SCHOOLYARD SURVEILLANCE

The Rise Of K-12 Contact Tracing Technologies

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SEPTEMBER 2, 2020

STOP
SURVEILLANCE TECHNOLOGY OVERSIGHT PROJECT

INTRODUCTION:

This Spring, COVID-19 drove K–12 schools across the country online. By late March, more than 104,000 schools had shut their doors, affecting 47.9 million students.[1] At the time, school closures were considered temporary, with the hope of renewed in-person instruction in the Fall. However, as semester start dates approach and COVID-19 cases continue to surge in many parts of the country, it is becoming increasingly clear that education for millions of American children will remain online.

School closures expose entrenched inequities and add uncertainty to an already anxious time. For low-income students, the lack of access to affordable, functional, and reliable computers, tablets, and broadband internet further limits educational opportunity.[2] A quarter of American households lack access to any home broadband (cable, DSL, fiber, microwave, or satellite), and many of those so-called "broadband" connections are too slow to support high-quality video calls.[3] This has placed parents, teachers, and local school boards in an impossible position: choosing between effective education that reaches all students and effective precautions against school-based spread of COVID-19.

This paper does not confront the question of ***whether*** schools should reopen for in-person instruction, but looks at what role technology should play in monitoring potential COVID-19 exposure if they do. Location-tracking technologies can sound like an attractive response to COVID-19, but, as explained below, they can undermine public health, amplify health inequities, and erode privacy. For-profit tech firms are flooding the market with purported solutions to COVID-19. But many of these "solutions" are far more likely to aid vendors' bottom lines than to help reduce the spread of COVID-19.

Persistent location monitoring of schoolchildren risks becoming yet another facet of the school-to-prison pipeline, providing law enforcement with unprecedented tracking capabilities for monitoring children of color. More broadly, a tech-focused response to the problem of COVID-19 in schools risks providing the public with a false sense of security, encouraging unwise risks while also detracting from the necessary investment in evidence-based public health measures.

There are alternatives to invasive tracking tools, the most crucial of which is manual contact tracing by culturally competent interviewers. This approach has been used to combat outbreaks of disease for decades, including everything from syphilis to Ebola to HIV/AIDS.[4] Manual contact tracing allows school officials to speak with students and staff, learning about their potential points of contact with other individuals. Manual contact tracing with very young children can present special logistical burdens, but it is no less indispensable to curtailing COVID-19.

This paper explores (i) potential COVID-19 exposure tracking technologiess for schools, (ii) flaws underlying these technologies, (iii) their civil rights implications, and (iv) the evidence-based alternatives available to schools.

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[1] *See* Lara Fishbane & Adie Tomer, *As Classes Move Online During Covid-19, What are Disconnected Students to Do?*, BROOKINGS (Mar. 20, 2020), https://www.brookings.edu/blog/the-avenue/2020/03/20/as-classes-move-online-during-covid-19-what-are-disconnected-students-to-do/.

[2] *See id.*

[3] *See* Monica Anderson, *Mobile Technology and Home Broadband 2019*, PEW RESEARCH CTR. (June 13, 2019), https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/.

[4] *See* Caroline Chen, *You Don't Need Invasive Tech for Successful Contact Tracing. Here's How It Works.*, PROPUBLICA (May 19, 2020), https://www.propublica.org/article/you-dont-need-invasive-tech-for-successful-contact-tracing-heres-how-it-works.

Turning Towards Technology:

With mounting pressure to reopen, local school boards and private institutions have turned towards technology in the hopes of containing potential outbreaks. Most exposure notification technologies rely on one or more of the following: GPS, cell tower triangulation, Wi-Fi triangulation, Bluetooth proximity detection, radio-frequency identification ("RFID") and/or quick response ("QR") codes. Most of these technologies track users perpetually, but RFID and QR tracking require manual user action to register location (tapping an RFID transceiver or scanning a code).

While most businesses and colleges investing in contact tracing technology are choosing smartphone tracking apps, K–12 school officials choosing tech-based solutions primarily opt for wearable tracking devices that use a combination of GPS, Bluetooth, and Wi-Fi triangulation to track students. Wearables use the same underlying tracking technologies as smartphone apps, but they are contained in purpose-built tracking devices that provide none of the consumer-end functionality of smartphones or tablets.[5] Some wearables can also include other features, such as health monitoring or COVID-19 symptom tracking.

One of the most popular geolocation tracking technologies is GPS, which uses satellite telemetry to identify a device's location. GPS offers the promise of precision, but interference and reflectivity can throw GPS location data off by 22 to 42 feet. This means the margin of error can be an order of magnitude larger than the commonly cited six-foot range of potential COVID-19 exposure.[6] GPS will lead to false alerts and resulting alarm fatigue, which occurs when users stop taking notifications seriously. At the same time, a portion of students will experience false negatives, where they are not notified of legitimate exposures to the COVID-19 virus. GPS is also maximally invasive of privacy. GPS satellites don't measure the location of devices, rather, they provide each device the ability to find its own approximate location. Each GPS-enabled device only measures its own location, so proximity to other devices and potential exposure can only be extrapolated after aggregating and comparing multiple users' location history over an extended period of time. This creates the opportunity for GPS location data to be misused for other purposes, everything from policing academic performance and truancy to actual policing of criminal activity to immigration enforcement.

Cell tower tracking is similar to GPS, though rather than tracking a user's location via satellite, it uses cell towers to record location. Since cell phones typically connect to the closest tower, phone companies can use tower location and the direction of the signal to map devices' approximate location, and they frequently retain this data for years. Because modern smartphones "ping" cell towers every time a call is made, a text is sent, or a data packet is transmitted, phone companies have an almost constant map of users' movements. However, that map can be quite inconsistent,[7] with locations distorted by a matter of miles, rather than merely feet. Additionally, as with GPS tracking, cell towers only track the location of one individual user, and not the proximity of the user to others. Proximity, and thus likelihood of potential exposure, can only be gaged through an aggregated analysis.

Wi-Fi tracking varies from cell tower tracking in two ways. First, Wi-Fi signals travel shorter distances than cellphone signals, making location estimates potentially more precise. Second, because Wi-Fi antennae are maintained by a decentralized array of operators, it is often harder to aggregate

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[5] *See* Marielle S. Gross, Robert C. Miller, & Assya Pascalev, *Ethical Implication of Wearables in Pandemic Response: A Call for a Paradigm Shift*, EDMOND J. SAFRA CTR. FOR ETHICS (May 18, 2020), https://ethics.harvard.edu/files/center-for-ethics/files/18ethicalwearables.pdf.

[6] *See* Will Knight, *Phones Could Track the Spread of Covid-19. Is It a Good Idea?*, WIRED (Mar. 15, 2020), https://www.wired.com/story/phones-track-spread-covid19-good-idea/.

[7] *See* Erik Franco, *The Tiny Detail that Is Still Bothering Us About 'Serial'*, VICE (Dec. 25, 2014), https://www.vice.com/en_us/article/gvy8gb/serial-cell-data.

and analyze location histories. For students and staff who live, work, and study on a boarding school campus, Wi-Fi might provide a fairly comprehensive map of their movements, but only when they are in range of the campus network. Moreover, the accuracy of the location history may vary based on the placement of routers, the construction materials a signal is penetrating, and the number of nearby devices.[8]

Bluetooth is the leading technology for COVID-19 tracking apps and wearables. Bluetooth transceivers estimate the proximity of nearby devices based on the strength and duration of their signal. Unfortunately, signal strength is a poor proxy for distance, as it can be affected by everything from phone model to battery level to signal interference tor how a device is carried.[9] Signals can reflect and refract off building materials, providing fluctuating levels of accuracy across a campus.[10] Similarly, Bluetooth can provide false positives by flagging potential exposure between individuals who were in separate rooms separated by a wall at all times.[11]

A distinct set of issues are raised by QR codes, machine-scannable codes that can provide a unique identifier for a device or location.[12] They can work via students using personal devices to scan the QR code at the entrance to a classroom to record their presence or via users making a code visible on their devices and scanning that code with a stationary QR scanner. While QR scanning does not suffer from many of the foregoing accuracy concerns, it does require users to access their smartphone or wearable device each and every time they log their location, creating a less granular location history.

Lastly, the most alarming set of contact tracing technologies are biometric tracking tools, including facial recognition and wide-area thermal imaging. Facial recognition has been proposed for both persistent location tracking and for registries of those who have recovered from COVID-19. In addition to suffering from well-documented racial and gender biases, many facial recognition systems have been shown to be less accurate for children and teenagers. Similarly, wide-area thermal scanning suffers serious limitations around reliability and potential bias. Taking temperature readings from a distance has not been found to be an accurate way to diagnose the presence of a fever, let alone COVID-19, and error rates may differ along racial and gender lines.

SCHOOLS TURNING TO COVID-19 TRACKING TECHNOLOGIES

Although many schools still have not finalized reopening plans, some have already announced steps toward contact-tracing technology investments. Some schools have worked with vendors to retool existing location tracking products as contact tracing solutions, while other schools are purchasing systems that have been rushed to market amid the shutdown.

Wearable tracking technologies appear to be leading the market. In New Albany, Ohio, the 4,800-student school district is evaluating a Bluetooth tracking system manufactured by the firm Volan. The company has claimed that that system can provide precise positioning of thousands of

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[8] *See, e.g.*, Geir Rimala & Jorunn Newth, *10 Things in Your Home that Interfere with and Block Wi-Fi Signals*, EYE NETWORKS (Dec. 6, 2019), https://eyenetworks.no/en/10-things-that-disturb-and-block-wi-fi-signals/#:~:text=Concrete%20and%20Masonry%20Walls,Signal%20Loss%20by%20Building%20Material.

[9] *See, e.g.*, Kelly Servick, *Covid-19 Contact Tracing Apps Are Coming to a Phone Near You. How Will We Know Whether They Work?*, SCI. MAG. (May 21, 2020), https://www.sciencemag.org/news/2020/05/countries-around-world-are-rolling-out-contact-tracing-apps-contain-coronavirus-how.

[10] *See id.*

[11] *See, e.g.*, Susan Landau, Christy E. Lopez, & Larua Moy, *The Importance of Equity in Contact Tracing*, LAWFARE (May 1, 2020), https://www.lawfareblog.com/importance-equity-contact-tracing.

[12] *See, e.g.*, Shaun Pagin, *QR Codes: What Are They and How Do They Work?*, https://www.fastprint.co.uk/blog/quick-response-codes-what-are-they-and-how-do-they-work.html (last visited Aug. 18, 2020).

individuals, but there is little data to substantiate the claims.[13] Similarly, the superintendent of Robbinsville, New Jersey, schools—which have previously used Volan for building-access control systems—has expressed interest in using the firm for contact tracing.[14]

CENTEGIX, an Atlanta-based tech company, is marketing its ContactAlert system as a tool for safe school reopenings.[15] The company is rebranding their CrisisAlert system, which is already used in 1,200 schools across the country for campus policing, to trace potential exposure. The system uses badges worn around the necks of students, staff and teachers, which track on-campus location using Bluetooth technology. The company's CEO, Matthew Stevens, has said that if someone is later diagnosed, the collected data can be used to isolate students and disinfect certain areas of the school.

Another supplier of Bluetooth wearable technologies, RightCrowd, claims to have received inquiries from several boarding schools. RightCrowd's Bluetooth signal is embedded in a badge that is worn around user's' necks and hangs by their chest. An image of the user, as well as their name, is shown on the front of the badge. In addition to continuously monitoring proximity, the badges issue warnings if individuals are too close to one another.[16] Many schools plan on allowing students to be within six feet of one another when separated by thin, clear dividers; this could lead to frequent badge warnings becoming more of a classroom distraction than a helpful solution.

A startup company called Identigy has a platform called CAMPUS.JRNY which is marketed as a tech platform for school reopening. The platform offers a number of different technologies including QR codes, mobile device apps, long-range and short-range RFID identification badges, biometric scanning, and Bluetooth technology. All of the different technologies can be incorporated into one tracking system. Kiski School, a private boarding school in Pennsylvania, has spoken with the company about contact tracing using Bluetooth beacons that would notify the system whenever a user walks through certain doorways or halls.[17]

Bus Guardian is being marketed as a way to contact-trace students while they are on school buses. Parents opt in to have their children use either their smartphone or student ID to check in and off of school buses. Similar to QR codes, this would not trace students continuously throughout the day but. It would provide a record of student locations for a particular period of the school day.

In practice, schools are likely to use a mix of tracking technologies, potentially compounding the privacy impact. For example, Catholic Central High School in Troy, New York, is one of the many schools requiring students to use a tracking system as a condition for in-person learning.[18] Before each school day, in-person students will go through an automatic temperature reader and will have their phones checked to ensure they are using the contact-tracing app. Unfortunately, it's unclear how long student's biometric data is held and who has access. As of July 2020, school enrollment was up 8%.

While many schools have not yet finalized their contact-tracing plans, many are considering the use of invasive tracking tools. Washington State has considered statewide deployment of contact-

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[13] *See* VOLAN, https://www.volantechnology.com/ (last visited Aug. 18, 2020).

[14] *See* Will Knight, *Schools Turn to Surveillance Tech to Prevent Covid-19 Spread*, WIRED (June 5, 2020), https://www.wired.com/story/schools-surveillance-tech-prevent-covid-19-spread/.

[15] *See* Rebekka Schramm, *Atlanta Company Debuts Covid-19 Contact Tracing Technology for Schools*, CBS46 (Jul. 27, 2020), https://www.cbs46.com/news/atlanta-company-debuts-covid-19-contact-tracing-technology-for-schools/article_038a516e-cff1-11ea-8344-0722ccd9d999.html.

[16] *See* Knight, *supra* note 14.

[17] *See* Samantha Murphy Kelly, *Universities and High Schools Are Readying High-Tech Ways to Curb the Spread of COVID-19*, CNN BUS. (June 17, 2020), https://www.cnn.com/2020/06/16/tech/schools-technology-fall-2020/index.html.

[18] *See* Kumi Tucker, *Catholic Central High School Issues Reopening Plan Early*, WNYT (Jul. 20, 2020), https://wnyt.com/education/catholic-central-reopening-plan-school-students-teachers-study-remote-classroom-hybrid-flexible-choice-/5800588/.

tracing technologies,[19] a decision that could exponentially increase the rate of adoption over states that allow decisions about tracking technologies to be made at the local level.

Inconsistency in End-User Devices

The reliability of smartphone-based tracking is further undermined by variation in staff and students' access to devices. A majority of children receive their first smartphone by age 11.[20] But since contact tracing technologies require a supermajority of a population to participate, and there simply wouldn't be enough students who own phones to make the system viable for many grades in many schools. Additionally, teachers and staff who are older adults may have lower device adoption levels. For example, only 79% of individuals between the ages of 50 and 64 own smartphones, and only 53% of individuals over the age of 65 have the devices.

Further, access to smartphone technology varies depending on income. For families earning $35,000 to $100,000 a year, 69% of teenagers have their own smartphone, whereas only 51% of teenagers with families that make less than $35,000 a year own smartphones.[21] There are also racial disparities; whereas 82% of White Americans own smartphones, 80% of Black Americans and 79% of Latin/X Americans have the devices.[22]

With these factors combined, a highly distorted contact tracing picture begins to emerge, one in which the health of lower-income students of color is not taken adequately into account. Such a tracking system could easily skew decisions around how to reopen schools and which communities need the most support combating COVID-19, further exacerbating health inequalities. In another factor that could contribute to inequality in school-based contact tracing, it's unknown how variations in smartphone brand, model, and device age might impact performance and/or correlate with users' age, gender, or race.

Cost of Wearable Technology

It's possible that a lack of smartphone penetration, especially for younger children, is one of the factors leading K–12 schools to disproportionately invest in wearable solutions, especially when compared to post-secondary institutions' reliance on smartphone apps. Wearables can map on to existing access control technologies, such as wireless ID cards, while permitting schools to limit cell phone access in the classroom.

Still, there are other drawbacks to wearable technology. First, there can be a tremendous upfront cost to purchase wearable tracking devices for every student and staff member. The hardware for a single school board could easily run into the millions. And schools will face additional costs replacing damaged, defective, and lost devices. For example, in 2019, Hillsborough County, Florida, paid CENTEGIX $7.6 million—or approximately $30,400 per school[23]—for a non-COVID-related

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[19] *Presentation to Taskforce: Best Practices for Reopening WA Schools*, WASH. OFC. SUPERINTENDENT PUB. INSTRUCTION (June 2, 2020), https://www.k12.wa.us/sites/default/files/public/workgroups/Kinetic-West-PPT-June-2-2020-Best-Practices-for-Reopening-WA-Schools.pdf

[20] *See* Anya Kamenetz, *More than Half of U.S. Children Now Own a Smartphone by Age 11*, NPR (Oct. 29, 2019), https://www.npr.org/2019/10/29/774306250/report-more-than-half-of-u-s-children-now-own-a-smartphone-by-age-11.

[21] *See* Dan Cohen, *It's Not Only Rich Teens that Have Smartphones*, ATLANTIC (Apr. 15, 2016), https://www.theatlantic.com/technology/archive/2016/04/not-only-rich-teens-have-cell-phones-digital-divide/478278/.

[22] *See Mobile Fact Sheet*, PEW RES. CTR. (June 12, 2019), https://www.pewresearch.org/internet/fact-sheet/mobile/.

[23] Hillsborough County Public Schools, U.S. Dep't of Ed., https://www.ed.gov/labor-management-collaboration/conference/hillsborough-county-public-schools (last visited Aug. 18, 2020).

student tracking system.[24]This would be a nontrivial outlay for many schools in a normal year, and is a particularly concerning expense at a time when school budgets are facing historic pressures.

Coercion

No tracking device can monitor a user's location or proximity to bystanders unless it is carried on the user's person. Some schools have responded by requiring students to wear contact tracing devices and download smartphone apps as a condition of attendance. For public schools, this raises novel legal questions about students' rights to an adequate education and their Fourth Amendment rights not to be subject to warrantless searches. For private schools, there are likely fewer legal obstacles to mandating device use for students, but legal challenges may still occur. Regardless, the outlook for all these schools is bleak in light of past failures to gain public trust in contact tracing apps and wearables.

In April, Utah launched Healthy Together, a contact tracing app that cost taxpayers over $6 million. In July, state officials announced that the app would no longer track resident's movements. The reason? Only 200 Utahans had agreed to opt in to the App's tracking tools.[25] Although the app retains some Bluetooth functionality, the state health department said that that too will likely be deactivated unless users opt in.[26]

Similarly, North Dakota has seen less than 5% participation in its contact tracing app. When asked about the low adoption numbers, a state official responded that "there is a perception that maybe [tech] companies are not to be trusted."[27]

South Korea requires tracking wristbands for individuals caught evading smartphone location tracking.[28] When used punitively, wearables have a dehumanizing impact along the lines documented for inmates required to wear tracking anklets as a condition of release. Wearables often must be worn outside of clothing, making them visible to passersby. For schools that assign wearables only to students who can't afford smartphones, allowing other students to use a tracking app, it is easy to imagine wearables becoming a highly visible marker of class status.

Schools may also see varying degrees of resistance to contact tracing technology from parents and students of color. In addition to facing centuries of discriminatory policing, Black and Latin/X Americans have faced generations of medical discrimination, leading to comparatively heightened distrust of health authorities.[29] When asked by an education journalist about reopening plans for her sixth grader's Brooklyn school, Janine Harper, a Black mother, said "Our kids have been devalued [for] so long…It's just really difficult to trust that people are going to fight on your behalf."[30] Parents

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[24] *See* Sam Ogozalek, *Hillsborough County Schools to Launch New $7.6-Million Crisis Alert System*, TAMPA BAY TIMES (Jul. 23, 2019), https://www.tampabay.com/news/publicsafety/hillsborough-county-schools-to-launch-new-76-million-crisis-alert-system-20190723/.

[25] *See* Bethany Rodgers, *Utah's Expensive Coronavirus App Won't Track People's Movements Anymore, its Key Feature*, SALT LAKE TRIB. (Jul. 11, 2020), https://www.sltrib.com/news/politics/2020/07/11/states-m-healthy-together/.

[26] *See id.*

[27] *Convincing the Public To Use Smartphone Tech to Track Covid-19 Exposure May Be a Challenge*, CBS NEWS (June 15, 2020), https://www.cbsnews.com/news/coronavirus-contact-tracing-smartphone-tech-privacy-concerns/ (quoting Vern Dosch, North Dakota's contact tracing administrator).

[28] *See* Gross et al., *supra* note 5.

[29] *See, e.g.*, Katrina Armstrong et. al, *Racial/Ethnic Differences in Physician Distrust in the United States*, 97(7) AM. J. PUB. HEALTH 1283 (Jul. 2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1913079/.

[30] Matt Barnum & Claire Bryan, *Despite Stress of Closures, Most Parents Wary of Rush to Return to School Buildings, Poll Show*, CHALKBEAT (Jul. 14, 2020), https://www.chalkbeat.org/2020/7/14/21324873/school-closure-reopening-parents-surveys.

and activists fear that where schools make contact tracing technology mandatory, there may be disproportionately high levels of student discipline targeting students of color.

EVIDENCE-BASED ALTERNATIVES

Despite the outsized investment in, and attention to, novel contact tracing technologies, the most effective, evidence-based methods for containing the spread of COVID-19 are quite low tech. They include social distancing, frequent testing, proper ventilation, and isolation, all of which can be achieved without using highly invasive technologies. For contact tracing, rather than relying on dystopian tracking tools, schools should rely on human-centered approaches with culturally competent outreach from manual contact tracers. Manual contact tracing is nothing new to the health departments around the country that have used it to contain tuberculosis, sexually transmitted diseases, and, increasingly in recent years, measles.

Language Access:

Contact tracing is only as effective as its ability to harness the trust of those who might have been exposed to COVID-19. As an initial matter, this means effective communication in that person's native language. When programs fail to guarantee effective communication, patients will be unable to fully explain their points of exposure, and they will be far less likely to develop the trust required to convey intimate and potentially uncomfortable information.

The number of languages needed for each school will vary. For example, in New York City, the contact tracing corps hired so far includes speakers of 40 languages.[31] However, many jurisdictions, including some schools, have only recruited contact tracers who speak English. Even New York's language efforts may prove insufficient to navigate the hundreds of languages spoken in the city, particularly indigenous dialects.

Cultural Competence:

Language access is necessary for effective contact tracing interviews, but it's not sufficient on its own. By building on shared background, community ties, and an understanding of an interviewee's lived experience, a contact tracer can obtain a far more nuanced picture of potential contacts. Also, by turning to community leaders and community-based organizations, contact tracing programs can reach parents, students, and staff who would be fearful of government entities. Laudably, Chicago has invested tens of millions of dollars in community groups as part of an effort to recruit contact tracers from the hardest-hit precincts of the city.[32]

When it is not possible to recruit trusted community partners, schools should invest in training resources for contact tracers, helping to break down potential barriers to trust. In one example, Montclair, New Jersey, contact tracers receive cultural sensitivity, cultural bias, and historic cultural context training.[33] While Monclair and Chicago's methods are not targeted at schools, they could easily be adopted by school contact tracing programs.

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[31] *See* Erin Durkin, *De Blasio Hires 1,700 Contact Tracers, Downplays Privacy Concerns*, POLITICO (May 26, 2020), https://www.politico.com/states/new-york/albany/story/2020/05/26/de-blasio-hires-1-700-contact-tracers-downplays-privacy-concerns-1286661.

[32] *See Mayor Lightfoot and CDPH Announce $56m Grant to Chicago Cook Workforce Partnership and Partners to Bolster Contact Tracing Efforts for Covid-19 Cases in Chicago*, CHI. OFF. MAYOR (June 30, 2020), https://www.chicago.gov/city/en/depts/mayor/press_room/press_releases/2020/june/GrantChicagoCookWorkforcePartnership.html.

[33] *See* Jaimie Julia Winters, *Covid-19: As We Open Up, Get Tested, Contact Tracing Effort Will Increase, Says Governor*, MONTCLAIR LOC. (June 10, 2020), https://www.montclairlocal.news/2020/06/10/contact-tracing-effort/.

Contact tracing of school-aged children presents a unique challenge to all contact tracing models, including manual interviews. This is one reason why schools will need to invest in contact tracing programs that supplement municipal and state-based efforts. Young children in particular require specialized interviewing techniques, not only to provide students with a sense of safety but also to avoid questions that may improperly suggest inaccurate answers to children. This may be especially challenging where children are asked for information that they would wish to keep private from their parents and/or school officials. Thus, as in all contact tracing situations, strong privacy safeguards—and effective communication about them—are crucial.

Analysis Systems Vs. Tracking Systems:

While manual contact tracing is less dependent on technology than contact tracing apps and wearables, large-scale manual efforts do require databases and case management tools. The privacy impact of these "analysis systems" is different in kind, not degree, from the privacy threat of "tracking systems" (GPS, Bluetooth, Wi-Fi, etc.).

Analysis systems rely on technology to compile and analyze information provided exclusively through consensual interviews with manual contact tracers. In contrast, tracking systems do just what their name implies: invasively track users' movements. As a result, tracking systems obtain far more information, potentially compiling a user's location history over the course of years.

But for the reasons outlined above, tracking systems aren't particularly good at collecting *useful* data for public health purposes. Tracking systems offer school districts the worst of both worlds, both collecting extraneous information that public health officials don't need, and leaving out crucial details that they do. A list of user's past locations leaves out so much crucial context, even when it is accurate. Simply knowing that two people were close to each other doesn't tell us if they were in the same room, if they were indoors or out, or if they wore masks or other personal protective equipment. But location history is a powerful tool for countless other tasks, including policing and immigration enforcement.

Still, analysis systems are not free from privacy concerns. In centralizing information from a large number of contact tracers in a single location, analysis systems create a large pool of highly sensitive health data. Without an array of legal and technical protections, analysis systems are vulnerable to exploitation by an array of bad actors.

As with any database of personally identifiable information, analysis systems require strong access controls, such as two-factor authentication; access logs; audits of user access; penetration testing; and other standard safeguards. Similarly, an array of contractual and statutory measures are needed to prevent lawful use of contact tracing data for any purpose other than tracking COVID-19 infections. This includes bans on commercial sales of contact tracing data, and bans in its for educational purposes such as monitoring truancy or for law enforcement.

Unfortunately, existing health privacy laws generally allow law enforcement and immigration officials to access contact tracing information through a simple subpoena – which requires a much lower evidentiary standard than a judicial warrant. But even a warrant requirement to access contact tracing data is still insufficient so long as patients believe that there is any risk that answering contact tracers' questions will give agents information to help arrest or deport their loved ones.

Since schools will be forced to comply with lawful requests from law enforcement and immigration officials, their best safeguard is data deletion. This includes the prompt deletion of records relating to any individual who is fully recovered, as well as to those isolating during a period of potential exposure. Reducing data retention won't merely act as a disincentive for efforts by police to subpoena contact tracing records, it will also dissuade hackers who might target the data.

Earlier this year, INTERPOL sent a global alert that it detected a significant increase in cyber-attacks against hospitals around the world that were actively engaged in fighting COVID-19

outbreaks.[34] The agency warned that hospitals were being targeted by hackers who were attempting to infect systems with ransomware in order to lock the hospitals out of their data until the hackers received hefty bitcoin payments. Recently, in the wake of Canada announcing the release of their own contact tracing app, cyber criminals created knock-off versions of the app containing ransomware.[35] The moral of the story seems clear: The more data you keep, the more people will try to take it.

Financial Support

The cost of contact tracing can pose a significant challenge for many localities, especially as they see dwindling tax rolls and increases in other COVID-19 related expenses. Schools might have struggled with such a cost under normal conditions, let alone during a pandemic and economic downturn. As a result, federal funding may become an indispensable safety net for many schools seeking to return to in-person instruction.

While surveillance vendors may promise to provide contact tracing on the cheap, the reality may be quite different. As seen in Utah, North Dakota, and elsewhere, successful containment using contact tracing apps and wearables is easy to promise, but far harder to deliver. Schools must be given the resources to suitably invest in culturally competent contact tracing before we see millions more wasted on high-tech boondoggles.

Invasive surveillance of children is not the answer. Instead we must harness the power of humans to establish trust-based dialogues within their own communities in order to stop the spread of COVID-19. Without such an investment, student transmission and the subsequent community spread will become yet another metric of American inequity.

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[34] *See* Davey Winder, *Cyber Attacks Against Hospitals Have 'Significantly Increased' as Hackers Seek to Maximize Profits*, FORBES (Apr. 8, 2020), https://www.forbes.com/sites/daveywinder/2020/04/08/cyber-attacks-against-hospitals-fighting-covid-19-confirmed-interpol-issues-purple-alert/#488944aa58bc.

[35] *See* Charlie Osborne, *New Ransomware Masquerades as Covid-19 Contact-Tracing App on Your Android Device*, ZDNET (June 24, 2020), https://www.zdnet.com/article/new-crycryptor-ransomware-masquerades-as-covid-19-contact-tracing-app-on-your-device/.

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