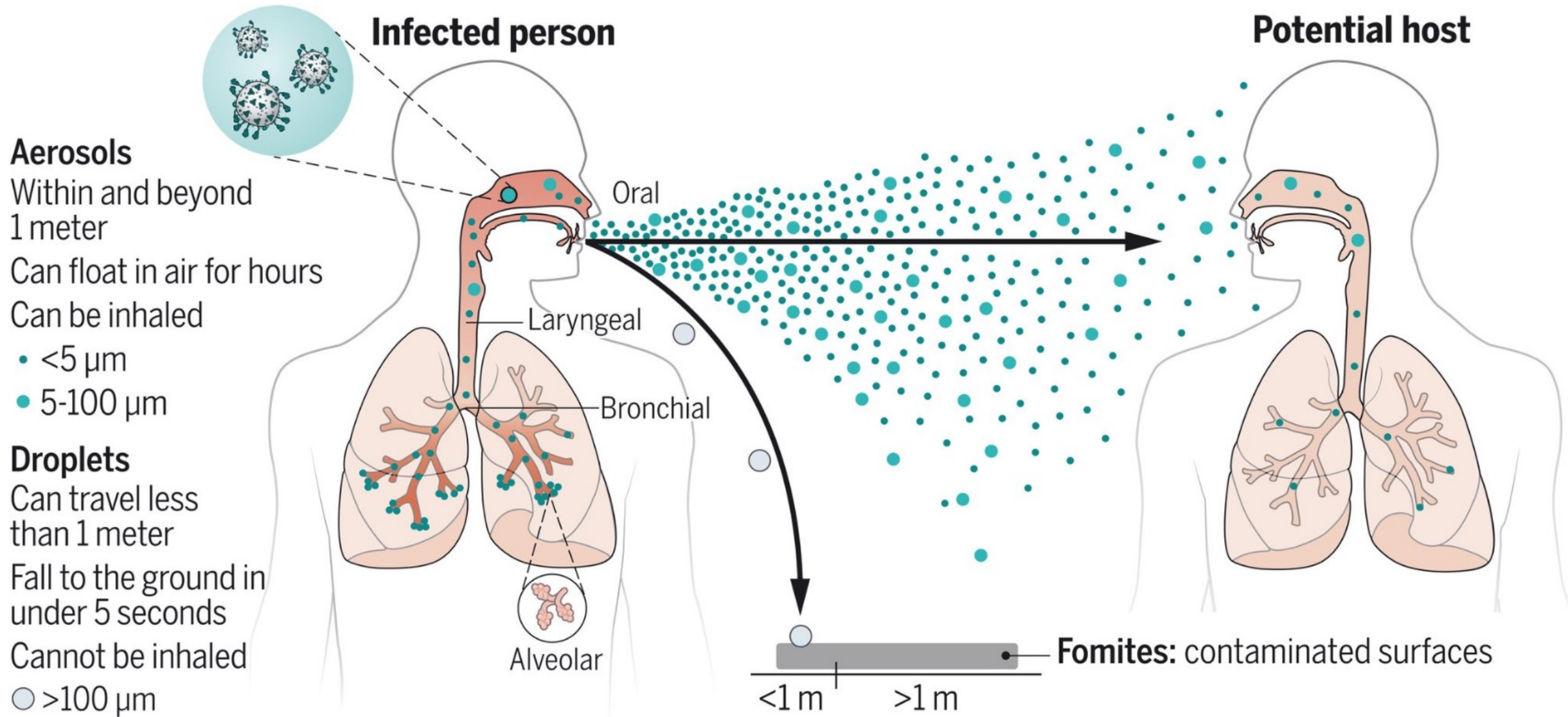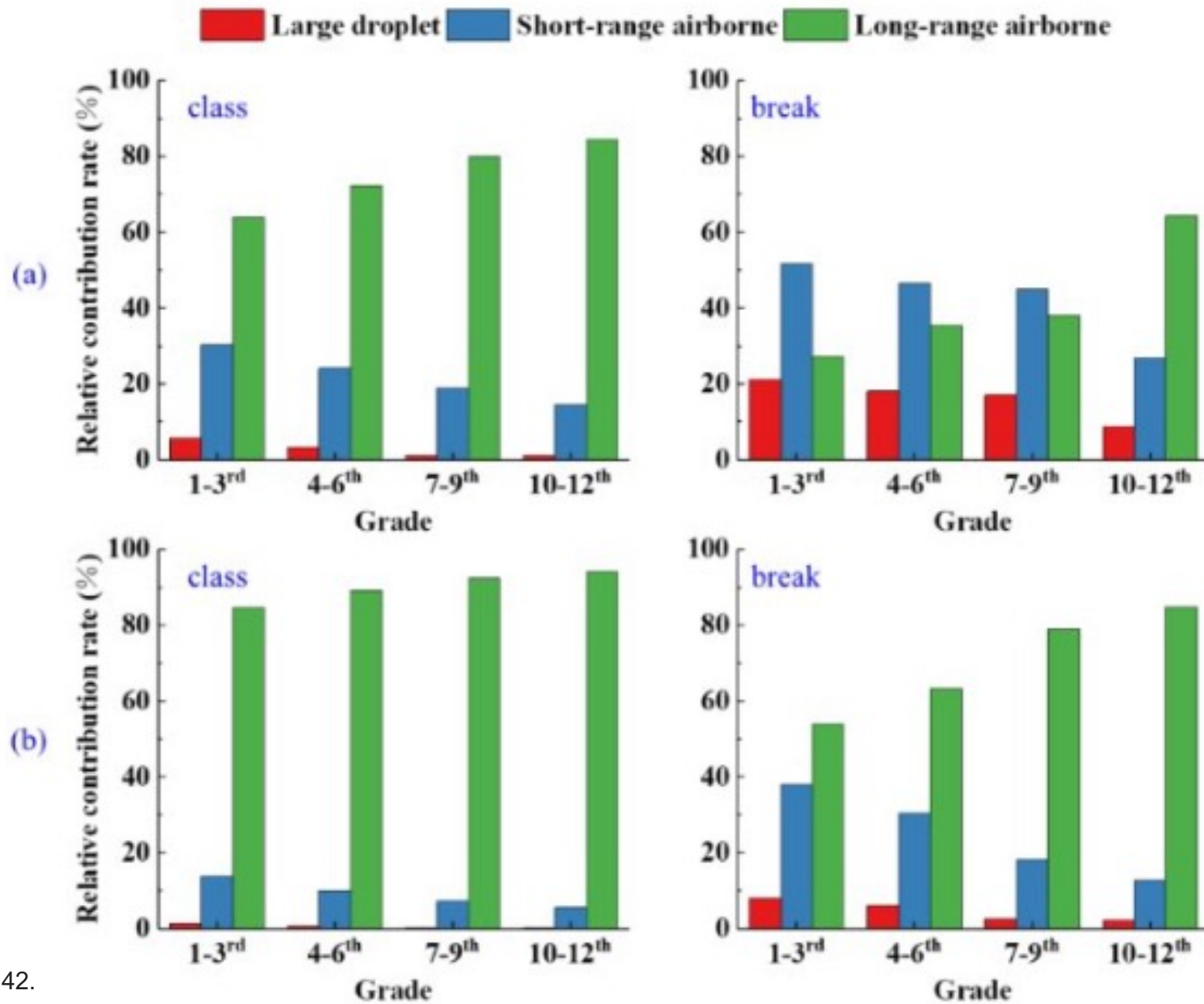Many respiratory viruses are transmitted through the air

Wang, C. C., Prather, K. A., Sznitman, J., Jimenez, J. L., Lakdawala, S. S., Tufekci, Z., & Marr, L. C. (2021). Airborne transmission of respiratory viruses. *Science*, *373*(6558), eabd9149.

Infected person

Potential host

Aerosols
Within and beyond
1 meter
Can float in air for hours
Can be inhaled
- <5 μm
- 5-100 μm

Droplets
Can travel less
than 1 meter
Fall to the ground in
under 5 seconds
Cannot be inhaled
- >100 μm

Oral

Laryngeal

Bronchial

Alveolar

Fomites: contaminated surfaces

<1 m   >1 m

Wang, C. C., Prather, K. A., Sznitman, J., Jimenez, J. L., Lakdawala, S. S., Tufekci, Z., & Marr, L. C. (2021). Airborne transmission of respiratory viruses. *Science*, *373*(6558), eabd9149.

Long-range aerosols are the dominant form of transmission

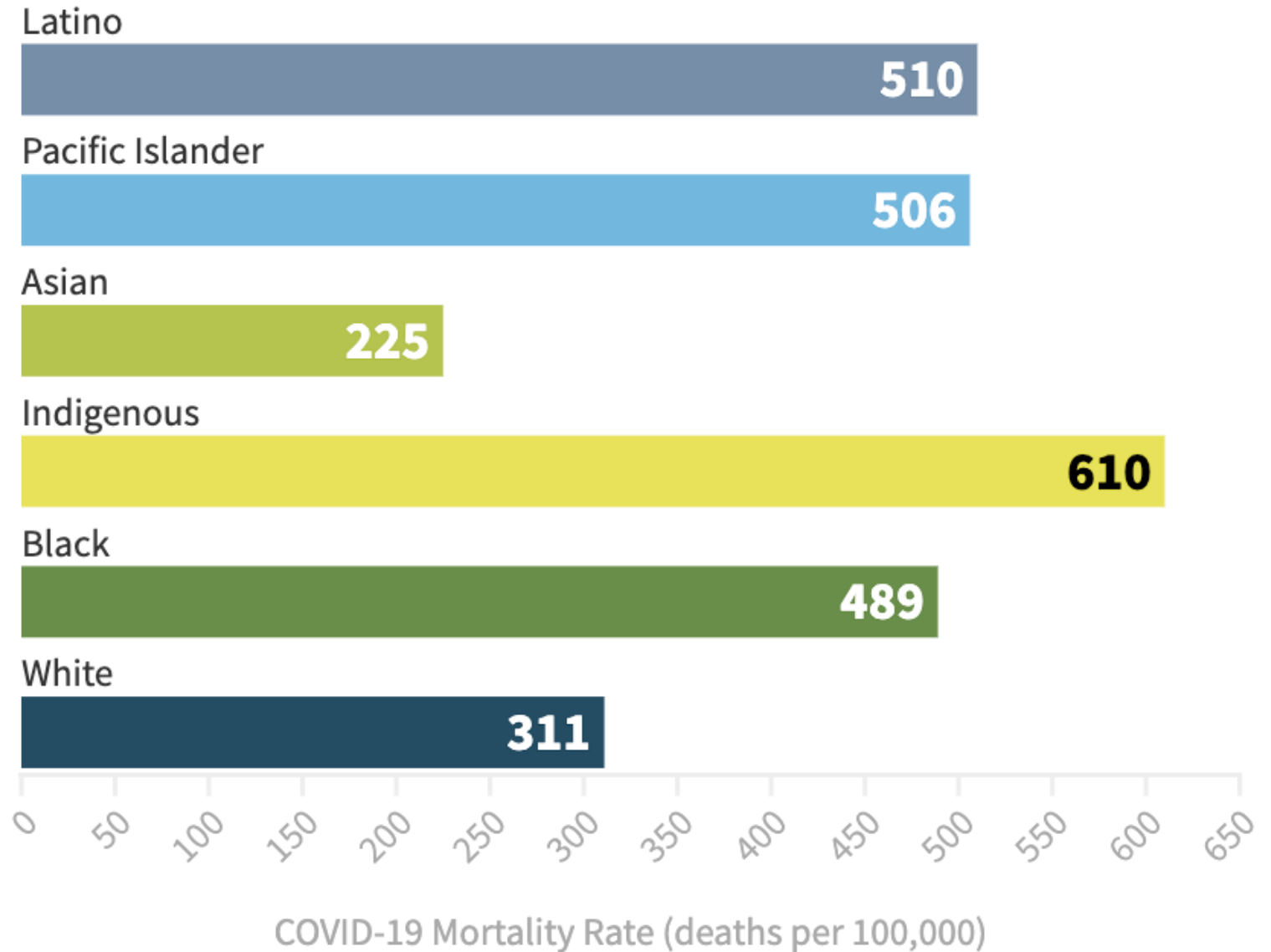Fig. S7. Relative contribution rate of each transmission route (a) without wearing mask and (b) with wearing masks.

Guo, Y., Dou, Z., Zhang, N., Liu, X., Su, B., Li, Y., & Zhang, Y. (2023). Student close contact behavior and COVID-19 transmission in China's classrooms. *PNAS nexus*, *2*(5), pgad142.

Covid-19 Mortality Rates (age-adjusted)

Latino 510
Pacific Islander 506
Asian 225
Indigenous 610
Black 489
White 311

COVID-19 Mortality Rate (deaths per 100,000)

2 EQUITY

Source: Data from US Centers for Disease Control and Prevention, Analysis by APM Research Lab. Rates are based on deaths reported as of June 21, 2023.

Persons with disabilities are at greater risk of developing more severe health conditions and dying from COVID-19.

Source: U.S. Bureau of Labor Statistics

fred.stlouisfed.org

3
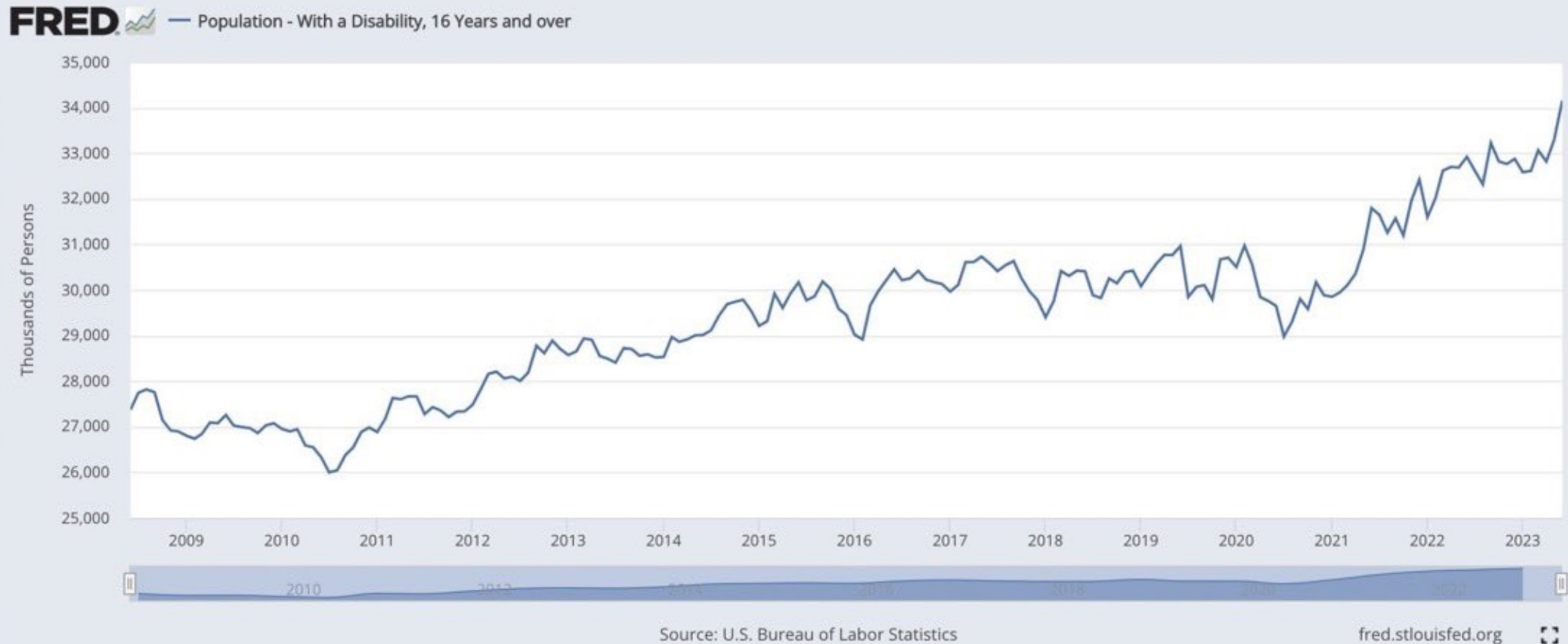
LONG COVID

World Health Organization (WHO) ✔
@WHO

"An estimated 1 in 10 infections results in post #COVID19 condition, suggesting that hundreds of millions of people will need longer-term care."
-@DrTedros

7:09 AM · 4/26/23 from Earth · **1.3M** Views

1 in 20 teachers

Believe they have Long Covid. Another 14% think (or know) they had it, but eventually recovered.

1 in 6 kids
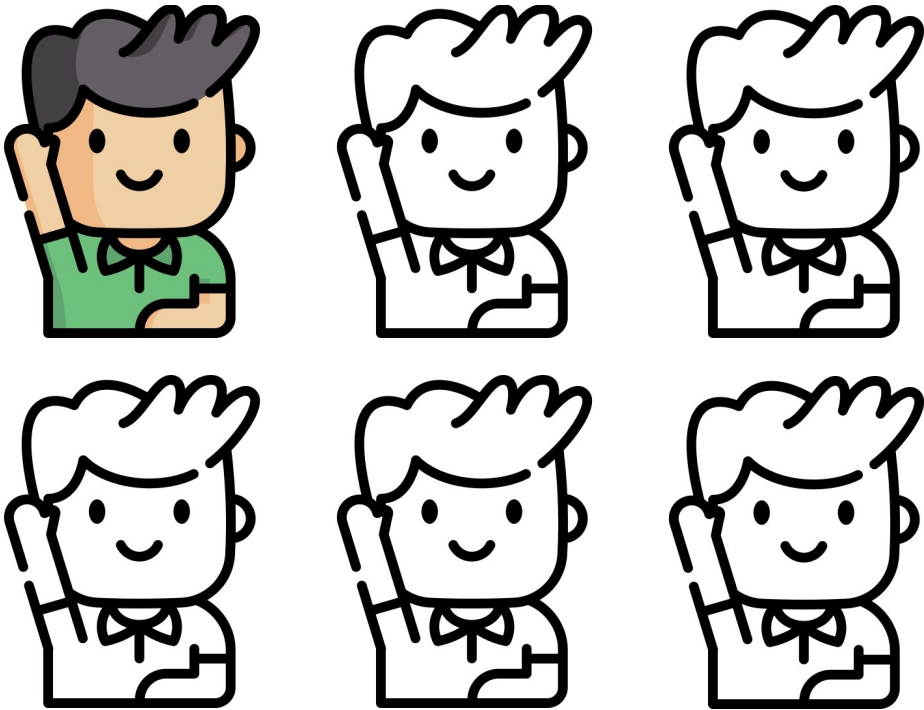
experience long covid symptoms at least 3 months post covid

Jiang, L., Li, X., Nie, J., Tang, K., & Bhutta, Z. A. (2023). A Systematic Review of Persistent Clinical Features After SARS-CoV-2 in the Pediatric Population. *Pediatrics, 152*(2).

4 ABSENT STUDENTS

Chronic absenteeism rates at San Diego Unified

| | '16-'17 | '17-'18 | '18-'19 | '20-'21 | '21-'22 | '22-'23 |

virtual

Source: DataQuest. Data for 2022-2023 school year is as of January. 2019-2020 data is invalid according to Ca Dept of Ed.
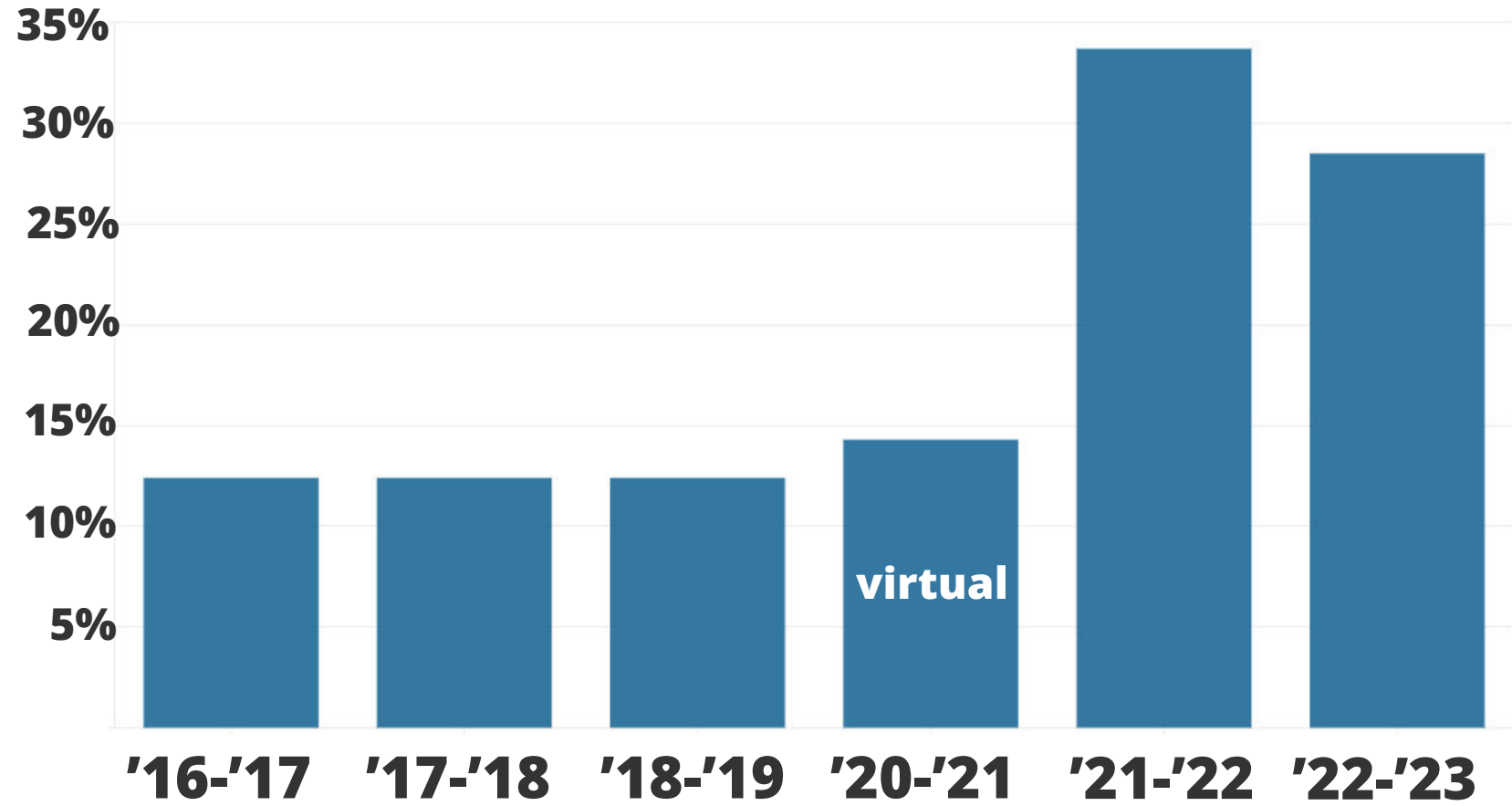
% of Absences by Absence Reason

Absence Reason	Percentage
Acute Illness	48%
Skipping	5%
Chronic Illness	4%
Family Emergency	4%
Routine Dental Appt	3%
Preventative Medical	2%
Travel	2%
Mental Health Issue	2%
Suspension (not ISS)	1%
Family Responsibility	1%

0%   10%   20%   30%   40%   50%

5
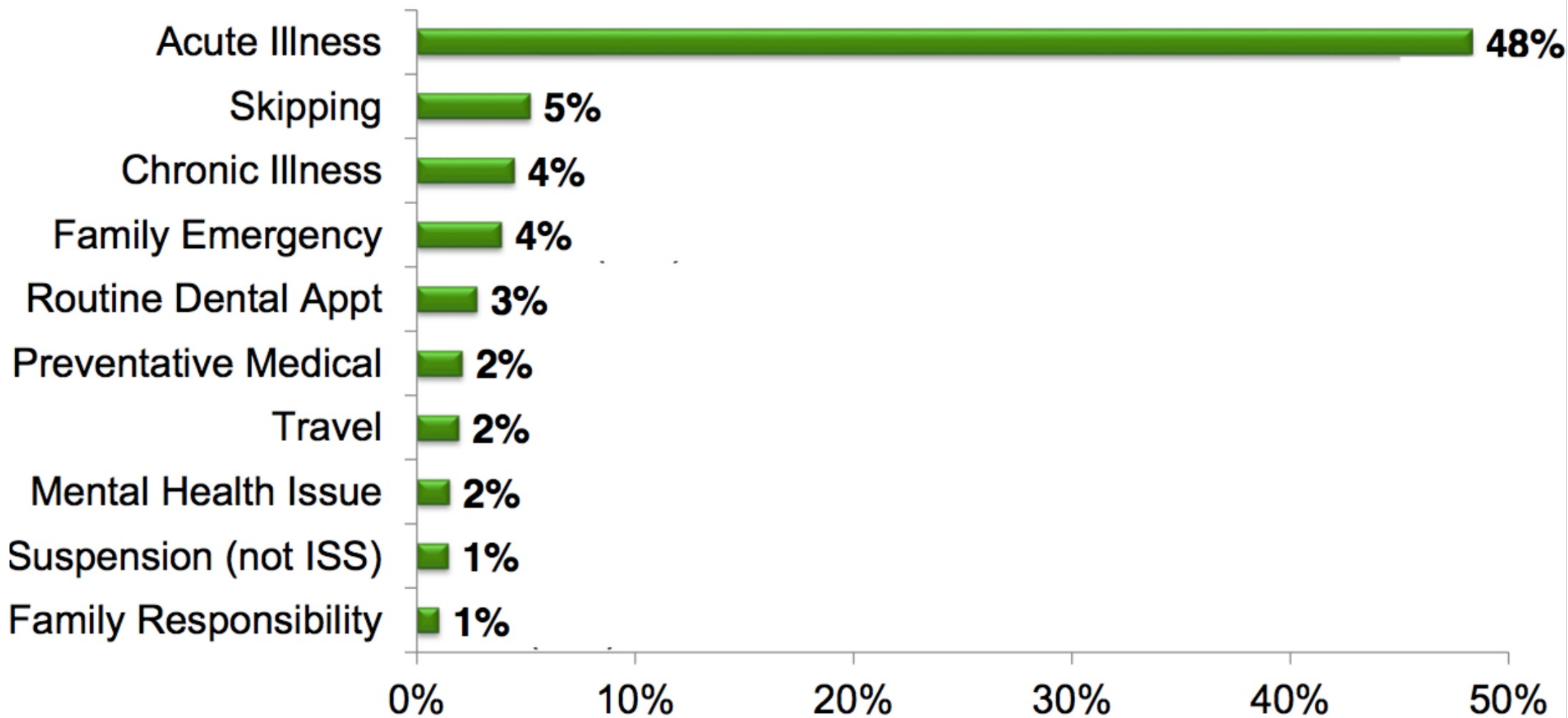
COMMUNITY

70%

of household spread of Covid-19 started with a child, according to study of 850,000 US households.

*Rates dropped during school breaks.

**Younger kids under 8 more likely source of transmission than kids 9-17.

Tseng, Y. J., Olson, K. L., Bloch, D., & Mandl, K. D. (2023). Smart Thermometer–Based Participatory Surveillance to Discern the Role of Children in Household Viral Transmission During the COVID-19 Pandemic. *JAMA Network Open*, *6*(6), e2316190-e2316190.

1 ILLNESS

2 EQUITY

3 LONG COVID

4 ABSENT STUDENTS

5 COMMUNITY

ACH

AIR CHANGES PER HOUR

The number of times that the total air volume in a room or space is completely removed and replaced in an hour.
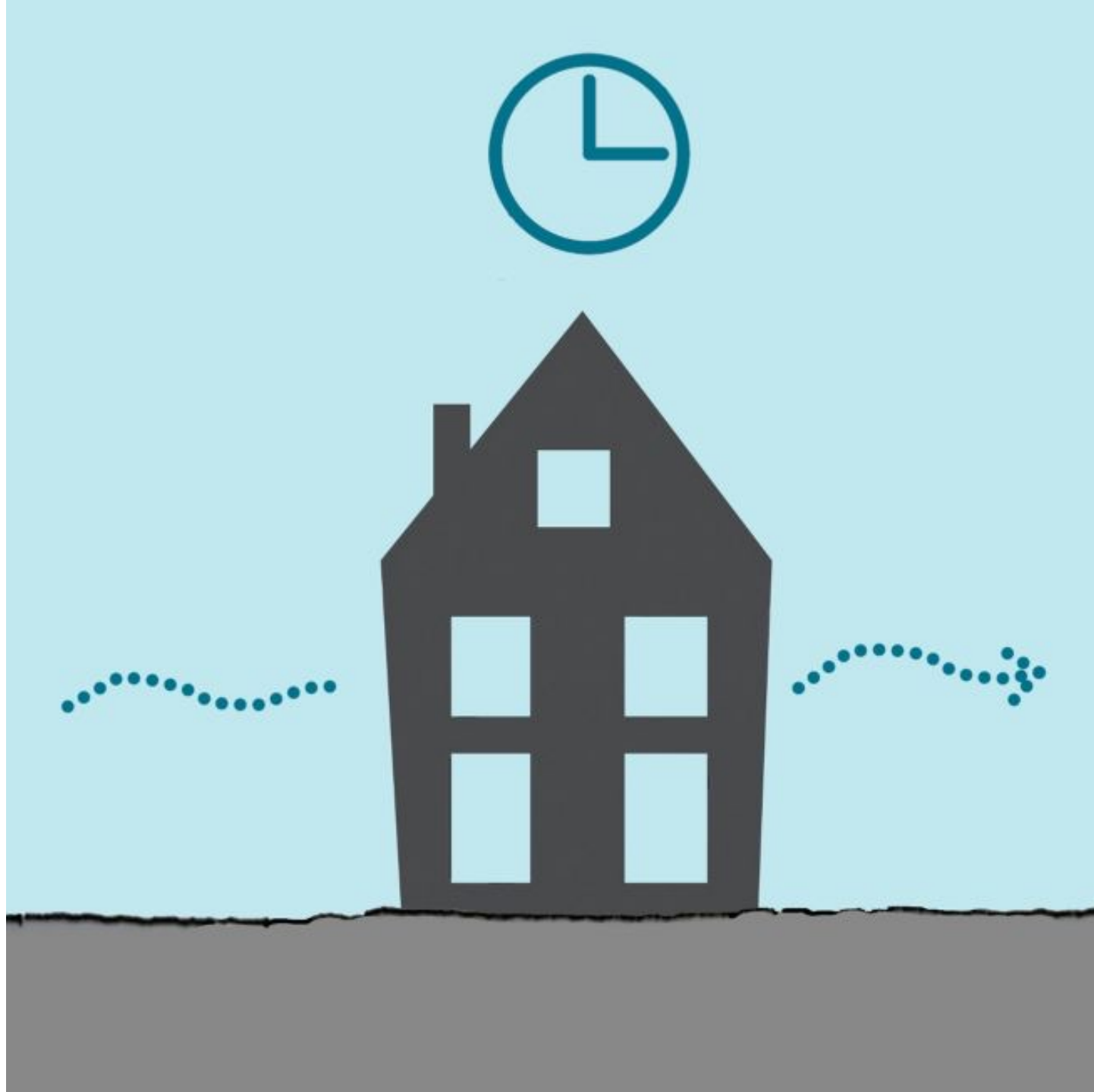
Imagine if you froze the air in a room into a cube...
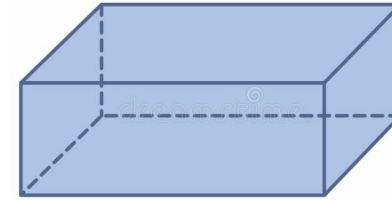
And then swiped left on that stale air
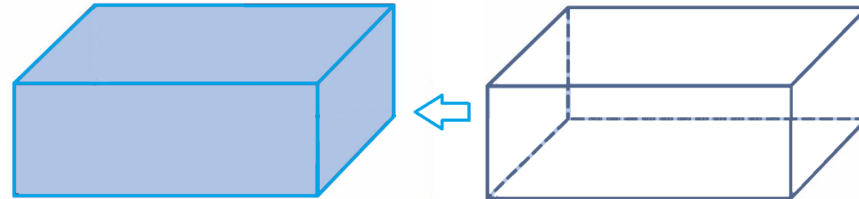
Then brought in one room's worth of new air...
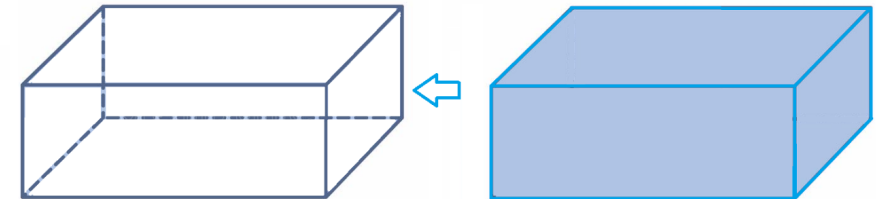
That's one air change!
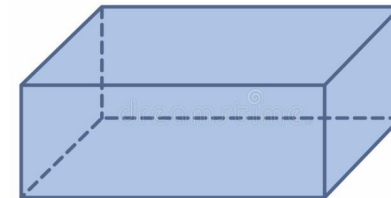
CDC recommends 5 ACH

Aim for 5

Aim to deliver 5 or more air changes per hour (ACH) of clean air to rooms in your building. This will help reduce the number of viral particles in the air. You may need to use a combination of ventilation (air supply, filtration, and air treatment) strategies to reach this target.

How many Air Changes per Hour (ACH)
are we getting at my kids' school?

A) 1.7 ACH

B) 3.6 ACH

C) 6.6 ACH

D) 9.9 ACH

Clean Air

In Classrooms Using

W.A.T.C.H

Windows

- Open windows as much as possible.
- If it's cold outside, even cracking windows slightly can help.
- Keeping the classroom door open helps circulate the air even more.
- Warm weather? Having 2 windows open while using a fan to blow air out of 1 of the windows is optimal.
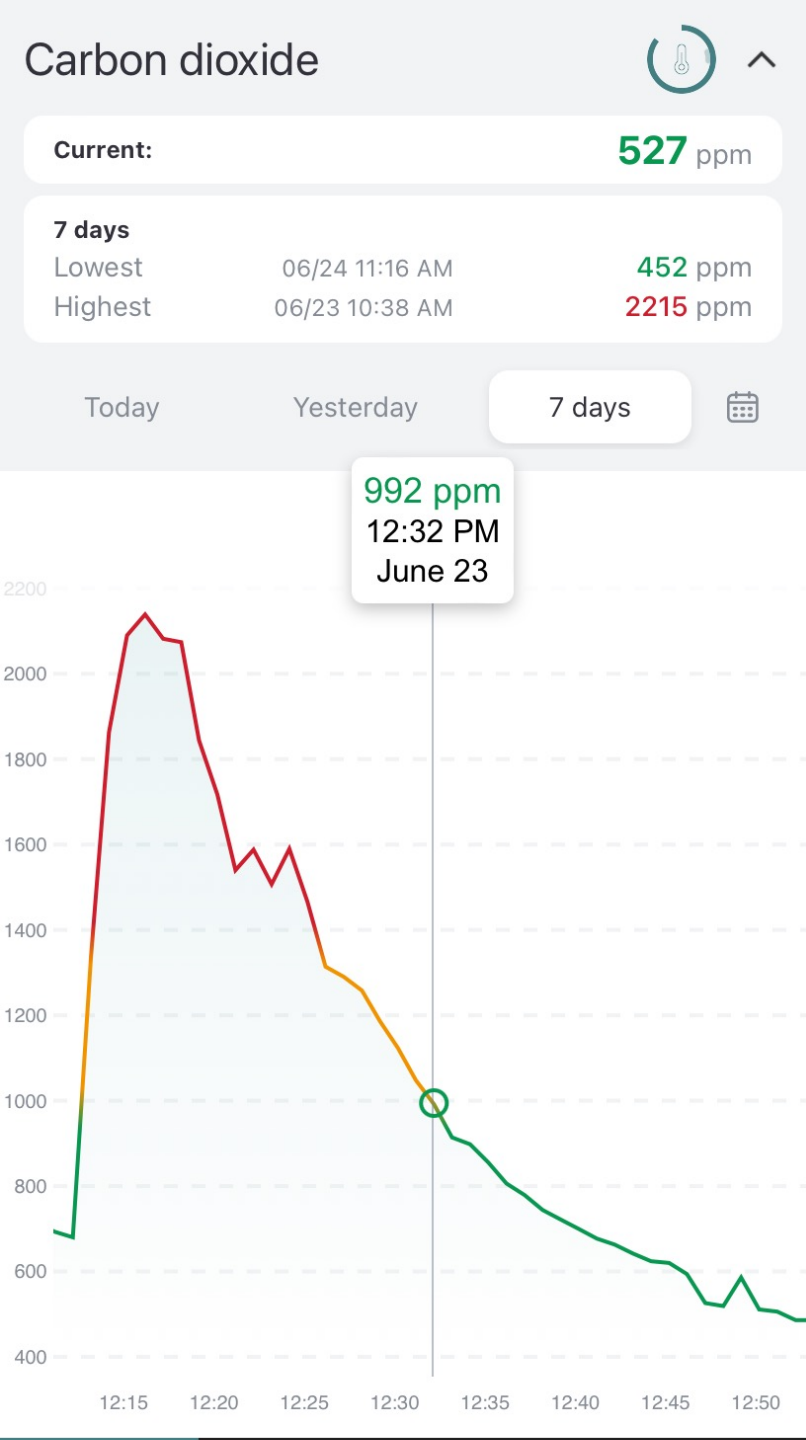
ent

coming

How many Air Changes per Hour (ACH) can we get with windows/doors open?

A) 1.7 ACH

B) 3.6 ACH

C) 6.6 ACH

D) 9.6 ACH

Air Movement

Check to see if you feel air coming from the diffusers or air vents.

Attach a ribbon to the vent for an easy visual cue that it's working!

Thermostat

Keep the FAN setting ON when the room is being occupied.

72°
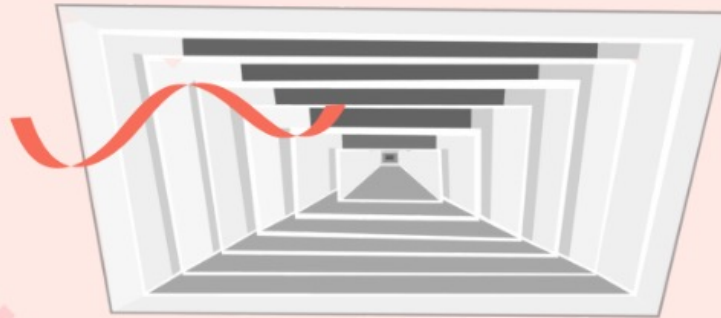
AUTO is ok to use when the room is going to be unoccupied.

Temperature

Current:

06/21 - 06/23
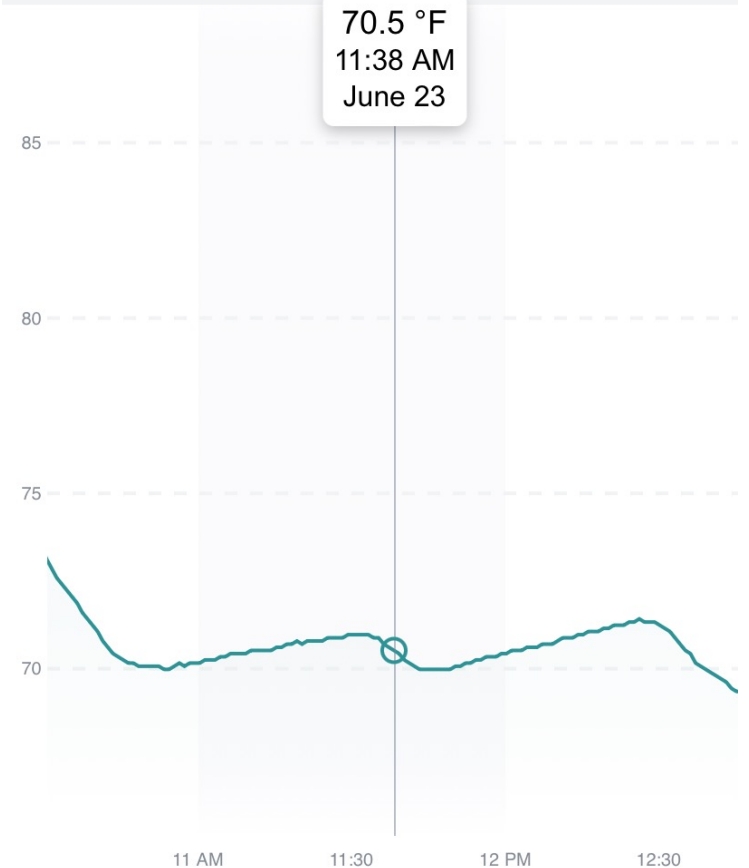Lowest   06/23 8:09 AM   65.8 °F
Highest   06/23 12:53 PM   85.4 °F

Today   Yesterday   7 days

70.5 °F
11:38 AM
June 23

85

80

75

70

11 AM   11:30   12 PM   12:30

CO₂

imal.

CO2 Levels

600
PPM

Use a CO2 monitor with a nondispersive infrared (NDIR) sensor

< 600 ppm	Very Good
600 - 800 ppm	Good
800 - 1000 ppm	Acceptable
1000 - 1500 ppm	Poor
> 1500 PPM	Very Poor

* HEPA filters do not change CO2 levels.

CO₂ ppm   rebreathed air %

3600   8%
2800   6%
2000   4%

67.2°F   72💧
488

1200   2%
800   🔋   🔊 CO₂ ppm   1%
600   0.5%
420   0%

aranet4

72.0°F   53💧
2357

CO₂ ppm

aranet4

Rebreathed CO$_2$

Breath approximately 40,000 ppm
Outdoors 400 ppm

**For every +400 ppm
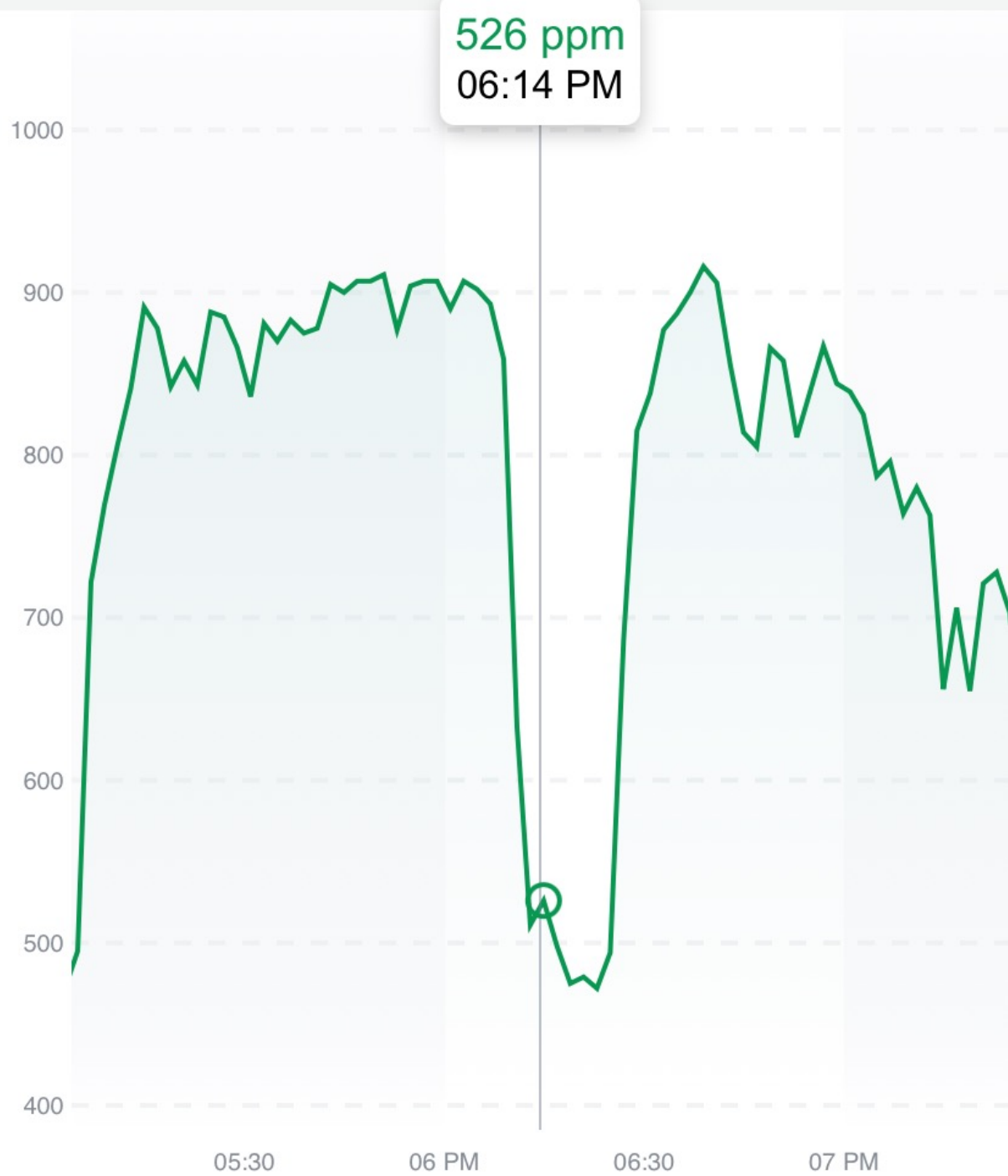rebreathed fraction +1%**

800 ppm = 1%	1 in 100 breaths
1200 ppm = 2%	1 in 50 breaths
2400 ppm = 5%	1 in 20 breaths
5000 ppm = 12%	1 in 8 breaths

Typical day in my child's classroom
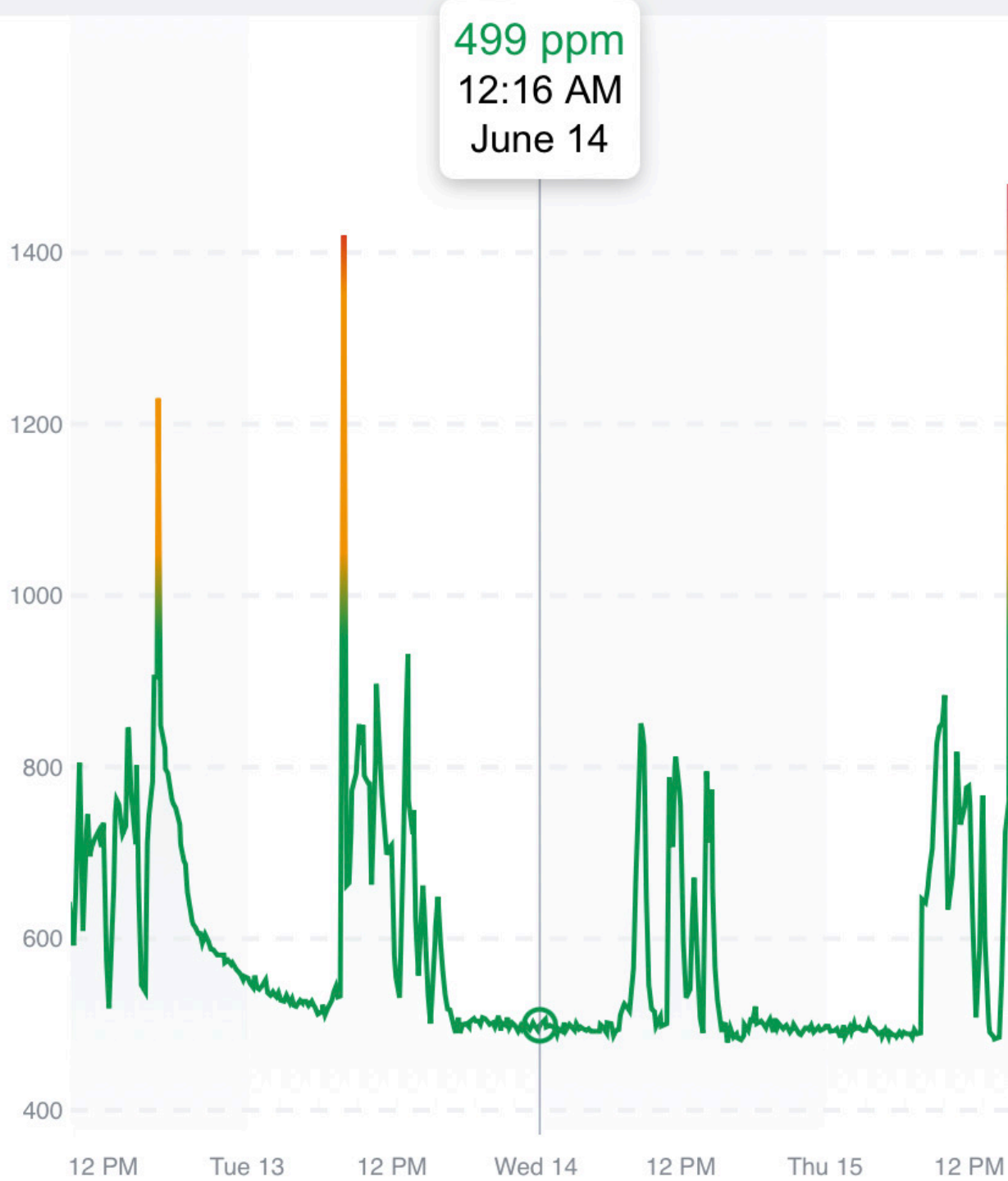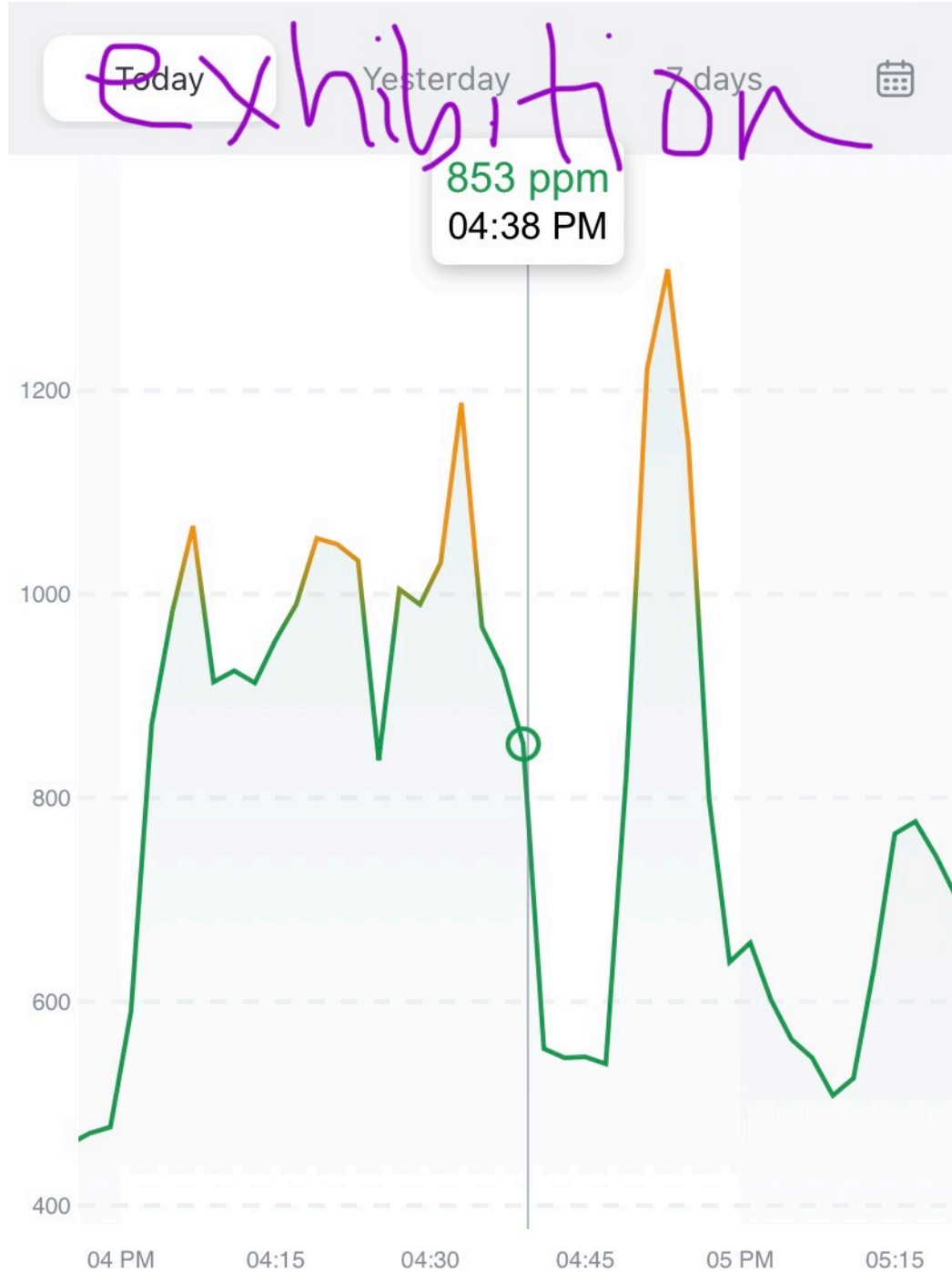
Typical week in my child's classroom

3468 ppm
08:10 PM

4000

3500

3000

2500

2000

1500

1000

500

07 PM   07:30   08 PM   08:30   09 PM

Talent Show in the theater at my nephew's school

Exhibition

"Open House" at my kids' school

Application

The eZNT-T100 has the same sensing functionality as the eZNS-T100 but

Features

▶ Native BACnet firmware

▶ Standard RGB backlight allows choice of colors to indicate conditions, alarms and night mode

▶ Large easy-to-read LCD screen. On-screen visual feedback on button selection.

▶ Multiple button and slider layout options. Custom button design available through Professional Development Services (PDS).

▶ Support for custom button and screen interactions through GCL+ programming

▶ Support for local scheduling, trending

Icons

Buttons
2 rows of 4 capacitive touch zones, allowing up to 8 individual buttons or combined to form larger buttons

Backlight
RGB LED backlight for multicolor LCD and button illumination

Temperature
Digital temperature sensor
+/- 0.2°C (+/- 0.36°F)

Digital Humidity Sensor (Optional)
Accuracy +/- 2%

CO_2 Sensor (Optional)
Dual-channel NDIR detection

Range: 0–2000 ppm

Accuracy @ 25°C (77°F):
± (30 ppm + 3% of value)

Occupancy Sensor (Optional)

HEPA Filter or Corsi-Rosenthal Box

* HEPA filters do not change CO2 levels.

Use the highest setting.

* Noise permitting.

Disable Features like:

- Ionization
- Plasma
- UV with Catalyst
- Auto

CORSI-ROSENTHAL

For more information please visit: itsairborne.com

Infographic: agcreative.org

PLACEMENT IS IMPORTANT

- Move away from walls & corners. (0.5 m - 1.5 ft)
- Place as close as you can to the centre of the room.
- Avoid blowing directly at anyone.
- Face away from walls & obstructions, e.g. blowing under a table.
- Raised is better than on the floor.
- Keep away from clean air sources: open windows, air vents & other HEPA filters.
- If you have multiple HEPA filters, space them out evenly.

Each Corsi-Rosenthal Box (on low) adds an additional 3 ACH*

*based on data for our classrooms, if used properly:
- Turned on
- All 4 sides exposed
- Away from door/window
- As close to center of room as possible

How many Air Changes per Hour (ACH) do you want?

A) 1.7 ACH

B) 3.6 ACH

C) 6.6 ACH

D) 9.6 ACH

Clean Air In Classrooms Using W.A.T.C.H

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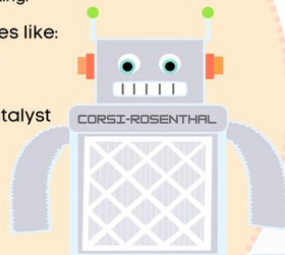| < 600 ppm | Very Good |
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CORSI-ROSENTHAL
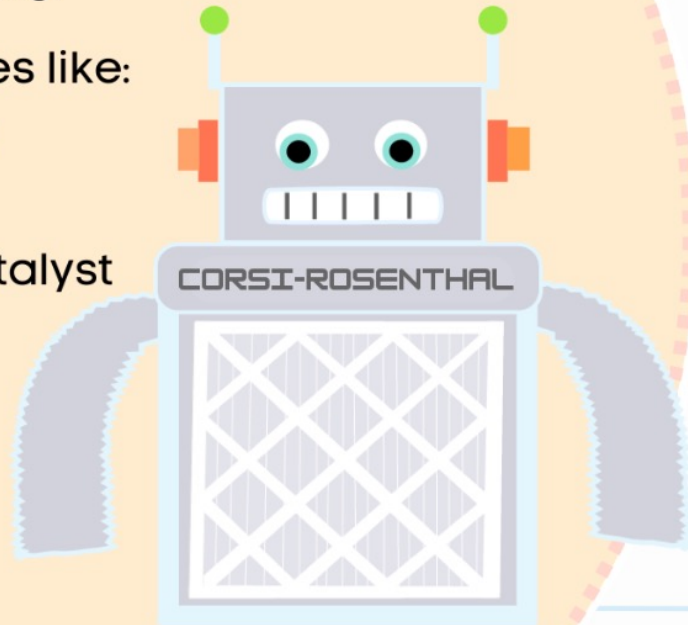
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Infographic: agcreative.org

Download this graphic from Joey Fox HERE.