

"The Science of Social Distancing: Part 2"

Dr. Georges Benjamin.

Good evening, everyone. I'm Georges Benjamin, and I am the executive director of the American Public Health Association, and I want to welcome you to the second webinar in our COVID-19 Conversations series, which is brought to you directly by the American Public Health Association and the National Academy of Medicine. The purpose of the series is to explore the state of the science on COVID-19 to inform policymakers, public health, health care professionals, scientists, business leaders and the public. I'd like to thank Dr. Victor Dzau, who is the president of the National Academy of Medicine, for his support of this important effort. We are also grateful for the input of our advisory group co-chaired by Dr. Carlos del Rio and Dr. Nickki Laurie. You can find all of our advisors listed at covid19conversations.org. If you have any questions or topics you would like to address today or in future webinars, please enter them in the chat box or email us at apha@apha.org. If you experience technical difficulties during this webinar, please enter your questions also in the chat box. Please pay attention to the chat box for announcements on how to troubleshoot. This webinar will be recorded, and the recording, transcript and slides will be available on [COVID19conversations.org](https://covid19conversations.org). Now I would like to introduce our moderator for today's webinar, Dr. Sharon Inouye. Dr. Inouye is a member of our advisory group and a professor of medicine at the Harvard University Medical School, where she directs the aging brain center at the Marcus Institute for Aging Research, at the Hebrew SeniorLife. Sharon, over to you to frame today's conversation.

(Moderator, Sharon Inouye) Thank you, Georges.

I also want to Victor, Nikki and Carlos, and I want to welcome all of you on the line who are listening in. As you know this is a rapidly evolving situation with COVID-19, and many more people in many more states are in social distancing, or physical distancing mode, since last week. So our topic is ever more relevant. Last week on the first webinar, we discussed the science supporting the effectiveness and the importance of physical distancing, and in today's webinar, we are going to take it a step further, to examine the risks and benefits of social distancing strategies, including the impact on particularly vulnerable populations. We will also explore some strategies for promoting mental health during this very challenging time. And discuss what science is available to guide us, in terms of when and how we might eventually relax the social distancing measures.

First, I would like to introduce our four outstanding speakers for today's conversation. Dr. Anne Schuchat is the principal Deputy Director of the CDC. She's dedicated her career to public health service for over 30 years, and she is no stranger to these crisis situations. She has been at the forefront of CDC's emergency responses, including the 2009 H1N1 influenza pandemic, the 2002 SARS outbreak, and the 2001 bioterrorist anthrax attacks. We are so grateful to her as she lends her expertise and leadership to our panel and shares her thoughts on the current situation nationally.

Next is Dr. Jason Karlaswish, Professor of Medical Ethics, Health Policy and Neurology at the University of Pennsylvania. And one of his primary focus areas is quality of life and decision-making for people with cognitive impairment and residents of long-term care facilities, groups that are particularly vulnerable to COVID, as you know. And Dr. Karlawish will discuss the benefits and risks of social distancing measures, and the disproportionate effects on certain populations.

Next we'll have Dr. Sandro Galea, the Dean of Boston University's School of Public Health. He's an emergency medicine physician with expertise in epidemiology. And he's a renowned expert on the mental health impacts of disasters, ranging from natural disasters like Katrina to human made disasters like wars, mass shootings and the 9/11 attacks. And Dr. Galea will speak with us about the mental health impacts of the COVID-19 crisis and how they might be mitigated.

Finally, joining us is Jennifer Nuzzo, who is a senior scholar at the Johns Hopkins Center for Health Security and associate professor at the School of Public Health. She's an expert on global outbreak preparedness and

response. She will share her expert opinions on how we make decisions about potentially relaxing the physical distancing, what kind of data do we need, how do we plan for different scenarios, and how do we best move forward.

So this is an incredible lineup we have for you. Each speaker will provide remarks for about 10 minutes, then we will open up for general discussion. To all of you on the line, we really thank you for being here. Please send in your questions and comments on the chat - we would love to hear from you and would love to try to address as many of your questions as we can during the Q&A. Now I'm going to turn this over to Dr. Schuchat to lead us through an update us on the status of COVID-19. Thank you.

(Speaker 1) Anne Schuchat

Thank you so much, Sharon, and good afternoon, everybody. I so appreciate the chance to be part of today's conversation. We are all physically apart, but we are all in this together. The COVID-19 pandemic has been difficult, complicated, challenging and humbling. What I would like to do in the next few minutes is really set the stage for the rich conversations that will follow.

The concept of social distancing, or what we are calling now being *physically distant but socially connected*, dates back some time. Actually in 2007, Howard Markel and Marty Cetron, in reviewing extensive information about the 1918 pandemic and the way that different cities and geographies coped with that, coined the phrase of social distancing, and really talked about those nonpharmaceutical interventions (NPIs) that could potentially slow the spread and reduce the peak of respiratory pandemics. As a respiratory epidemiologist and public health person, I cannot believe how everyone in America knows about trying to slow the spread and decrease the peak and how expert our country has become in the science of pandemic management. But the concepts basically are including things like personal protective measures, and maintaining 6 feet distance from others, and to stay home, now we would say stay home in general, and community measures, whether they are related to mass gatherings, schools, workplace or as of today I believe 270 million Americans in 33 states have been asked to stay home by the authorities in their jurisdictions.

This pandemic is hitting many areas of the world, and the United States continues in the acceleration phase. This map looks at the three-day period from March 23-26, and the redder areas are the ones with the greatest acceleration of disease, with 151% or more increase in that three-day period. Take a look at the northeast of the country, at the New York and Boston area, and then turn to the next slide, which shows the subsequent three days from the 26th of March through the 29th. You can see that the red dots in that New York/Massachusetts area have shifted to peri-urban or rural areas. So really what we are seeing is hard-hit states, and then a spreading from urban to peri-urban to potential rural areas, as this virus really takes off in one community after another.

CDC modelers have looked at the potential effects of a pause, where we reduce school contact by about 80%, work contacts by about 50%, and have about a 50% reduction in other non-home contacts. To estimate what kind of blunting of the peak of the pandemic, and shifting to the right to slow the spread, we might see with different durations of pause. So the first curve in black is a 2-week pause, and all the way over on the right you can see a 16 week pause. The purple shaded area represents the range of available bed capacity for the 10 most populous hospital referral regions in the U.S., which have a combined population of 57 million. The horizontal purple dotted line represents the two hospital referral regions covering New York City, and you can see that New York City has pretty much the least available hospital beds on an average day, of these very populous areas. And so, not a surprise that New York is already experiencing the overflow and the need for alternative care sites.

I think as everyone on the call knows, one of the most visible aspects of the social distancing efforts have been school closures. You can see that virtually all of the states have some variation of school closures. I am told that today in Georgia, we just moved from closed until May until closed for the academic year. This is a

rapidly evolving picture. In gray it is not no data, but it is “closed until further notice” - a rather ominous phrase.

Although it is unprecedented for us to take this kind of incredible social measures, nationwide, really, we never seen this before in the U.S. for this extended period. It appears that people are behaving according to the recommendations. These data show mobile phone information about a maximum distance moved by a person's phone, on a particular day. And you can see this, six states are shown here, with virtually all of them showing a dramatic decline after the first wave of school closures on March 14. And that continued decline once the announcement was made about that initial 15-day pause.

Another way to look at mobility is based on what is called *City Mapper*, where people look for the routes to get somewhere, something like Google Maps and directions. And that shows that Seattle, in purple, began to reducing their mobility, based on this data source, earlier, and Seattle was the first site in the country with that community spread from a long-term care facility. And then we saw subsequently, drops in New York City and Washington, which were more recently hard-hit.

It has been fairly impressive to see, I think, the technologic and creative innovations that people have identified, to enhance the ability to socially distance. One of the low-tech approaches to social distancing seen is a carryout venue in Atlanta, was this masking tape, which measures six feet distance from one person in line to the next one. And we were very proud that the masking tape was officially designated the CDC social distancing limit.

To just wrap up setting the stage here, I want to say that this is a dynamic, and continuously changing, epidemic. CDC has developed interim resources that we update as we get more information, as we learn of new challenges and new problems, and we are always interested in knowing how we can be serving institutions, communities, states and partners to really help the public weather this challenging epidemic. I am really looking forward to the discussion and hearing about the downside of this attempt to try to protect people. We know this is an enormous social experiment and anything we can do to minimize the negative effects, while protecting health and really protecting the health care system to serve us all, I think it will really be worth learning.

(Moderator) Thank you so much, Dr. Schuchat, for that really enlightening presentation and the dramatic presentation in some of your graphics about the fact that people really are abiding by the physical distancing requests. So that's really heartening. I'm going to turn now to Dr. Jason Karlawish who's going to present the risks of social distancing and some of the impacts on vulnerable populations. Over to you, Jason.

(Speaker 2) Jason Karlawish

Greetings and good evening from Philadelphia. I'm Jason Karlawish, and I'm a professor at the University of Pennsylvania and co-director of the Penn Memory Center. I'm going to be speaking about the benefits and risk analysis of social and physical distancing strategies, with a particular focus on the impact on vulnerable populations. The prior speaker, Dr. Anne Schuchat, spoke much about the benefits. Much of my talk is now going to focus on the risks. I want to thank the National Academy of Medicine, and the American Public Health Association for organizing this and Dr. Inouye for chairing. The outline remarks will begin with explaining the concept of being vulnerable. Next I will take a closer look at who is vulnerable as a result of physical distancing. I'll then introduce a framework to address this vulnerability during a pandemic. And close with some preliminary thoughts and recommendations.

What do we mean when we say vulnerable? The definition I will offer is: *being relatively or absolutely unable to protect or advance one's rights, interests or well-being*. When we think about physical distancing, the question I then have, when I take that definition, is, well who is made vulnerable by the act of physical distancing in a pandemic?

And I'd like to submit that there are at least three categories of people: First, people who need physical closeness in order to survive. That is to say, they need care. Second, people who provide services that require physical closeness. For example, people who are caregivers. And third, people who provide services that facilitate physical closeness. I'd like to submit as a point of principle that sometimes physical distancing causes social isolation. Think, for example, of the one of the ultimate punishments in our penal system, short of execution. That is solitary confinement.

So let's take a closer look at who is vulnerable. In this table, I have organized it into three columns - the headers are the three categories I introduced earlier. And I would like to walk through particular examples within each of those categories. Going from left to right, we will start with *those who need physical contact in order to survive*. So, for example, those are individuals who are living with a disability, either an impairment in their ability to perform an instrumental activity of daily living, like managing their money, or cooking, or driving; or a physical activity of daily living, particularly bathing, dressing, grooming, and toileting, the ADLs. And within this, obviously, are categories of people divided by whether they have a physical impairment or cognitive impairment or, of course, both. Within the category of cognitive impairment, we think of individuals who have either mild cognitive impairment or dementia. Another group in this category are persons *who need chronic or intense face-to-face, hands-on care*. Individuals, for example, who require dialysis, chemotherapy, or who are enrolled in hospice. There are persons who need acute medical care, they are in a hospital. Persons who live in what's called a total institution- a term that describes a place where people not only live, but work and recreate. Examples of a total institution are college students who live on campus, prisoners, or residents of long-term care facilities. And finally, in this category, I've thought about persons who don't lack access to the Internet, something I think all of us right now realize that while we're physically distant, we are not socially distant.

In that middle group, now I want to talk about people *who provide services to those who require physical closeness*. This is not complete list but it's intended to get you to think about, for example, caregivers. People who either informally, that is to say family members for example, or formally, that is to say who are paid, to assist someone to perform instrumental or basic activities of daily living. We can think about people whose employment is to run and otherwise work in an adult day care program, or childcare program, or who do domestic work or cleaning, who are in the food service industry, entertainment, the point being *people whose job it is to provide services that require face-to-face engagement with other people*. Finally, that third category is *those who supply or facilitate work that leads to physical closeness*, so for example a food supplier to a restaurant or an adult activity program. I'm thinking of people whose jobs are to support people who provide services such as for an adult day program.

All of these I'm going to maintain are in some way made vulnerable by a social policy of social distancing. Let's take a closer look at the vulnerable, *recognizing clearly that people can have multiple causes of vulnerability*. For example, a person who has dementia, who requires dialysis, lives in a nursing home, and enjoys walking about that home and visits from family. I hope that you appreciate that individual faces multiple possible routes of exposing and spreading COVID: going to dialysis, walking about the facility, being visited by family, and others. A strategy of physical isolation into the room of that resident's room is now going to cause social isolation and in that room alone, without visits from family, this individual is at risk for delirium and decline. Another example that mixes causes of vulnerability is a certified nursing assistant at that same nursing home, they need to take public transportation to the facility and has multiple children at home. Again, multiple possible routes of COVID-19 exposure as well as spreading it. A job, though, that is essential for others' survival, like the gentleman with dementia I described above, and her children who require her to work and bring home a paycheck- putting others at risk.

Here's a recent blog post from the London Review of books, by the Nigerian writer Adewale Maja-Pearce, who describes how telling the majority of the poor to stay indoors in Nigeria is impossible. The point about a developing country is that the majority of the poor depend on their daily wages to feed their families. "It is hunger here that people fear," he writes, "not a virus they can't even see." They need to get out on a daily basis to make money to feed themselves and their families. Social isolation just simply isn't possible for

them. Back in America this map illustrates another example of combined vulnerability. This map depicts, state-by-state, the uninsurance rate for food service and preparation workers in 2017. The point of this is they are in a job that requires getting out and potentially interacting with other people, such as waiter-ing and other things, they don't have insurance. So if their job is stopped because of closures and restaurants and other types of food service facilities, they don't have health insurance because they are uninsured.

Next I would like to introduce *abasic principle of justice*, that helps us think through this vulnerability in the time of a pandemic. The basic principle of justice is that we need to treat equal people equally, and unequal people unequally. Persons who are vulnerable are unequal to persons who are not vulnerable; therefore someone who is vulnerable merits or deserves more, to be treated differently than people who are not vulnerable. So in a pandemic, that is being treated by physical distancing, the question we have to ask is how are people equal or unequal with respect to what? What should matter when we decide that you should be treated differently?

I put down here at least five things that need to be considered:

One, is having health insurance that is tied to employment, because if you lose your job, you lose your access to health care. Living in a private space allows you to be, obviously, distant. Working at a job that can be done remotely, having easy and regular access to technologies that close social distance, such as the internet that we are all enjoying, and being able to perform activities of daily living. In a pandemic, I would submit, survival supersedes quality-of-life rights and interests. For example, demanding free assembly in public spaces such as to have a demonstration or some sort of rally, is simply not important. It's not going to happen. And finally, another principle here is that in general, we want to live days that are safe, social and engaged. And of course, this is a balance, a kind of triangle. You can't have a day that's fully, safe entirely social and totally engaged. We have to achieve a balance. Right now, in this pandemic, obviously that balance is tilted quite towards that vortex if you will, of safety. Let's start putting things together. So Think about how applying physical distancing would affect these three different kinds of people. First, a very wealthy person who has paraplegia; second, a person with dementia who requires dialysis and lives in a nursing home, we talked about that individual); And third, that CNA I talked about. And what I've done is gone through those various criteria, that we should think about when we think about justice with respect to the vulnerable, in the time of a pandemic.

Let's go down the list there. Our very wealthy person who has paraplegia, well, she or he has health insurance, lives in a private space that's an accessible residence because it's been retrofitted to allow getting in and out, certainly can work in a job remotely courtesy of the Internet, etc., and has easy access to the Internet that allows close social engagement. And finally, is able to hire whatever help is needed and even have them stay there with him or her to do IADLs and ADLs. Our resident of the nursing home has health insurance, because we'll say he's over 65 and therefore has Medicare. But in that setting of the nursing home, their meal settings, it's simply impossible to serve meals to individuals in their rooms, due to staffing issues, maybe even has a roommate, and has to go to the dialysis center three days per week. Having easy access to technology simply isn't available to this person because of cognitive problems but also lack of ready access to technologies that allow remote connection in many nursing homes. And finally, he needs someone to help him or her do his IADLs. That CNA, now, in our third column, who has health insurance, yes, but if loses her job, maybe doesn't have health insurance because it's tied to employment, lives with others, at home, needs to travel to his or her job, and has to work in this other setting with other people, and does not have the ability to do the work as a CAN remotely. And finally, though, is able to perform IADLs, etc.

I hope you can see the spectrum of how these people are unequal and therefore need to be treated differently. Back to that table I showed you earlier, I bolded this particular group, I think that going forward, we need to think very closely about people who are living in total institutions. Our earliler presenter showed us how colleges are solving this quite easily by simply shutting things down, and schools. But prisoners and residents of long-term care facilities need extra and additional thought.

With that in mind, I would like to offer preliminary thoughts and recommendations to address these sources of vulnerability. But first, where possible, we should try to remove them. So, for example, I listed out a host of different kinds of workers who depend on physical closeness to do their jobs. Many of these people will be, if are not already, be unemployed. And as we know, there's been an enormous spike in the unemployment filings. This is a clear opportunity for social policy to address that loss of income. They need access to health insurance, it would be very interesting to think about further political discussions about modifications to access to the Affordable Care Act. Schools, of course, are being closed. We should think about broadening our ability to get people access to the Internet across every bit of the country.

And finally ponder things like prison release or parole. But even after addressing these sorts of vulnerabilities, my list is not complete. Some people will still remain vulnerable. And I would submit the more that a person is vulnerable, the further up in front of the line, for personal protective equipment, testing, once it's widely available, treatment should it every be available, and a vaccine. That the principle of access and who has what place in the queue and why. And finally, I would say that we must pay attention to total institutions, such as nursing homes and prisons. I can tell you as we know from Seattle, and in my own city, they are ground zero for this epidemic, this pandemic. It's going to be this way for months. We need to think about, for example, how Medicaid funding can be a pipeline to those nursing homes, and Medicare to dialysis, in order to get them the resources they need, such as access to personal protective equipment. Many nursing homes are sorely under resourced with the essential PPE that they need. We need to crowd source ideas to improve access to PPE as well as to create safe social and physical connection in these congregate living settings. For example, families could be trained to be CNAs, there could be allowed to have selected or escorted visits to see their relatives, we can use technology to allow better connection remotely, in-hallway dining. I realize some of these things are very peculiar and particular. But nothing at this stage in this time right now is too stupid or outside the box.

I would like to close with this observation. In this pandemic, we're faced with a disease that is incurable, and, we think, untreatable. We sadly have to almost let nature take its course, of course providing palliative care. We are right back to where we were before modern medicine in some sense. We have to take caregiving seriously. Caregivers, humans, are really like the influenza vaccine, the vaccine we desire for COVID, they're like penicillin. Social distancing can clearly impede the ability to deliver care. This is our national dilemmat that we have to address. Thank you.

(Moderator)

Thank you, Jason, for that insightful analysis. And clearly the risks are very serious and the solutions are going to be difficult. We need to carefully balance those risks against the tremendous mortality risk of not doing the physical distancing adequately or long enough. And so I see that questions are pouring in, so I want to move on so we have time to address them. I would now like to turn this over to Dr. Sandro Galea to take us the next step and probe further about the potential mental health risks of social distancing, and potential mitigating factors. Thank you, Sandro, turning it over to you now.

(Speaker 3) Sandro Galea

Very good, thank you for having me. And thank you National Academies and thank you to American Public Health Association for arranging this. In my 10 minutes I want to talk about mental health and COVID-19, and I ground my reflections in the observation that what is going on right now is a trauma. It is a global trauma. And, focusing on the US, it's a national trauma.

This is a definition of a traumatic event that I have used for decades, really, a lot of my work I've studied trauma and mental health: "A traumatic event is an experience that causes physical, emotional, psychological distress, or harm. It is an event that is perceived and experienced as a threat to one's safety or to the stability of one's world." This definition typically has been applied to more typical mass traumatic events like terrorist attacks or hurricanes or floods. But I think anybody can see that it applies equally to what is going on right now with COVID-19, both the pandemic itself, as well as the efforts to mitigate the pandemic.

When we understand this, I think we can ground a fair bit of our understanding in the literature of mass traumatic events. So I thought I would make seven points. I'm going to make seven points with just one data slide for each. And I'll go through each one of them. Let me start this way.

Number one, is that prior evidence from a whole range of studies that have accumulated largely over the past quarter-century suggest that there is an increase in mental illness after traumatic events. After mass traumatic events. Much of that is in the mood anxiety disorders spectrum. Things like depression, anxiety, post-traumatic stress disorder, increase use of substances, alcohol, cigarette use, cannabis, as well as increase in behavioral disorders, things like domestic violence. I have just one slide to show you on this. This is from my research, after the 9/11 terror attacks. You see here, a map of the density of post-traumatic stress, leading out from where the World Trade Center was, which you'll remember was at the south tip of Manhattan. And what I want to show you here - concentric circles with lower prevalence as you further out from 9/11, which was a consistent finding across many studies. The closer you are to the trauma, the higher the density of mental illness. And of course this is a trauma that is global and national. It's not exactly clear where the epicenter is. The bottom line is, previous evidence suggests after traumatic events you're going to have an increased incidence and severity of mental illness. That's point 1.

Point 2 is that the emerging he emergent evidence after COVID-19 is that this is exactly what's beginning to happen after COVID-19. Now, we are early in the epidemic, but there are a few papers that have been published in literature, most of them from Asia. And I just want to show you a couple of them. This is from one of them, which actually looked at the prevalence of anxiety, depression, and PTSD symptoms. What I want you to see is the prevalence of people - the blue bars are anxiety and depression, the red bars are PTSD, and the bars on the right are co-morbidities, any symptom of anxiety and depression, red is any symptom of PTSD, and the purple is both anxiety, depression and PTSD, at least one symptom. And about 50% of people in this one study had at least one symptom of anxiety, depression and PTSD. And when look at PTSD symptoms, you had 15 % of people had six PTSD symptoms, that's in the red. The study wasn't designed to come up with diagnostics for PTSD, anxiety and depression, but I think it gives us a clear indication early on that these symptoms are emerging.

The second other study uses the PHQ, which is a validated diagnostic instrument for depression, also looks at anxiety and some other symptoms of distress. But I highlighted in red, at the top right of this busy table, but I kept the table as it is, given that this is a science audience, And all I want to draw your attention to, and I hope you can all see, the table, is that there are columns here, the left, if you just look in my red circle, is Wuhan in China. The second is Hubei province outside of Wuhan. And he third column is outside of Hubei province. So that means you're actually getting closer and closer to where there was more COVID-19. And if you just focus on PHQ depression, the rows are normal, mild, moderate, severe. And all I want you to see, is in the Wuhan column, you have more people who are severe and moderate, more severe than there are outside of Wuhan, more moderate than there were in Hubei outside of Wuhan. But then when you get to normal, you have more normal in Hubei outside of Wuhan. So in other words, early evidence, and these are really early studies, are that the closer that residents were to Wuhan, which was of course the first place there was COVID-19, the higher the likelihood of severe symptoms of depression. Which, if you think about it, is exactly the same as what I showed you about PTSD after 9/11. And then one other slide from a different study that came out, this looked at variables associated with, in this case, depression, and you can see there are multiple variables variables on the left. It's a fairly typical graph. But all I want you to look at here is the bottom row. And the bottom row looks at social media exposure. And you see that social media exposure "frequently", is associated with greater likelihood of depression and sometimes "a little bit less", both of which are much more than less social media exposure. This, again is consistent with what we saw after the terrorist attacks and disasters in the past 20 years. This is beginning to behave like we've seen in the past two decades in studies of disasters and mass traumas, which suggests we are going to see a fairly predictable pattern of depression and PTSD throughout the country and the world. What is different about this event, of course, is the enormous geographic scope that it hits.

Moving onto the third point, is that right now I've just talked about the mental health consequences of the COVID itself. We also have an economic downturn that is compounding the influence of the COVID, as you heard, and there are going to be ongoing stressors that are going to compound mental health as a result of the economic downturn. This is simply just a graph to remind us of what's been going on with the economy. And I could spend an hour talking about the literature about the mental health link to economic downturns. This is just a very simple graph looking at economic indicators and likelihood of suicide. So on the X axis here, we have an index of economic indicators, and on the Y axis, you have the rate of suicide deaths in New York City. And as economic indicators get better, you see suicide rates go down. And this is pretty consistent across a range of literature. And I could show you economic indicators linked with a broad range of common mood anxiety disorders. I'm just showing suicide as a common point. So economic conditions will, themselves, have mental health consequences.

And a fourth point is, that a key part of this picture is, it's not just that economic consequences are one time. They're not just punctate events. What they are are ongoing stressors. One of the pictures forgotten after disasters, Typically, we tend to think of disasters as something that happens, they happen and then they're over. But when you look carefully at the science on this, what matters to mental health is the stressors that go on into long-term after a disaster. And those stressors themselves influence the incidence and the trajectory of other mental illnesses. To make that point, I'm just going to show you one data graph. This is a graph of people with PTSD after Hurricane Katrina. So this is a survival curve, everybody on the left of the Y axis, essentially, had PTSD, and as you go forward in time, we have a couple of years here, is people have remission, either a natural remission or else through treatment. but what you see here is two lines, the PTSD curve splits. There are two curves, one labeled "high stressors" and one labeled "low stressors." And that the people who experienced other stressors, and here, in this study those stressors were things like having hard a time paying the mortgage, having a difficult time putting children in school, worried about one's parents., which we all recognize are things that are going on right now. Those who had these stressors were likelier to have PTSD for longer. So, essentially ongoing life stressors are what drives the trajectory of mental illness after the initial insult happens.

Fifth point, we're talking about mental health, and I was asked to speak about mental health, which I'm glad to do, but I do want to make the point that mental health is inseparable from physical health. When I talk about mental health, if you believe the argument that I'm making and if you are a reader of the literature that I'm reading that shows exactly what I'm suggesting is going to happen, you're going to also realize that this mental health burden is going to be also a burden that will excentuate the physical health burden after this event. Let me show you just one graph to make this point. It is from a study that our group had done. This is What you see is people, age on the x axis, but what really matters is cumulative incidence of Type II Diabetes-if you look at the black line, which is the bottom line, these are people who never had traumatic events. What you see is, as you get older, your incidence of diabetes goes up with age. Nothing surprising there. But what I want you to see is that the slope of that line gets steeper and steeper, the more trauma and traumatic symptoms that people have experienced, until we get to this pink line, which is the steepest. These are people who have experienced trauma and have symptoms of PTSD. So the natural incidence of diabetes which goes up with age, that slope gets substantially steeper if you have experienced a trauma and you've had PTSD symptoms. That means that the mental health burden, after COVID, and after the consequences of COVID, that I am describing and we should expect to happen, is going to influence the burden of physical disorders after COVID. So that's one way in which mental health is linked to physical health. And then I want to show a totally different slide just to make this point because I feel like this point has not been made in the public conversation. What this is, is the data from perhaps the most comparable recent incidents, SARS and Ebola.

This is a slide about Ebola. And what this slide shows, just focus on the bottom right, the green lines, which you see going up and down, are the Ebola epidemic. The bars are not Ebola at all. The bars are actually malaria, they're the diagnosis of malaria, and deaths from malaria. What's really interesting about this, if you just look at the bottom right, is that Ebola cases went up, malaria cases also went up, but then, Ebola cases after Ebola was resolved, malaria cases still went up and deaths from malaria went up. The reason I'm

making this case is that what happens after these events is not just the mental health consequences, but the physical health consequences get worse, simply because our health systems are all focused on dealing with one specific subset of disorders, leaving open the whole ground for other physical conditions.

Sixth point. The mental health consequences, unfortunately, are long-term and lasting. I think right now our attention is all diverted on the urgency of COVID, and it is appropriate. COVID is a terrifying disease and it's going to result in more than 100,000 deaths in the U.S. alone, which are deaths that we previously were not counting on. It is also important to remember that, unless, by the grace of God something changes, we will get through COVID. But the consequences, particularly mental health consequence, are long-term, and they're going to be lasting for months and years after we're over the acute part of the COVID epidemic.

And just to make that case, I just want to show you some data from a study we had done in Africa. And all I want you to see here is, this is from a province in Liberia, and the dots here are areas where there was conflict. And that conflict was 25 years ago. Twenty-five years later we did a study, and the dark dots are the areas where there was high prevalence of PTSD. And really, all I want you to see, is that 25 years after, in an area where there was conflict, you can trace the path of trauma by looking at the PTSD in this one region in Africa, 25 years later, really, a quarter of a century later. So the echoes of these events goes on for a long time and the reason for it; It's not just the initial trauma but the intitial trauma compounded by the stressors and compounded by the social and economic upheaval, which is exactly what we are seeing now with COVID.

So my last point, we can mitigate some of these consequences. How do we mitigate some of these consequences? Obviously, we could spend an hour talking about mitigation, but just four points: Education; Surveillance; Stepped care approaches; and Improving social and economic conditions. Briefly, one of the challenges we have, is that as a society we remain really, we are far behind in educating the public about mental health, de-stigmatizing mental health, making sure people come see providers in a timely way about mental health. And also normalizing mental symptoms. Normal anxiety adjustment reactions, normal sadness about being locked up in your house, it's normal, it's not necessarily pathological. But we don't have that level of education that then allows us to screen people, screen the normal reaction from the pathological. Number two, surveillance. Actually being able to monitoring mental health symptoms, being able to monitor the emergence. Number three, stepped care approaches. Stepped care approaches means creating a system where we educate, we monitor, and refer to treatment only the people who need it. There's a good, growing literature that stepped care is the way to deal with mass, large-scale traumatic events. And number four, improving social and economic conditions, which, hopefully, now it should be clear why I'm saying that given how much social and economic conditions compound mental illness after traumatic events. This slide, here, what I want to show you, this is from a modeling study that we did. And what you see here, is, you can look at any of these, but just focus on the bottom right. The red line is stepped care approaches, and the purple line are usual care, without improving social and economic conditions. You can model the survival curve, the progression, of mental illness. And what you see is that the steepest decline, the most rapid resolution of mental illness is the red line. The red line is where we implement stepped care approaches coupled with improving social and economic conditions.

So, coming back to 7 points. The evidence does suggest we're going to have a substantial increase in mental illness. The emerging evidence is consistent with that. This is going to be compounded by economic downturn and long-term, ongoing stressors. These mental health consequences also will compound physical health. They will last for a long time. You can mitigate some of these, but, ultimately, this is the next wave of the consequences of this pandemic that we have a responsibility to be prepared to deal with.

Thank you for having me.

(Moderator)

Thank you, Dr. Galea, for that really informative talk. So much for us to think about together. Now I would like to turn to Dr. Jennifer Nuzzo to help us understand the decision-making process about when to and how

to end the physical distancing. How will we know when to stop, and what will be the next steps? Over to you, Jennifer. Thank you.

(Speaker 4) Jennifer Nuzzo

Thank you so much I really appreciate the introduction and being able to speak to this topic.

Life has changed, clearly, a lot in much of the world. Certainly here in the U.S. within the last two weeks, I think we are living in a situation that is largely unprecedented. Though we've known about COVID-19 for months now, we've been seeing very worrisome impacts in many countries across the globe, I think perhaps one of the more stunning developments as of late was the rapid rise in reports of cases and deaths in Italy. A Lancet paper that was published in March describes some of the early hospitalizations and admissions to intensive care units, and raised the possibility that the country was possibly weeks away from exceeding health care capacity. Here in the United States, I think that this was a bit of a galvanizing report. Data and images of overwhelmed hospitals now was a bit of a reality check and really, I think, caused many to ask whether we would see cases similarly rise in the United States and if our health systems could keep up. I know many people at this point began to worry in particular if the US was possibly on the same pathway, and if we were only just weeks behind Italy, in experiencing some of the same levels of health system stress that they were seeing.

Fortunately, and I think, related ... is when state governments really began to implement social distancing in an attempt to slow the growth in the number of COVID-19 cases, and in hopes of preventing systems from being overwhelmed. Of course we're still hearing of these stories of stress because these measures that we're implementing to take some time to show an affects. So there may be some glimmers of hope in some places in terms of potential flattening of the curve. It will take some time to see that. But at this point, many states have begun to implement measures, and although the measures taken in each state differ, I think the trend overall is they increasingly states are implementing stronger and stronger restrictions. And so this ranges from closing mass gatherings, closing schools, and then even in some places, shelter-in-place recommendations. So that is where we find ourselves. Staying at home. Limiting our interactions, and not showing up to work if you don't have to, doing it from home as much as possible. Clearly, there are parts of our society that need to still function. But for the most part, in many places, life has changed considerably. We're hoping to do our part to slow the spread.

The question that probably everybody has asked, that's weighed in on this issues the most, is how long will this all last? How long will we have to maintain these measures?

We know that these measures aren't a cure. They are not going to stop the virus from circulating. They are probably more equivalent to hitting a pause button on the rapid acceleration of cases. We also know that if we let up on these measures, we can expect to see a rise in cases once again. But at the same time, for reasons that the previous speaker has just illustrated, we can't maintain this level of shutdown forever. There are certainly harms associated with the measures themselves. So we need to figure out a way to be able to return to normal and how to do that safely. But figuring out when we can safely begin to ease up on these measures, and it will be more a question of easing up, and not just lifting the measures entirely. We need to also think about what comes next, and what we will do to respond to the rise in cases that is going to occur. So that we don't find ourselves back to where we started. We need to figure out what the work in that next phase will be. So that we can suppress the cases that are emerging so that we don't once again see accelerated growth. Social distancing is a tool, but not a solution to the pandemic.

What I'm showing here is from Imperial College of London. They did a modeling looking at various different modeling strategies, different social distancing strategies, and what their likely impact would be. There are a number of takeaways from this. And although I have points to quibble with here and there, about these models, I think they illustrate the reality of the situation, which is that these measures will have to be maintained, and if they are lifted, entirely, we will see a rise in cases. In this particular study, they looked at it over an 18 month period, likely because 18 months is one of the early estimates of when we could

potentially have some vaccine, although that may even be an optimistic estimate. So there needs to be a next phase of action, we can't just, I personally think it's unlikely we can maintain this level, the current level of social distancing, for 18 months. But if we are to do something different than what we are doing now, we need to have a plan B. So what will that Plan B, what does that next phase does that look like, what is the next phase of action? What measures can we take then to limit the spread of COVID-19, such that we don't find ourselves worrying, once again, 'will our health systems be overwhelmed?'

I think there are some potential models out there that we can look to. One really promising, I think, approach, is Singapore's experience. It's interesting. Singapore didn't really implement any of the social distancing that other countries in Asia did, not fully. What they did was they relied on sort of tried-and-true public health measures: aggressive case finding, case isolation, contact tracing and monitoring. They found cases early and then they conducted detailed epidemiologic investigations and attempt to find anyone who may have been exposed to an infected person. And monitor those individuals, so if they became a case themselves, they don't further transmit the virus. And they were largely successful. They were able to reduce their incidence to these very targeted case base measures. But these measures, as much as they are probably going to be a backbone of our next phase, are very laborious. And if we are to try this in the United States, which I believe we will have to, we're going to need additional resources and tools to enable this kind of approach. This kind of contact investigations alone, certainly with case numbers where they are right now, it's definitely out of reach of almost essentially every health department in the US. But perhaps once we get the case numbers lower, it can be attempted. But even still, there are very limited resources to conduct these sorts of investigations now, and clearly additional resources, in the form of new technologies, and new personnel, volunteers likely, will have to be brought into this.

Another potential model is South Korea. I think, probably at this point everyone has heard about the success South Korea had in flattening their curve, and reducing their case incidence. It's pretty famous for how it rapidly expanded testing for COVID-19, which enabled it to find many more cases in the community, as compared with other countries that are largely testing people in hospital settings. By testing the broader community, it enabled them to identify and isolate cases early, possibly milder cases that might otherwise not have been caught had they not done this. And then through a very, very aggressive, technology-supported contact investigations, they could then monitor and test exposed individuals and hopefully limit transmission by isolating them if they were found to be infected so they did not pass on the virus to others. I think what those examples show us is that the next phase for us will likely have to rely heavily on these tried-and-true public health measures, case finding and isolation, contact tracing, contact monitoring, and then ultimately isolation if they become cases. You know, this, test/isolate, test/isolate, repeat phase that people have been stressing, particularly the WHO. I think this is very much in our future. But when we get to that next phase is the question, right? So what does this mean for the United States? When are we able to move to this next phase?

If we want to be able to ease social distancing, we have to have confidence the number of infections that are occurring won't outpace our health care capacity. And in order to know this we need to conduct surveillance in two major areas:

The first one is that we need to better understand the occurrence of disease of our communities. And that sounds obvious. But while individual states are publishing total case counts, case counts alone are not enough to help us gauge if the situation is getting better enough to ease these social distancing measures. We need other data to help us interpret case increases or decreases. We need a way to track, and ideally in one place, and not on 50 different states' websites, what criteria states are using to test people, what percentage of states' populations have been tested, and what proportion of tests are positive. The case numbers alone can be very subject to changes in surveillance. And so it's really hard to interpret increases and decreases without understanding what kind of surveillance they're doing. It's also really hard to compare case numbers between states as first of all we don't standardize that by the population and also understand how different states may be approaching testing in the first place. Once we see the case numbers are falling despite increasing numbers of people being tested, we may begin to be reassured that the social distancing measures

are having an impact and that we can begin a phase of return to normal life – But we won't know that until we have more data. And I think people are working hard at trying to improve the availability of the data. But it's really, I think, going to be an area where we need urgent action.

And then the second type of surveillance we need to be doing is to better monitor the strain on the health system. What we are trying to gauge, really, is if we flatten the curve enough, beneath the line, and the line represents what kind the health system is capable of doing. In order to understand, if the health system is okay, and not at risk of being overwhelmed, we need to understand what level of strain it is experiencing. So there are some ways we can essentially collect and analyze these data. One thing is that we don't regularly report what percentage of cases are being hospitalized. Some states do, but not all do. We should probably also understand how many of these hospitalized cases are requiring intensive care. That is probably one of the most limited possible base resources that we have. And then we need to know if hospitals have the resources they need in order to provide this care. Do they have sufficient access to supplies, personal protective equipment, do they have enough ventilators? We need to know whether shortages are occurring so if our case numbers outpace supplies, that's just one of the things we have to ask. But also, it just useful to know so that we can see if we could possibly reallocate health care resources or transfer patients to reduce strain on certain facilities. Not every facility is going to be affected the same way and not every location is going to be affected the same way all at the same time. So it may be possible even through enhanced surveillance of a health system to understand if we can reallocate to ease some of the stresses in some places.

And then critically, I think we also need to monitor our health care workforce. We've paid a lot of attention to some of the hard stuff, the ventilators of PPE, and those are utterly essential. But we need people to wear the PPE and we need people to power the ventilator. One of, I think, the important indicators that we should be monitoring health care worker inspections and health care worker absences possibly due to exposure-related quarantine. Because if we don't have enough health care workers in a health facility, then the capacity is clearly going to be limited there. So I think we need to establish those two surveillance streams. Once we get a sense that we are seeing progress in both of those areas where we can begin to be a little bit less panicked about how the case numbers are going with respect to the very somewhat fixed limits of the health system. I think that will be the point where we can start to think about, perhaps, a phased return. However, even if we get to that kind of more, slightly more relaxed point, the work clearly will not be done at that point, right? As soon as we ease up those measures, we may see an increase in cases. So these measures, if they are relaxed, will have to be done incrementally. Some of the measures will probably have to be maintained for quite a long time. It's going to be critical, as long as this virus is still circulating, that we continue to protect those who are most vulnerable to severe illness and disease so they don't wind up in intensive care units. So the elderly and those with underlying conditions may have to remain protected for as long as this disease is circulating, or until, perhaps, we have a vaccine or a specific treatment that could lessen their chances of becoming severely ill and dying. It is crucial that we have a plan and resources for identifying and isolating the COVID-19 cases that occur. Once we begin to release these measures, because, again, we don't want to have done all of this just to find ourselves back where we started. Right now I don't feel we have enough of a plan for finding and isolating cases and conducting contact investigations. We're still hobbled by lack of testing and lack of personal protective equipment. And health departments still don't have the tools, or person power, to do the investigations they need to do. So when people asked me when will it end? When can we get back to normal? It's not purely a function of the disease and disease transmission but also about what resources we have to manage it. When we've determined that we have flattened the curve.

I think the next phase is also an opportunity. We don't want to go backwards. We don't want to come out of this and still experience the same vulnerabilities. We need to come out of this with a reimagined health system that is not so susceptible to collapse. Prior to the pandemic, I led a team at Johns Hopkins that worked with colleagues with the nuclear threat initiative and the economists intelligence unit to create the first-ever global health security index, which assessed the health security of 195 countries, specifically with respect to their readiness for a pandemic. What we found was that no country was fully prepared for a pandemic, which we're clearly now witnessing play out across the world. But most worryingly, we found

that countries' health systems were their weakest points. This wasn't surprising to us because we had watched recent events like Ebola in the Democratic Republic of Congo, and clearly we saw evidence where an unprepared health system could then become a focal point of disease transmission to the broader community. But we also found that across the globe, health systems were largely unprepared for a pandemic, even in high income countries. And we're very much seeing this play out today. The fact that we are all sitting home, social distancing, we are trying to prevent our health system from collapsing.

So I think one of the things we are going to have to start doing in the next phase of work is making sure we include health systems in our efforts to strengthen countries' health security capacity. This may sound like an obvious thing to say. But I think it's somewhat lamentable that for the most part, efforts that have been aimed at countries' abilities to prevent, protect and respond to epidemics and pandemics, have largely focused almost entirely on public health capacity. We've made great progress in strengthening laboratories and surveillance systems across the world. We're doing work on risk communication. And clearly more work needs to be done in those areas for sure. But important work, it's very important work, but what has not been included enough in these efforts, I believe, is our health system. Much of the work that has been done in terms of health security capacities here and elsewhere, has focused on these public health capacities. They tend to miss or not include the foundational capacities that exist in health facilities and health systems. So if we work to strengthen public health laboratories, to make sure they are capable of doing certain test, we also need to make sure that there are enough clinicians to collect specimens that the public health lab is hoping to test. These clinicians need to have the supplies to collect these specimens and to do it safely.

So we need to come out of this with a better sense of what is needed to equip health facilities to address pandemics and commit to building those capacities. The chart I'm showing here, was from a project that we did that was funded by the Rockefeller Foundation, where we tried to develop a health systems resilience checklist. As part of that effort, we did an exhaustive literature search, we spoke to dozens of people who were involved, in either response to epidemics or a significant outbreak, or even natural hazard events, as well as people who were working in the field of health system strengthening. And we tried to identify, from all of that, the literature, the first-hand experiences, if a health system were to respond to an infectious disease emergency, what capacity, what capability would the health system need to have. And we created these bins of capacities and capabilities. And we then sort of as a thought exercise, kind of compared it to a tool that is being used around the world to assess countries' readiness to infectious disease emergencies.

A tool being use by the World Health Organization, it's called the joint external evaluation. More than 100 countries have signed up to do this. When they sign up, they get a team of external experts to come into the country and ask them a lot of questions about what they are able to do. Is a very great process, I think it is enormously valuable. And a very important exercise for countries to go through it, a great strategic planning exercise, I think, to help countries think about, were an event to happen, where would they have strengths and where may they have weaknesses. But we compared all the things that we found were needed in the health system, and then looked and to see if we could find questions that related to it. And the answer was largely no, the JEE is not oriented around health systems. Which is not a criticism of the JAE itself but is to say, we need to do a better job of bringing into the work of health security strengthening, also, people who work on health systems. And an interesting exercise when we were doing these interviews with experts, we talked to a lot of people who worked in the field of health systems strengthening, and very few of them had even heard of the JEE tool.

That suggested we need to do work to bridge those two communities, the practice. I think now, that work is being done by itself. I think this COVID-19 situation is very much illustrating our dependence on the health system and why weaknesses in that area really make us so vulnerable and really limit our public health response. I think going forward we need to use this opportunity to strengthen our health system, such that we don't have to find ourselves, stuck at home yet again, when another virus emerges.

Thank you. I think we have time for questions.

(Moderator) Thank you so much Dr. Nuzzo. A terrific presentation. A lot of very practical information that I think we all needed to hear, to think about what data is needed to monitor in order to know if you're ready to stop the social distancing. And also the next steps to planning to strengthen our health care system. We want to start a Q&A with a question that came from the chat.

Question 1: I want to target this to Dr. Schuchat. One of the questions is, it appears like states of California and Washington implemented very early social distancing, and what have we learned from their experience so far? Is there evidence of flattening of the curve? Is there anything that you could say that we can learn? We realize that's early experience, but we wonder what you are seeing there.

Answer 1

Dr. Schuchat

Thank you for that observation. It is encouraging that Washington state seems to be flattening, as well as Northern California. But I would say that the outbreaks in those two areas were less generalized at the time that the mitigation efforts began. The Seattle/King County area was hard-hit, in the long-term care facility/assisted living facility/health care environment. And northern California, sort of a mix of things. The East Coast has had enormous numbers of importation. And so New York City, it wasn't just a few chains of transmission that needed to be interrupted; there were so many people returning from Europe at the time that Europe took off, that the mitigation started later, basically. I think the question is correct. Early mitigation probably helped. But just the New York City area was seeded by quite a bit of virus. I think a factor that's important in this virus as well as others, is the super spreader phenomenon. Where, clearly, in the life care facility in Seattle/King County, there was a super spreading event given the vulnerable populations and the circumstances there. But, spread from one to very many, is a problem in a number of other areas where we have seen local spread take off really quickly. We know that cruise ships are famous for that, a meeting in Boston that spawned quite a few cases. And because the virus can be spread when a person feels well, before symptoms develop and possibly when they're asymptomatic, there can be a lot of unrecognized transmission before you realize that you have community spread. So earlier mitigation definitely can help. The question of whether it can be sustainable anywhere is really the topic of the conversation today. Thank you.

(Moderator)

Just a quick follow-up, Dr. Schuchat, what are you seeing in terms of the types of data collection that Jennifer was talking about in terms of assessing health system capacity, availability of resources, availability of health care workers, is that something that the CDC is assessing across states and across the country?

Answer 1

Dr. Schuchat

Let me make a few comments about those very excellent points. There are a couple of approaches. And one of the challenges in this response is to make sure that we are coordinated, and not duplicating efforts, and that there are streamlined data collections, to not further burden the health care system or the public health sector. So of course there's an attempt to use as many open-source data or automated laboratory reporting rather than manual kinds of reports. There's something called the national health care safety network, or NHSN, which is a system we use for healthcare associated infections and microbial resistance in about 7000 acute-care hospitals across the country. It has good participation because there have been some CMS incentives associated with reporting through that system. And they have launched a COVID-19 module for that health care capacity types of parameters, really trying to get at, you know, ventilators for the critical care beds staffing and so forth. The feeds from that are really directly fed into the National Response Coordination Center that FEMA and the CDC and the Assistant Secretary for Preparedness and Response are all staffing, to help with some of these allocations of scarce resources, ventilators or PPE. So that is one of the things that has been stood up. There are certainly other data collections that also are going on.

Certainly, the issue of getting beyond laboratory test results, or hospitalized patients, is going to be very important for us to understand the full spectrum of the disease. But more importantly the full burden of just how much disease has occurred. To get at some of those measures, like hospitalizations requiring intensive

care units, we are using an expanded version of our emerging infection program network, or flu-net, which looks at flu hospitalizations in 14 states and a defined population that can really get at the severity of the scarce critical care beds. As well as factors for complication. There also a lot of discussion about serologic surveys, trying to help us understand just how many people are infected, after a wave goes through one of these communities. That can help us understand who is susceptible, and maybe, at risk for a subsequent wave, if we release, or when the release the mitigation steps. Also, important because we have this paradox that the more effective your mitigation efforts, the less people that will be infected and potentially asymptotically infected, and the more susceptible the population remains to further exposures and disease when you re-open.

Those are a few of the data streams that are in progress or ongoing that we hope will help us get a picture of where we are right now across the country and where we are going as we try to get away from looking at having to do very difficult mitigation until a vaccine is available. That is pretty much unfathomable. We're trying to get as much understanding of is that health care system able to take on a resurgence if it occurs. Is that public health system capable of doing aggressive case identification, contact tracing, and isolation? If you really suppress the virus, do we have the testing capacity to help us rapidly identify cases and isolate them. There are these the types of data streams we are gathering now. As we look at this continued extensive mitigation in the month of April.

Question 2

Thank you so much. Question for Dr. Sandro Galea. Could you speak to the anticipated short- and long-term impact on children and youth, in terms of mental health issues, and are there things that can be done now to try to mitigate those?

Answer 2: Sandro Galea

That's an excellent question. The children and youth are as susceptible to mental health symptoms as are adults. And everything I said applies to children as they do to adults. In many respects children are more susceptible and the current thinking I think, is that, most mental disorders are rooted in early in childhood and adolescence. In a book I edited years ago with several colleagues, we talked about the life course approach to mental disorders. The majority of mental disorders really start in childhood, and adolescence. The problem, when they start then, is they end up having implications throughout their life course. We know that people who have mental disorders that started in childhood and adolescence, will then go on to have a trajectory that is longer and more severe and it will intersect more with physical health and social and economic functioning. In terms of what can be done, the approaches are exactly what I outlined earlier, broadly, for children and for adults. It would be education. It would be screening. It would be making sure that care is available. And it would be making sure that the economic conditions and social conditions faced by their parents are dealt with. Some studies have shown that children of mothers who have depression, or mothers who have anxiety symptoms, those children are much more likely to have delayed social and developmental milestones, than mothers who are not depressed or don't have anxiety symptoms. And so unfortunately, the implications of this for children, are serious. To my mind, the more we can do to mitigate these consequences both for children and for their parents, because that again affects the trajectory of the mental illness in children, it will yield enormous significance for us as a society in terms of return on investment. If we can invest now in mitigating these consequences.

Moderator: Dr. Galea, is there any evidence that sort of more broad scale population-based interventions might help? One of our people on the chat asked about mindfulness or other kinds of maybe broad-based interventions that could be done at the population level, or, alternatively, in low-resource areas?

Sandro Galea: There is literature on universal versus targeted interventions, and things like mindfulness are very difficult to deliver to millions of people, but they work much more in targeted ways. But probably, my read is that it is a combination of universal approaches, and targeted approaches to higher risk populations, that probably have the greatest yield. So I think it's entirely reasonable to say the population level, we are going to aim for education about mental health, screening for mental health so that we can then direct people

to needed, to more intensive, therapeutic approaches. And think of mitigating social and economic stressors as a form of treatment for mental illness. That's at the population level. Than to say, for higher risk populations, which in particular cases may be children of those who are affected by COVID or its economic consequences, for those groups, led us train potentially lay workers, to deliver higher intensity approaches that can prevent or mitigate mental illness to higher risk groups. I think it is that kind of combination that we need to embrace collectively to minimize or reduce the mental health consequences of this event and the consequences of its consequences.

Question 3: This is for Dr. Karlawish that's been posted by several people on the chat, is that you talked about the risk in terms of physical distancing itself. But many have asked about people more vulnerable to the infection itself. Such as disabled populations, some ethnic minority groups are found to have higher rates, African-Americans for instance, the LGBT population, homeless population, possibly in pregnant women, could you speak to that for just a moment. Separating that group from the other groups that you discussed.

Answer 3, Jason Karlawish

Sure. When the science shows that certain types of individuals are at greater risk of getting infection, the next step is to say what is being done to particularly reduce their risk? That is just sensible. The second point that comes to mind is, I think the group that presents the particular dilemma is those at greater risk of getting the disease that also need physical contact to live. For example, a chronic illness the requires contact with individuals, they're disabled, they have a cognitive impairment and require caregiving, they live in a congregant setting, all the groups I outlined there and more. That's where we face this dilemma of how can we continue to provide care for them that maintains their well-being and quality of life and at the same time reduce the risk of them developing infection? As it has been pointed out by several speakers, if you are doing social and physical distancing for just a week, we can tolerate that. But this endures for weeks and months, we're going to have harms to those individuals, so we have to begin to think about ways to both keep them from developing the disease, and in many cases also spreading it, but also be able to continue to take care of them. I do think that we have to think more aggressively about providing resources to nursing homes and other types of congregant settings where people simply cannot leave and go elsewhere. Both for their well-being and also to minimize continued spread.

(Moderator)

And that's going to be a high risk population, as Dr. Nuzzo indicated, for a long time to come. We have run out of time for questions right now. And so I just want to offer a quick closing, that we have learned so much today from our incredible panelist. There's a steady increase, as we're seeing, in cases if the spreading increases in the U.S., and some preliminary evidence that distancing is working. Individuals are taking on hardship for the greater public good. Which is very inspiring. But we've also learned about the substantial risks to physical distancing including social, economic, health, and mental health risks that pose tremendous challenges to the livelihoods and health of many vulnerable populations. We've heard about ways we can begin to mitigate these risks. And these are important challenges and areas that we'll need to take on together as a community and as a nation. We've heard some very helpful information on how to guide the decision about when and how physical distancing should end. How we are going to go about it in a stepped way. And about appropriate next steps. I know there's still a lot of uncertainty, and we have a long way to go.

The overarching goal here, through the National Academy of Medicine and the American Public Health Association and through the efforts of many, many groups and the CDC, our dear hope is that we will learn from this. We will recover and we emerge stronger. More unified. More resilient. And prepared to face future crises with a stronger health care and public health system in place. And I really think this is our opportunity to learn. We have heard so much about what we need to know and what we need to learn, what need to get stronger. Working together, I really believe we can make this happen.

So, that concludes today's webinar. Our next webinar will take place on the week of April 6. And it is going to address emerging evidence on COVID-19 spread and treatment. It's a topic that is on everyone's mind. Everyone who registered for the webinar will receive an invitation automatically to the next webinar. And

this webinar has been recorded and the transcription of all the slides will be available on the website, covid19conversations.org to follow these webinars.

I want to close by thanking our terrific panel, thank you so much for being here. Thank you for sponsoring this webinar series. Thank you to Victor and Georges, cochairs, Nikki and Carlos, and to our advisory board. And a special thank you to Susan and Jenna, who made this webinar possible. And the biggest thanks to all of you, our listeners, for joining us today, for sending your terrific questions, your comments, and your thoughts. And we are sending out, all of us are sending out, please stay well, stay safe. And stay physically distant.

Thank you so much. Until next time.