COVID-19 and K-12 Schools: Updates from the Field Transcript

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Board on Science Education

KENNE DIBNER: Good morning. I am Kenne Dibner and I'm a senior program officer with the Board on Science Education at the National Academy of Sciences, Engineering, and Medicine. In July 2020, the Board on Science Education released a report, *Reopening K-12 Schools during the COVID-19 Pandemic: Prioritizing Health, Equity and Community*, and today we have an outstanding panel of speakers to talk to you about emerging research and what is happening in the field. So it is my privilege to introduce to you Dr. Caitlin Rivers with The Center for Health Security at the Johns Hopkins University. I should note that this webinar is sponsored by the US Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response, and we are thrilled to collaborate with the Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats for this webinar and with that I'm going to turn it over to Caitlin.

CAITLIN RIVERS: Thank you everyone who is joining us here today including our distinguished panelists. Our goal is to discuss reopening K12 institutions and this is a conversation that has been ongoing for months now. Our goal today is to discuss the latest evidence and experience on how to approach education with the pandemic. This session follows on a report the Academies published over the summer called *Reopening K12 Schools during the COVID-19 Pandemic: Prioritizing Health, Equity, and Communities*. But a lot has happened since the report was published in July, so today we're going to hear from some of the leading experts on COVID and schools about how reopening is unfolding. We will hear first from Nate Schwartz who is a Professor of Practice at Brown University's Annenberg Institute for School Reform. Dr. Schwartz leads the research partnership in Rhode Island focused on educational improvement and he also started the Ed Research for Recovery project which collects requests for pandemic related guidance from educational leaders and identifies the researchers across the country to build out quick response and synthesis. Dr. Schwartz previously served as the chief research and strategy officer for the Tennessee Department of Education on a number of exciting initiatives. Next we will hear from Christina Silcox. Dr. Silcox is a managing associate at the Duke Margolis Center for Health Policy, working on policy solutions to advance innovations in health and healthcare and improve regulation,

reimbursement, and long term evaluation of medical products. She is currently leading the Duke Margolis work on COVID-19 testing which has released multiple papers on various topics related to testing, including legislative and policy opportunities and practical considerations for implementing screening and surveillance programs. We will hear from her about that work today. Third, we will hear from Dr. Neeraj Sood at the Price School of Public Policy and a founding member of the Schaeffer Center for Health Policy and Economic. His research focuses on economic epidemiology and infectious diseases, pharmaceutical markets, health insurance, economics and innovations, and global health. He is currently leading a study on COVID-19 in collaboration with the Los Angeles County of Public Health and we will learn more about that as well. Finally, Dr. Preeti Milani is the University of Michigan's Chief Health Officer and Professor of Medicine in the Division of Infectious Diseases. She's also a director of the University of Michigan's National Poll on Healthy Aging, and in addition to her clinical work where she cares for COVID-19 patients, she is University of Michigan's Chief Health Officer and has advised local schools including K-12, as well as the Big Ten conference, around the return to practice and competition. She also participates in the Michigan Governor's COVID-19 advisory councils and the nursing home task force. So, we are very honored to be joined by such a distinguished panel of experts and we will turn first to Dr. Schwartz for his remarks.

NATHANIEL SCHWARTZ: Thank you so much. I am the only non-public health expert on this panels I will keep my remarks short. But I will try to offer some framing that I think will hopefully provide questions that the rest of you can answer. My work over the last few months has been focused on trying to help school leaders move beyond the operational issues around school safety that we discussing here towards the key educational issues that we will need to take on if we are to continue educating students and supporting students and families during this period. In the spring I started an initiative called Ed Research for Recovery that tries to bring together research on key issues about student learning and climate and we are now working with leaders in DC and Rhode Island to try to put these findings to practice. Frankly, attempts to move beyond the logistical questions around school openings and closings are really difficult right now. I thought I would offer a few observations to try to explain how this is unfolding for school leaders. Coming out of the spring as you all know we already have seen patterns suggesting that the districts with more resources were also more likely to open in person. For those that have not seen it the Associated Press just a couple days ago released an article the other day that documented the continuation of these trends describing the ways that

districts with more white students, richer students, more suburban students were also more likely to open in person. But even as the debates around school districts opening have dominated the conversation, this question of should school districts open in person or not, I think it's important to note that the act of reopening schools does not actually solve the issues that most schools are facing around virtual learning and this is because of my first observation which is the even where districts that have reopened, many students are opting to remain at home and likely because they don't feel safe going back to school in person. In New York, the biggest system to attempt an in person reopening, 75% of students opted to virtual instructions. In other places where the data is coming out, we tend to see somewhere between 30% and 50% of students opting to virtual and while we are just starting to see which students are staying home, the data I have seen suggests it's often the most vulnerable students - students living in poverty, students of color, and students with disabilities were more likely to remain virtual. So what does this mean for student learning? Researchers show that one of the strongest predictors for whether students will recover and get back on track after a learning disruption is the strength of their relationship with adults in schools. That is much harder in a virtual setting and it is harder to set up the small group interventions or high dosage tutoring options that seem to be most effective ways of accelerating students who are the farthest behind. I think student disengagement represents a key challenge for most moving forward. This means making it easier for schools to open safely in person which is the subject for the rest of this discussion but I think it also means continuing to find ways to serve students better virtually. Right now there are exciting attempts across the country to find ways to strengthen relationships and to provide better academic interventions online. This work is key and again because so many students are opting into virtual learning, this work is not about to disappear even as you get better at reopening. So how are schools moving forward with this mix of virtual and in-person schooling? We have seen a lot of districts taking what seemed to me like heroic measures to simultaneously offer in person and virtual learning opportunities for students. But we are not set up for this. The research on virtual instruction is very clearly that virtual learning requires a different kind of teaching and that means a different concentration on different kind of teachers and thinking about what they're doing virtually differently than what they're doing in person and some districts as you see are reconfiguring to offer virtual academies to serve all their virtual students at once but that is much harder to do in smaller communities so what we have seen is placing tremendous strains in our schools which leads to my final observation. That solving our concern for students in schools we are staking a lot more about what we have about how to support the adults in the schools. The good news is that we have not seen a mass

exodus of staff or the waves of early retirement in most places that people fear, but I don't know that personally, in my time or education that I've ever heard from so many entirely overwhelmed teachers. Most enter this profession for the connection you make with students and that is the part of their job that has gotten the most tenuous in this new environment. I don't have an answer to this issue but I have been thinking a lot about the research on helping traumatized students and one of the really interesting things about this research is that some of the most effective programs for helping students cope actually turn out not to be about students at all. One study for example found that randomly assigning teachers or aspiring teachers to mindfulness programs actually made them far far better at coping with student trauma than they were before they had taken on their own mental health. So I just think as an idea to leave with going forward we need to figure out how our society can build working environments that seriously support teacher and student mental health in both virtual and in person settings. It is going to take serious effort and investment and we have lots of work ahead so I'm very excited to see where the rest of the panelists take us. I look forward to taking questions from here.

CAITLIN RIVERS: Thank you so much. I think the points you made, the public health pieces of reopening are not the only pieces that we need to attend to. I think that's going to really be important for the rest of the discussions. I want to remind our attendees that if you have questions for panelists, we encourage you to submit them in the chat box and after we hear from the panelists, we will go to those questions. Now we will turn to Dr. Christina Silcox.

CHRISTINA SILCOX: I will be talking about reducing COVID-19 transmission in schools and testing. So when we talk about testing and screening, we are really talking about two different pillars. One of which is diagnostic testing, and this is really critical. Making sure we have accessible diagnostic testing for symptomatic kids and for close contacts of confirmed cases is really important and not necessarily as obvious as you might think. There are areas where it's very difficult to get tests for younger students, for the younger population so having schools work with the public health agencies identify where that testing can happen is really critical and making sure that the schools are asking the parents to do the screening tests, screening surveys with their kids every day making sure they don't have symptoms before they come to school is that first pillar of testing. We know there's a lot of asymptomatic disease especially in younger people so that's where screening and surveillance comes in. For screening tests, it's routine testing to find and isolate asymptomatic cases before we have a chance to infect other people and to break those chains of transmission. You can also do surveillance

testing which is slightly less frequent testing and is more meant to understand prevalence in a specific setting for decision making. As you start thinking about how you might put together a testing pillar, you want to first do a risk assessment. This is really three components. The first is assessing the likelihood of COVID-19 cases being introduced into your school setting. Here you want to think about what community prevalence is and other factors that make you increase the risk or decrease the risk of your school population. Next you want to think about the likelihood of onward transmission within the school setting, so here you want to think about what is the workflow in the school during the day, how the students move around, how the teachers and staff move around, and what mitigation measures have been put into place. Here you're thinking about is there physical distancing, is there masking, is there potting, is there handwashing, and what does the ventilation system look like. You're trying to combine all these things and say have I really been able to effectively put these mitigation measures into place. The third component of risk assessment is the consequences of transmission. Is your particular school population a population where there is more likelihood of severe disease, more likelihood of death, and not just for the student but also for their family and caregivers? Within that risk assessment, we want to be able to put yourself into a bucket of medium or low risk to high risk to really be able to understand what you want to do and how you want to do the testing protocols in schools. And this fits well with the CDC thresholds and indicators for K-12 risk that was released earlier in September, and here they talk about the lowest level of risk to the highest level of risk where they use as core indicators the number of cases per 100,000, as well as a test positivity, but they combine that with the ability of the school to mitigate key mitigation strategies. There's other protocols and other secondary indicators that they use around preparedness of a system to handle severe cases, so really the risk assessment we introduced in that paper does mesh well with the CDC guidelines. You also want to think about screening as one part of mitigation strategies but not the whole. So here we say that this is the Swiss cheese model of risk mitigation and you use this when you don't have any perfect way of mitigating. No perfect method of mitigation, so all of your methods are sort of holey like swiss cheese, but if you're able to layer a bunch of mitigation techniques together that puts you together into a solid resilient layer that does actually help prevent transmission from happening. Here you see that we have social distancing, we have wearing masks, we have washing hands, and we also have that rapid testing. So why is it important? Here we want to talk about that risk assessment idea. As you're thinking about what bucket you're in, you may not actually need that rapid testing slice of cheese in there, so when you're at a very low risk perhaps you only need mitigation measures and that is enough to keep your school safe, and

with that low risk, perhaps you add in a layer of surveillance testing. Surveillance testing, like I said, is not necessarily breaking those chains of transmission but it is meant to understand where your school is and how prevalence might be changing over time. So that's being used for key decision-making. Once you hit the moderate risk, that's when you might add in that routine screening. Routine screening is really meant to identify those cases where people are asymptomatic or pre-symptomatic and isolate them and their close contacts before they have a chance to potentially cause an outbreak in schools. And then at the higher risk maybe that's a point where we think about re-closing schools. So one person make ask, why don't you use routine screening for all of these cases and one of the reasons for that is that when you have routine screening, you're going to expect to have false positives and when you have false positives, the rate of false positives is going to be the same no matter what based on your test but the problem is if you have a very low prevalence and you're going to have very few true positives and false positives are really outweighing the positives and that can undermine faith in your testing regimes and can end up causing problems so we only suggesting routine screenings in that moderate risk category where you want to think through and be able to break those chains of transmission and potentially keep your schools open because you don't have those larger outbreaks. So as you're thinking about the right testing strategy, there's more than one way to get results so this is where when you doing routine frequent testing you don't necessarily need to have the most sensitive test. It is really a combination of testing sensitivity, frequency, time to results, as well as the costs to your school and what's possible. So you're able to achieve some similar results with different tests based on the frequency you're able to do and it's really is important to understand because it goes back to that Swiss cheese strategy idea where you might not being using a perfect test and you might miss some of those positives and that's where it's really critical to keep the handwashing, keep the masking, and the physical distancing in place because you might not be catching them that first testing round and maybe you catch them next time. So there is that period of time where people may be infectious and you might have missed them, so you need to make sure other mitigations measures are in place. So again, even the screening testing is a holey strategy, it has holes in it, so you want to make sure you layer the strategies. Risk projection also depends on swift isolation of the individual and a quarantine of close contacts. As you're thinking about putting into place a screening and testing program, you need to help the community understand why you're testing and what to expect. Here again, it is really critical to explain the possibility of false negatives, the possibilities of false positives, to expect both of these things will happen, and this is a just component of the overall mitigation strategy and the mitigation behaviors do need to remain in

place. You should also explain what actions need to be taken in response to test results, and be transparent about what testing results are as you do each round of testing. So I talked a little bit about the ideas behind the screening and testing protocols that we put out, but I do want to talk about that we are testing these ideas out in different pilot sites. We're testing these ideas in Los Angeles, in Louisville, in New Orleans, Tulsa and Rhode Island. As we test some of these ideas out, we will be updating our protocol document that I showed at the beginning of my slides to reflect the findings that we found in those pilot sites. We are really excited to try and test these ideas out to understand whether the reality matches the modeling and understand some of feasibility and the logistical challenges as well, so with that, I'm going to send it off to the next person.

CAITLIN RIVERS: Thank you for the useful comments about how we might think about using screening tests as they become more widely available. We will turn now to Dr. Sood for his remarks.

NEERAJ SOOD: I don't have slides but I wanted to share my notes so you have something to follow along as I talk. I want to touch upon three topics. First, I want to review the evidence on whether children have a lower risk of infection from COVID. Next, I want to review some of the evidence on whether children have a lower risk of transmitting COVID to other people, children or adults. Then, I want to talk about what we are doing in LA and school reopenings. So if you look at the evidence on whether children have a lower risk of infection or not, the first evidence of what people point to is the fact that the fraction of children who were diagnosed with COVID is less than the fraction of children in the population. So at the end of October, about 11% of diagnosed cases of COVID-19, which is about 800,000 cases, were children. But, children account for 22% of the population, compared to the fraction of the population, they are underrepresented in cases, which would imply that children have a lower risk of infection. However, there are some problems or issues with this line of thinking. The first is that children are more likely to have asymptomatic disease or mild disease, which means even though they are infected, they might not be part of the diagnosed cases because they never got tested. So there might be undiagnosed cases not catching all of the infections of children. Similarly, some of the children might not want to go undergo a COVID test even if they are symptomatic at the same rate of adults, and this again would lead to the under-diagnosis of children. And final things is that a lot of schools have been closed, children have been at home, while adults have been doing errands, working, and having social interactions. So the risk of

exposure to COVID might be different for children versus adults, and children might actually have a lower risk of exposure to COVID. So when we see fewer cases for children, it could just mean that their exposure is lower and it does not mean that conditional of exposesure, that they have a lower likelihood of getting infected. There's another piece of evidence which tries to address these issues, which is called seroprevalence studies, where you pick a random sample of the population or a representative sample of the population, and you do an antibody test on them to figure out if they have ever infected with COVID. So what these seroprevalence studies do is they try to address the concern of under-diagnosis of children, so here you're seeking individuals and you're offering them testing rather than the other way around where individuals who think they have symptoms to go seek testing. When you look at evidence from seroprevalence studies, most of them again suggest that seroprevalence is lower among children compared to adults. So this has been shown in a paper published in JAMA Internal Medicine where the CDC did seroprevalence studies in several different regions in the U.S. I'm focusing on the four regions where they tested samples from at least 100 children and in all those four areas, New York, western Washington, Missouri, and Connecticut, they found lower seroprevalence among children. Similarly, there was a recent meta-analysis of all different seroprevalence studies published in JAMA Pediatrics, and they also conclude most studies were consistent with lower prevalence in children compared to adults although seroprevalence in adolescents appear to be similar to adults. So when you come to the high school-age, you start seeing seroprevalence similar between adults and children, but lower than high school age you typically sought lower seroprevalence in children. So these studies better account for under-diagnosis in children, however they could still be prone to some bias. So for example, in the CDC study, the children come from different households than adults so you really don't know whether the risk of exposure was similar. Maybe children came from households where there was lower exposure and you see lower seroprevalence, or it could be the other way around. There are still some possibilities of bias here and, overall, all of these seroprevalence studies again were done in a context where schools were closed so maybe there is this lower exposure risk for children that we cannot account for. One way of addressing this exposure risk is to look at contact tracing studies where you identify the next case who has COVID and then you identify all close contacts. So these close contacts could be children or adults and then you try to figure out whether the attack rate, or secondary attack rate, is different in children versus adults. So all of these individuals we know have been in contact with the same index case so they have the same exposure and the question is, is there is the secondary attack rate different or not. The same meta-analysis in the JAMA Pediatrics shows that the secondary attack rate in

children was much lower at 0.56, so the odds ratio was 0.56, so roughly 50% lower odds in children compared to adults. We did a similar study where we look at health insurance claims data from about 6 million individuals and then we identified about 80,000 persons who had at least one household member that have been diagnosed with COVID and then we said okay, now we can set up these individuals as children versus adults and try to figure out if you were part of a household where someone in your household had COVID, what are the chances that you have a secondary attack of COVID yourself? What we found again was that children had much lower odds of getting COVID compared to adults. So to kind of give you this data in another way, suppose we look at households where there is one child and one adult, or actually one child and two adults. So the adult got COVID and we have one child and one adult left who can potentially be infected with COVID, and what we find is that in such households, there is a 92% chance that no one got COVID, which means the child and the adult did not get COVID. There is a 1% chance that both the child and adult got COVID, a 2% chance that only the child got COVID, and a 6% chance that only the adult got COVID. So again, you see much higher secondary attack rates among adults compared to children. So when you look at the other question, which is "If a child has COVID, what is the risk of this child transmitting the virus to others?" Here, the evidence is much more sparse. Some studies suggest that children might have a higher risk of transmission because these studies find that children have higher viral loads and when we compare secondary attack rates for children and adults based on contact tracing studies, sometimes we find that children are more likely to cause more secondary infections. However, I'm not completely convinced by this evidence because higher viral load does not necessarily mean higher risk of transmitting the virus, and second, the contact tracing studies is difficult to know given that people can be asymptomatic who is the index case? But nonetheless these type of evidence suggests that there might be higher risk of transmission by case, and on the flipside, there is evidence from several countries where we did find low secondary infections from infected children attending school. So we find cases where the child was infected and actually attended school, and then they do contact tracing to figure out how many other children or adults got infected and they find pretty low secondary attack rates. Similarly, there's evidence which have found, again, looking at these contact tracing studies and finds that children are much less likely to be index cases. So they are much less likely to be the first case that spread COVID in a class. There's also evidence from a study done by the school of public health where they look at staff who are working in childcare centers when the childcare centers was open versus staff who were childcare workers but the centers were closed. They showed that the center being open or closed did not influence the

risk of infection for those staff. That suggests that working in a childcare center does mean an elevated risk of infection. There is a similar study where they compared infection risks for teachers in Sweden versus Finland. Sweden schools were open, Finland schools were shut, but they don't find differences in infection rates. There are other studies that suggests that school closures do not affect the trajectory of the epidemic, and finally there's a study out of Iceland where they sequenced the genome to figure out who passed on the virus to whom within the household and they basically said they did not find a single case where a child infected an adult in the household based on these genome sequencing studies. So what do we do about this evidence or should we reopen schools? How should we reopen schools? How do we think about this evidence? I think the way I think about this is that this is not just about science. It's about judgment and ethics. We need to trade off children's educational outcomes that Nate was talking about with the risk of community spread of infection that Christina was talking about, and there is no clear scientific way to make this trade-off. It's ultimately a judgment call, especially given the fact that the scientific evidence is uncertain. And I think the ethics of this are also difficult because closing schools imposes costs on children but the benefits of this might accrue to both children and adults. So in my judgment, I can agree with Christina that in some cases we can probably open elementary and middle schools, implement safety protocols that are noted above and especially as I was saying that these protocols should respond to the underlying risk of infection of community spread. So you want to have more stringent protocols the greater the underlying risk. What we're doing in LA is we're trying to kind of address Nate's point that people just don't feel safe, so we are trying to address whether rapid antigen testing can make schools safer and are looking at are two things. One is, as Christina was saying today, do they identify individuals were asymptomatic and infectious and the second thing is if they do so, how do you actually implement them in schools and what are some logistical challenges schools might face and we are trying to address those challenges. I will stop there and back to Caitlin.

CAITLIN RIVERS: Thank you, Neeraj. I think the question of the risk to children and the risk of transmission within school buildings is really important. As a reminder for listeners, you should feel free to submit questions to the chatbox and we will be posting both the recording and the slides that our presenters choose to make available to the public. Those will be posted on The National Academies' website in the next coming days. We will turn now to our last presenter, Dr. Preeti Milani.

PREETI MILANI: Thank you. I'm going to reflect a bit on the thoughtful comments of the other panelists and just a reminder that we are still in the midst of a global pandemic and eight months into the U.S. pandemic. Pandemics are still about making hard choices and the entire situation is tragic and difficult for different reasons for different members of our community, and unfortunately also there is not an easy end in sight. So from my vantage point as an infectious disease physician and public health expert, it is essential that we figure out what we can do and how we can do it even if it's not perfect, and conversely figuring out what doesn't need to be done, and in the case of k-12, what can be done remotely without large downsize and we just heard about that from Neeraj about grade schools/middle schools versus high schools. In the normal circumstances, everyday, the day-to-day tasks that educators are trying to accomplish are not simple, and the demands of supporting the growth and development of a diverse population of students with diverse needs is complicated and the K-12 system is not a one-size-fits-all. Schools vary by location, resources, physical plant, and funding. Nate pointed this out very eloquently that the schools with a lot of resources, they can do this better. Unfortunately, there's a lack of coordinated national strategy and states are also a little bit different. It is more of a "just go and do this" and there is not an easy playbook - not for Higher Ed and not for K-12. So when we think about back to March, within the matter of days, every K-12 school system had to make a rapid, largely unplanned pivot to remote learning, and at that moment, it was flipping a switch, turning off the light, and going home. The need to prevent transmission of infection had to drive all the decisions at that point and as a parent, as someone whose family was affected by this, it felt like a long snow day. Frankly, I don't know how much work was getting done in many homes and coming back to learning is much more complicated, and as you heard, remote teaching is different. It is not just having the video monitor on. It requires different kinds of skills and different kinds of pedagogy, and large numbers of students cannot learn remotely, and again, little kids trying to learn the fundamentals of reading and writing and math is going to be different than perhaps a high school student learning U.S. history. Emotional well-being in all of this - not just for the students, but for the adults in the buildings - already had a lot of issues, and we have made this worse in this situation for all of us. Since the spring, we had kind of made this adjustment of living in this bizarre world where we are living in little boxes and in our homes largely, and schools are perhaps one of the hardest places to retrofit because they're built around togetherness and community. The current medical situation, public health situation requires the opposite and one of the things with schools even with mitigation is its long exposure times. People are together for many hours and to me, March feels like a lifetime ago and a lot of things have changed since then, but even

at that moment everyone knew that getting back to face-to-face learning was going to be difficult. In fact, some schools that had planned or at least were enthusiastic about returning to face-to-face teaching had to rescind those decisions in the late summer because it is so complicated. One really thoughtful educator said to me that maybe instead of worrying about who is walking in what direction and where the arrows are, why don't we put all this energy into delivering the most robust remote curriculum we can, and I think that reflects a little bit on Nate's earlier comments. Others who have returned to the classroom are pivoting now with second and third waves of infectious groups in the community, and I often describe the return to learning is trying to make a boat out of a car. It is imperfect, it looks weird, but it can still float more or less. I will add to this that it is not just engineering that's difficult but there is uncertainty and things keep changing and there's also a lot of noise from the communities, from teachers and staff, from parents and also from students. From a public health standpoint since March I think there's a couple really important things we learned and this is not a surprise to anyone who's tuning in, but for the sake of mentioning it, the potential for asymptomatic transmission, particularly in children and you heard about that recently from Neeraj just before my comments and also the importance of face coverings in terms of prevention. The role of the environment is turning out to be a lot less important than we thought, which is good news, and we have relied on basic public health strategies including social distancing, face coverings, handwashing, and symptom screening; but there is a need for space in schools that are already crowded and there is a need for cleaning supplies, for PPE, and for training. We are learning skills that none of us learned growing up in our systems. Even for me as an infectious disease doctor, public health has required a little different set of skills. For schools, I think there are several caveats that I will point out. There is this perception of risk that's difficult, and this has been noted by the other panelists. People tend to think about their individual risk and the risk to their families, whereas from a public health standpoint we're thinking about a risk to the community. You can make things safe, but people have to feel safe and management of those concerns tends to be a big lift. It's not a one-time discussion. Every time there's a case of COVID in the school or in the community, the temperature increases and this is a scary diagnosis for people, so trust is important and I think frankly it's easier in a smaller system with consistent messengers, but there is not the case for many K-12 systems. There's a lot of focus on deaths, which thankfully is decreasing, but there's a lot of morbidity that goes along with this illness and students don't live in a vacuum. Many live in multigenerational families, extended families and those who are vulnerable economically are vulnerable in other ways too. Dr. Silcox talked a lot about testing which is really nice to hear about and testing is one of the

successes here, and I like to remind everyone that testing is not prevention. You can test all you want and you can still have cases of COVID. This has been demonstrated in the White House outbreak, for example. You still have to have a mitigation effort but utility of testing is evolving, particularly in the higher education space. some colleges and universities are learning to use this tool in a more precise way and I think for K-12, it likely has a role but it tends to still be pretty limited so from a practical standpoint what I would say is for K-12 schools to have a way for families to access testing – maybe that's in partnership with the local health system or community public health. If it's a limited resource available, my suggestion would be to offer it to faculty and staff to get back at that perception of safety for people to feel reassured because this is very important and the psychological benefits of testing is something that is as important as the medical ones. Having a strong relationship with the county health department is also key, and no one has the answers to these questions. There is no playbook but it's also helpful to say to families and staff that the public health department says this or that. Contact tracing is something that schools really cannot do on their own, but they can help and they can work hand-in-hand with public health to do that. One thing we learned that's really important is that classrooms are safe if they're engineered in a way to provide social distancing, ventilation. I will say too that masks are essential. Masks have proven to be, to me, one of the pleasant surprises in all of this. It gets complicated with movement, it gets complicated with eating, social events, co-curriculars including athletics.

KENNE DIBNER: Preeti, I want to move on to questions because we are hearing so much from the audience.

PREETI MILANI: Okay, I'll just stop here.

KENNE DIBNER: Thank you so much. I really appreciate it. Caitlin, take it away.

CAITLIN RIVERS: Great comments from all of our panelists. I'm excited to get to questions. I would like to go to Nate first and return to one of the comments you made that surveys are showing that children who are most vulnerable or may benefit more from in-person learning are more likely stay at home. I'm wondering if you can talk more about the concerns from those students and their families and also what engagement processes you seen that seem successful that really make sure that districts and communities are able to meet the needs of students during these difficult times.

NATHANIEL SCHWARTZ: Sure. The data is new on this, and again, I don't want to speak beyond what we actually know. But we do know again, it looks like in most systems 40% to 50% of students are choosing to stay home even if they open in person and I actually don't think we know enough yet about why those choices are being made. We see it across students from all ends of the income spectrum. We see it in terms of students of color and white students, but again, I think we're seeing slightly more frequent opt in into virtual among the more needy students, and I imagine this has to do potentially with their communities exposure to COVID. I imagine it has to do potentially with - I guess there are a bunch of hypotheses, and we're trying to test them in some of the places that we're working at right now but I cannot say definitely why that's the case. I do know therefore engaging these kids is going to require a real attention on making sure they feel a direct connection to schools whether or not they're in-person at school buildings, and what we have seen repeatedly is that making that happen requires strong relationships with adults and the kind of individualized tutoring and feedback that is hard to do in our schools and hard to do with the personnel we have right now without additional money and people. So we have been seeing moves to do things like create a national tutoring Corps like an AmeriCorps. We have been seeing on a more individual school level some really innovative ways of making sure each student has a mentoring relationship with an adult in the school, and I think I can speak more about those examples at some point, but there are a whole bunch of things like that where kids and families are being reached out to individually, and again that requires a lot more work for people in school buildings but it can make a big difference.

CAITLIN RIVERS: Thank you so much for that. Christina, we have a lot of questions about how schools should think about the frequency of testing, and particularly how the community problems has been surging across the U.S. should play into those decisions when designing a screening program and also, is there a limit at which you should just close?

CHRISTINA SILCOX: I should back up a second because I realized that I did not actually introduce the report I was talking about which is a report that Duke Margolis and John Hopkins with Caitlin in fact put out early in October called *Risk Assessment and Testing Considerations for Reducing SARS-Cov-2 Transmission in K-12 Schools*. That's the report I'm talking about and is on the website, you can find it there. So when thinking about frequency of testing, it really is about your goal of testing. If the goal of testing is to really break those chains of

transmission, stop transmission within the setting, you do need to test fairly frequently - once or twice a week to really get that effectiveness to isolate people and pull them out before they have a chance to infect other people. It is really in the lower risk areas where the mitigation measures you have in place are working better where you can do less frequent testing. That's really more on trying to understand the problems making sure you are where you want to be. That is where you would do less frequent testing, randomized testing that idea and that is fine. I think one of the things we don't really understand yet and this is what Neeraj was speaking about - we don't understand 100% how community prevalence and school prevalence relates. Is it more likely for school prevalence to be lower if it turns out that children are much less susceptible of getting it or much less susceptible to transmitting it than potentially testing just teachers more frequently makes more sense? One of the reasons that Rockefeller has set up these these pilots that I referred to at the end of my presentation is to really use some of this evidence generated and try to understand what is actually happening inside these schools. I know it's a hard number where you want to do one method over another and it's really that combination of three areas of risk assessment I talked about. CDC has put out some guidelines out on how to think about prevalence however so that's always a good place to start. I know a lot of local communities have also put out numbers. That is one way to think about it, but you want to think about in combination of how well you can actually implement some other mitigation measures - the distancing, masking, ventilation, where you're thinking about it, and then also the consequences of your population and this goes in with what Nate was talking about where there are certain populations that have more severe outcomes and that should be a consideration as you're thinking where your risk of your school is.

NEERAJ SOOD: I would like to add a comment. I think, for example, New York is one of the few areas that have done a lot of testing in schools - both children and staff. So they said they have done about 83,000 tests and their prevalence is 0.15%. So it is fairly low and not all of those prevalent cases are going to be infectious because PCR tests might identify people who are post their infectious period, but they still test PCR positive, so that underlying risks might be one in 1000 cases and what you're trying to do with testing is trying to find that one in 1000 cases. That is a challenge because we could do more frequent testing but we cannot force people to test. You still - parents and children still have to consent to testing, so it is never going to be in a model where you can have 100% testing twice a week and in reality you cannot have 100% testing twice a week. This is Preeti's point comes in - that no matter what we do, we are going to face that small risk- one in 1000 risk. We can reduce that risk of secondary infections from

that by having safety protocols so even if that one in 1000 cases is true, we have another shield or buffer like washing hands, making sure classrooms are well ventilated, making sure activities can be outdoors as much as possible, having pods, and so on. So I think that's the reason that they can both go hand-in-hand.

CAITLIN RIVERS: Preeti, building on Neeraj's last sentence there, it's not just education that happens in school buildings. It's also busing, extra curriculars, sports. Can you talk about how schools might think about these activities and how they factor into decision making?

PREETI MILANI: Activities are not the same in terms of their risk, but what we're finding is with creativity, you can reengineer things. Like with sports, the kids go on the bus and only the ones that need to go - go to the event, they open the windows, and they sit in their own seat. That is like a good example so I think what we have learned is that there are ways to adapt things but there's some things like basketball is. That's going to be difficult to do. So you are right, eating in your classroom is something that you would not normally want to do, but it might be a less risky way to do it. Everything is a trade-off. In places that the climate allows you to do, being outside as much as possible, so it is really these are sort of homegrown innovations things that people are doing and people do different things, but there are ways to try to at least move forward.

CAITLIN RIVERS: One of the themes I'm hearing throughout our discussion is that there is a number of gaps in the evidence, outstanding evidence and best practices. I would like hear from all the panelists about how the generation of evidence might unfold and whether it will be ready, whether we can expect any major developments in time to inform decision making for the spring semester.

NEERAJ SOOD: I think there will be, every day there is new evidence coming out. So for example we are trying to do studies to really understand how well rapid antigen tests can identify individuals who are asymptomatic and potentially infectious. I know Massachusetts is doing a similar study and New York is doing a similar study. So every day there is new evidence coming out either on the risk of transmission from children, either on how well these tests work for screening. So I'm pretty sure what we know two months from now is going to be a lot more than what we know right now. I think the other thing is the other part of the evidence is what strategy actually works, and the way to do that is to reopen schools and allow

different schools to innovate and come up with their own strategies so that six months down the line we be able to say, “Hey, schools in Michigan did XYZ and it seems to work really well and they did not have outbreaks and schools in California took a different approach and here's what happened there.” So I think we need to, I think the underlying risk is low enough in several communities that we can reopen schools and rather than have one model pick all, let the different schools take different approaches and learn from that and that is another way of generating evidence of what works and what does not work.

CAITLIN RIVERS: Comments from others on that point?

PREETI MILANI: I think what I'm really curious about is how the schools affect everything else. This is the elephant in the room and it's the same thing with higher Ed. It’s very easy to say this outbreak resulted in community spread but with schools, it is different because children are living with family members - it's a little different. I live in Ann Arbor where we have both a large university population and K-12, so I think really understanding that nuance of what happens in terms of risk to vulnerable family members. Looking ahead, will there be an appetite around mandating vaccines because we could talk about testing and things, and I'm excited about it, but like doing this every day, it is really hard to do this. I think Neeraj mentioned this, you cannot force people to be tested, or maybe it was Nate who said this, but we're going to probably get to a vaccine before we get to the point where we have widespread testing. That's just my view, but I'm wondering about what work we are doing around mandating vaccines and will there be an appetite for that.

CAITLIN RIVERS: I will give you my question and you can roll that into your answer. I have a specific question but think it's really fundamental. Do you have a sense of whether it is best for families and teachers and communities to have plans that may facilitate in-person learning but then they need to flip back, or do you think picking a plan that districts are fairly confident will be sustainable throughout the duration is more important? How should districts weigh those considerations?

NATHANIEL SCHWARTZ: Such a great question. It feels like the fundamental question. Probably not one I could answer individually. What I would say, I guess, is a few things. Number 1, I think it has been that the schools that have tried to have families opt-in all in one direction or the other for a long period of time have been struggling with that. We have been

seeing that depending on what families hear from their communities and see the level of spread in different places, it has been hard for people to make decisions that last more than say two months in a stretch, and I think schools need to take that into account. Again, that makes it really hard for the schools in the districts that feel like they're constantly going back and forth, because as Preeti said, it is not the same thing planning for a virtual semester as it is planning for an in-person semester and doing both of those at once has been a real problem. When we initially, this fall, got together with a bunch of Rhode Island superintendents just after - it was about probably three weeks after schools had been opened and we were asking them about what felt most surprising to them. One of the things they said that I thought was, made me feel a little better, was that the logistical pieces of this, the getting kids to wear masks, the getting kids to walk in the right lines, all of that had actually turned out to be much smoother and easier than expected. There were all the other hard parts about educating kids during a pandemic, but that was turning out not to be one of them and what they really wanted and felt grateful to really have was clear direction about how to make those decisions. Those of us who work schools and districts and who make some the educational decisions, as we originally said in The National Academies report, we are not the public health experts and figuring out how to make the opening and closing decisions has fallen on schools in a way that has been kind of one of the hardest parts I think about this period, that educational leaders have repeatedly had to make health decisions for their communities and there is not necessarily a very good way of doing that. So I think moving forward to the extent that we can take that burden off educational leaders so they can deal with the burden of also, as Preeti said, planning for really rich deep instruction, rich deep student engagement. That's what they need to be working on but it is almost impossible to work on that when you feel like you're zigzagging back and forth between open and closed schools, between rules about ventilation and masks and all the other things that are taking most of our attention right now.

CAITLIN RIVERS: Excellent. We have come to our final question. I just have one more and a lot of interest in this one. Neeraj, Can you talk about the evidence for differential severity and transmissibility in younger children compared to older children?

NEERAJ SOOD: The evidence is that the older the children, the more they start looking like adults. So the evidence on lower risk of infection for children is strongest for children who are not adolescents, and similarly, the evidence of transmission is again stronger for younger children rather than older children. That is where I think a strategy where we reopen elementary

schools and middle schools first made sense because those are also the children who would struggle with independent learning or learning on Zoom, right? So those are the children who have lower risk of transmitting the disease to others, lower risk of getting the disease themselves, and they are the ones who suffer most from having school not in person, so that is the population I think would benefit most. The reopening high schools, gets trickier because the risk of infections rises as well as the risk of secondary transmission rises.

KENNE DIBNER: Thank you so much to all of our panelists. I have to say, I've been blown away by the number of questions from the audience. There had been a ton of phenomenal questions and I want to note that because everybody has had so much to say, we are committed on our end at the National Academies to providing answers to all of these questions, so we are going to work on a Frequently Asked Questions document for you to take a look at it, and I'm hopeful that we will be able to get this band together again to answer some of these more directly because I know you guys have a ton of interesting things to say and we want to hear from them. Thank you so much everyone for participating in and as a reminder of the recording will be posted on our website and we will also make sure to post Neeraj's notes as well as Dr. Silcox's slides and make sure everybody gets all the references they need, so thank you so much and looking forward to talking to everyone again shortly.

[Event concluded]