

Ellen Kelsay:

Today's episode is sponsored by One Medical, a modern, primary care benefit, employees use and love. Their mission is to make quality care more affordable, accessible, and enjoyable for all through a blend of human-centered design, technology, and an exceptional team.

Dr. Joseph Allen:

Healthy buildings are not expensive and doesn't have to be hard. I think there's this notion out there that it's too expensive, too hard, and can only be the new shiny buildings. It's not true. Any building can be a healthy building. You're going to be pulled into this movement, whether you lead it or you get dragged into it by other forces.

Ellen Kelsay:

That's Dr. Joseph Allen, an Associate Professor at the Harvard T.H. Chan School of Public Health and co-author of *Healthy Buildings, How Indoor Spaces Drive Performance and Productivity*. Dr. Allen directs the Healthy Buildings program at Harvard, where he created *The 9 Foundations of a Healthy Building*. An internationally renowned expert, Dr. Allen's knowledge on healthy buildings has never been more in demand, with his work appearing frequently in the *Wall Street Journal*, *Harvard Business Review*, *NPR* and *The New York Times*.

I'm Ellen Kelsay and this is a Business Group on Health podcast, conversations with experts on the most important health and well-being issues facing employers. Today, Dr. Joe Allen and I are going to discuss the importance of healthy buildings, both now and in the post-pandemic future.

Dr. Allen, welcome. Delighted to have you with us today.

Dr. Joseph Allen:

I'm happy to join you. Thanks for inviting me.

Ellen Kelsay:

All right. Well, awesome. I want to get right into it. You often start your presentations by talking about the 90 percent and specifically the 90 percent that we are ignoring. Can you elaborate more? What is the 90 percent and what do you mean about the 90 percent that we're ignoring?

Dr. Joseph Allen:

Yeah, good pick up. I've been starting most of my presentations, going back many years now, with that question, why are we ignoring the 90 percent? I talk about two parts of that. The first is we spend 90 percent of our time indoors, but we ignore that. We spend most of our time thinking about the 10 percent of where we spend our time. We have controls for outdoor air pollution, we have the national ambient air quality standards, but we don't have a corollary for the indoor environment. We've largely ignored that. One way I think about that or a way to get people to think about what that actually means for their health is to take your age and multiply it by 90 percent, so 0.9. That's your indoor age. No one likes doing the math publicly or no one likes to disclose their age publicly, but I'll do mine. I'm 45. My indoor age is 40; so 40 years spent inside my office, my home, schools, in a car, in an airplane, in a hotel. These indoor environments are just having absolute massive impact on our health, but largely been ignored. Then quickly, the other side of the 90 percent we're ignoring is the true cost of operating our businesses. That's the people side of this. I've come in from the green building movement where, you know, we focus mostly on that 10 percent or even the 1 percent of buildings, the energy, waste, water, all really important, but largely have ignored the true cost of operating our buildings. That's the people. So you put those together. If we spend all of our time indoors. If we optimize buildings for health, we start to capitalize on that business side of buildings we're ignoring, the 90 percent cost and that's the people.

Ellen Kelsay:

That's so profound and it's so amazing when you break it down and you talk about the time and the proportion of our lives that we spend indoors, but yet disproportionately how little we actually talk about that, let alone consciously plan and strive to create indoor climates that are healthy climates. I imagine by extrapolation that climate indoor really does impact our well-being, our productivity, and ultimately our performance. Have you studied that and is there a correlation?

Dr. Joseph Allen:

Yeah, there's absolutely a relationship between the two. In thinking about why we ignore this, I'll say most of the information we have on how buildings influence our health, our productivity, our well-being, comes from really a couple dozen researchers around the world who focus on indoor environmental quality, as opposed to many hundreds or even thousands of researchers who focus on outdoor environmental quality. Back to that issue of this is being ignored, before I talk about the science here, if I asked you or anybody and said, well, what does it mean to live a healthy lifestyle? You tell me, you have to exercise, you'd say I shouldn't smoke cigarettes, you'd say I have to eat a healthy meal, outdoor air pollution is bad for us, but you wouldn't turn right to the indoor environment. That gets to this issue of the science, right, because it's buried science. It's been largely held up in academic journals, which most people don't hear about. It's not *New England Journal of Medicine*, it's not *JAMA*, but it's these journals that I'm an editor for. Journals like the *Journal of Indoor Air*, but people didn't even know there was a journal dedicated to indoor air quality. You start to look at all that science and you put it together with that 90 percent of where we spend our time and then you start to realize just how much we're missing when we ask people what it means to lead a healthy life and they don't first think of the indoor environment. Studies that show relationships between the amount of fresh air that comes into your house and lower rates of asthma attacks, for example, or better performance on cognitive function tests, or how lighting and views or biophilic design, is nature indoors, is associated with better creative thinking, quicker stress response recovery. I could go on and on, but there are hundreds of studies that show these links between indoor environmental quality and our health, but they've been largely buried in some of these more obscure journals.

Ellen Kelsay:

Well, I love it. I think about all the time and money we spend thinking about indoor aesthetics, but we don't think about indoor quality the way that we should, and to your point, the science that really underscores that. I've been so interested in your work specifically *The 9 Foundations of a Healthy Building* that you've created. Can you share with the audience what those nine foundational elements are?

Dr. Joseph Allen:

I'm glad you brought that up. We've tried to synthesize this to say, okay, let's make sense of all the science that's out there and we put together a report we called *The 9 Foundations of a Healthy Building*. We have ventilation and air quality, thermal health, so temperature and relative humidity and how that influences our health, mold and moisture, dust and pests, water quality, acoustics and noise, lighting and views, and also safety and security. The idea for *The 9 Foundations of a Healthy Building* actually came from a real estate conference. At the end of a session I presented at, I said something to the effect, I think we're over complicating what it takes to have a healthy building. A lot of people kind of leaned in, what does it take to make a healthy building? The conversation continued after the presentation all the way through lunch and that's when it struck me that a lot of the science was locked up in these academic journals and we needed to produce a report that tried to synthesize it to say, what are the foundational elements of a healthy building? What does the science really tell us? So we came up with this idea for *The 9 Foundations of a Healthy Building* to try and explain this in really simple, two-page executive summaries - what is ventilation, why does it matter for health, and what should you do?

Ellen Kelsay:

That's great and I love that it was at a real estate conference and hopefully those developers and people that own the buildings are incorporating these nine elements in all their new construction and remodels going forward. Certainly, this past year we've seen the importance of all of those aspects on worker safety and how they feel about potentially coming back to the workplace. I want to pick up on perhaps the first one that you mentioned which was related to ventilation. We hear a lot about the importance of ventilation, certainly in this COVID era and a post-COVID potential return to the workplace environment. Can you speak perhaps a bit more extensively on ventilation, why it's so important and what employers and workers should be thinking about as relates to ventilation and coming back to the workplace in the future?

Dr. Joseph Allen:

Yes, you're right. I think prior to COVID, there were a handful of good organizations thinking about how the green building movement was transitioning to healthy buildings, but clearly with COVID it has the real estate world's attention. One of the issues, of course, is the ventilation. I think to understand why ventilation is so important in the context of infectious disease transmission, we have to take a quick step back and say, what do we know about how this virus is spread? It's spread through the air. It's an airborne virus. Now, I've been yelling from the rooftops for 14 months. The first article I wrote was February 9, 2020, talking about the power of healthy buildings as the first line of defense against this coronavirus, talking about the need for better ventilation, better filtration. The problem is the World Health Organization, CDC, and others were slow to acknowledge that airborne spread was happening.

They were focused on surface transmission, or what we call fall nights, and large droplets, so close contact transmission only. So it doesn't make to go out there and say, bring in more outdoor air if airborne transmission is not happening, right? If it's transmitted through surfaces, we don't say, well, open up the windows. The reality is all of the evidence supports that airborne transmission is happening. Let's say at this point, I think it's more widely recognized or finally accepted that airborne transmission is happening. When I talked about that, I'm talking about near-field and far-field. Near, being within a couple of feet, and far-field, transmission beyond this magical six-foot buffer we've been talking about or two meters. Accepting that airborne transmission has happened, we have to recognize that as we produce respiratory aerosols, that may carry the virus, just from breathing, talking, singing, saying aah, these will accumulate indoors and they'll stay aloft until they're removed through one of two mechanisms really. One, they will diluted out of the air, removed through ventilation. The other is they can be cleaned out of the air through filtration. We've seen time and again, every outbreak, really all the major outbreaks associated with time indoors, no masks, and low to no ventilation, you get the buildup of these respiratory aerosols. This is why ventilation has become just so prominent or such a focal point for schools, and offices, and homes, and hospitals, and really everywhere.

Ellen Kelsay:

You mentioned the schools and the hospitals and the workplaces. If you were to give a letter grade of how well ventilated you think most of those spaces are today, would you give them an A, a B, a C, an F? I'm sure that's hard to grade in aggregate, but generally speaking, are we properly ventilated or do we have a lot of ground to make up in terms of ventilation?

Dr. Joseph Allen:

I'll tell you honestly, we failed. I'll give it an F, but I'll say this, it's not the fault of the building owners or operators or developers or investors. The problem is the ventilation standards that we all designed to and build to are outdated. They are not designed for health. In fact, I often point out that the standard that governs ventilation buildings, schools, offices, everywhere, airplanes, it's called the standard for acceptable indoor air quality. Acceptable. It's in the name, right? It's not the standard for healthy indoor air quality. We know from decades of science that higher ventilation rates above these minimums provide many benefits, including reductions in infectious disease transmission, and benefits that are

more towards well-being and productivity. Right now thinking about COVID, we've known that the current ventilation targets are insufficient. This is why I give it an F, because everybody's under ventilated, really, based on what the science says, but it's not their fault. They're not being negligent by doing this, it's just, that's what the standard is. The problem is the standard hasn't been set for health and I'd like to see that change.

Ellen Kelsay:

What do we do? Recognizing that we are abysmally failing and the standards were set where they were, but there is a need for kids to get back into school, and for hospitals to remain operational, and for, eventually, individuals to return back to a work site, as an example. What's the realistic remedy? Are there some stop gap measures we can do? Is this an overhaul entirely of ventilation? What should employers and other organizations be contemplating when it comes to that?

Dr. Joseph Allen:

That's a great question. I think of it in two parts and maybe I'll talk about what do you do now in the middle of a crisis during COVID and then what happens next, like what do we do as we hopefully get through COVID. At least in the U.S. context things are looking good thanks to the vaccines. In terms of what to do now, I actually think there are things that most organizations can do that are probably going to be less expensive than they think and don't require a massive overhaul. I've been careful to give recommendations, really along these three strategies – 1) bring in more outdoor air, so figure out what your building is currently doing and optimize that for outdoor air; 2) put better filters on the recirculated air. Typically buildings have what's called a MERV 8 filter that captures a pretty low percent of airborne particles. If you're upgrade to a MERV 13, you're cleaning a lot more of that air, you're capturing maybe 80 percent of the particles, that's great; 3) if you can't do that, you're in a school, you can't open your windows, your office building doesn't have operable windows, and you can't bring in more outdoor air, your system can't handle MERV 13 filters. You can really achieve the amount of clean air we recommend through the use of portable air cleaners with HEPA filters, right? If you size them right for the room, pick one with a good clean air delivery rate, you can actually provide plenty of not ventilation, but good clean air, clean in the sense it'd be virus free, as a total stop gap measure. These don't have to be expensive.

Now, one of the issues that's been out there is that, you know, people said bringing more outdoor air without actually setting a target. That's one of the things my team did last year, and just published an article in *JAMA* two or three weeks ago, recommending that in small volume places, you know, typical ceiling height rooms, 8, 10 to 12-foot ceilings, target four to six air changes per hour through any combination of more ventilation or better filtration. There's a lot in my answer there, but in terms of the stop gap measures, yes, there are things any organization can do right now to minimize the risk of that airborne spread in buildings.

Ellen Kelsay:

Is there anything that an organization should not do that could actually make it worse?

Dr. Joseph Allen:

There's a whole bunch of things they shouldn't do and unfortunately, we've seen a lot of it. I'd say, first and foremost, you just heard me kind of walk through the top three – bring in more outdoor air, better filters on the recirculated air, portable air cleaners with HEPA – I wouldn't go beyond that. It's not a time we need some fancy, new, unproven technology. There's a lot on the market that's brand new. I'm not anti-technology. I actually like this. I advise organizations on new technology, but right now it's really a time for the basics and until something comes along that is better and is cost-effective. For me, I'm recommending the things that we know that have a deep evidence-base, I can tie it back to many peer reviewed papers, better ventilation, better outdoor air, that's going to help. We know this, better filtration, portable air cleaners with HEPA. For the portable air cleaners, you really don't want any add-

ons, you don't need any add-ons, right? They just add expense and they're not really adding anything in terms of benefit.

One Medical:

Mental and behavioral health issues affect millions of Americans. One out of every five people in the U.S. will be diagnosed with a mental health condition and 57 percent of those won't receive any treatment. People bounce between providers and mental health resources with little to no guidance around how to find appropriate care. That's why we've launched Mindset by One Medical, our virtual-first program with coaching therapy and group sessions, with the exceptional One Medical primary care experience. Same or next day, in person or over video, your employees can get care quickly and avoid the typical wait to see a mental health provider. We improve clinical outcomes, so your people are healthier, happier, and more productive. We reduce costs for companies by preventing unnecessary specialist visits and out-of-network referrals. One Medical is here to help your team feel their best emotionally, because mental well-being is essential to overall health and wellness.

Ellen Kelsay:

When you started answering the first question there, you said I'll answer about what to do now and then what's next, or perhaps longer term, things that organizations can do to address ventilation, beyond just the here and now.

Dr. Joseph Allen:

I think things like portable air cleaners are great, a stop gap measure, plug and play, you can get these things anywhere, easy to size for the room, but I don't think the future of the office or schools or anywhere is going to have hundreds of these portable air cleaners plugged in. We have better solutions there. I'd say the first thing you need to do is commission your building systems, right? Commissioning is, if you're not familiar with that, it's basically making sure the building systems you have are operating correctly. It's like getting a tune up for your car once a year, just make sure it's operating right. One, we know that systems that are commissioned provide better indoor air quality. Two, it will save you money; it saves energy. This is just a good, simple first step. Part of that commissioning process or building assessment is just figuring out what do you have? What kind of filters can you upgrade to? How old is the equipment? When's the last time you've had to give it a tune-up or put in these better filters. Basically, figuring out what you can and can't do with your existing systems. Then you can make your capital improvement plan accordingly, based on the end life of that system. What do you need to do to that system to bring in these higher ventilation rates, as we think about beyond COVID or beyond infectious disease. Right now we're focused on disease avoidance, right, but that's not health. Health is also flourishing, it's well-being, it's better cognitive function. We know that these higher ventilation rates come with those other benefits. In the interim, the stop gap right now of how do we prevent the spread of this virus indoors, but longer term it's I don't just want good filtration, I want good ventilation, as well, so I can capture these other benefits and go beyond the code minimums.

Ellen Kelsay:

I'm so glad you brought up that point and it is beyond just the stop gap measure of dealing with the spread of the virus, and really ultimately getting towards living better, more fulfilling lives and having greater well-being. You just mentioned cognitive function. Our team was also just so fascinated by the work of you and your team at Harvard on the connection between ventilation and cognitive function. Share what you saw there. What did you find?

Dr. Joseph Allen:

Yes, it's a really interesting set of studies. We are on our third version of what we call the cog effects studies for cognitive function. The first one that caught a lot of attention - I'll tell you about the third one in a minute that just wrapped up, and I'll tell you where we're going next - the first one was a highly controlled environment. We took knowledge workers, put them in a highly controlled office

environment, and administered these cognitive function tests at the end of the day. What these workers didn't know when they were working in our office, was that we were changing the air they were breathing. We changed the air without them knowing, it's very much like an animal toxicology study, at this time we did it with humans, and we just changed their air in subtle ways, nothing dangerous of course. Really, we enhanced the air. Brought in more ventilation, things where we were just talking about: higher ventilation rates, lower chemical loads in this space, lower carbon dioxide concentrations. And controlling for all other factors - how well they slept, if they just had coffee, what their baseline cognitive function is like - controlling for all of those other factors, the people who spend time in this optimized, indoor environment performed significantly better in nine domains of cognitive function performance. Things like strategic decision-making performance, ability to respond and react to a crisis, ability to seek out and utilize information, so domains that are, I think will be obvious to anybody listening that are critical to being successful in any really business environment or school environment for that matter. The key takeaway is that we just manipulated the air in really subtle ways and in ways that almost every building can hit right now. We didn't test some exotic condition, you know, some billion-dollar building, that could only hit this, it's pretty much bringing a little bit more air and use a little bit less cleaning chemicals in this space, so you have lower levels of what we call VOCs, volatile organic compounds. That's it. That caught a lot of people's attention. A double-blinded study published in an excellent journal, fully peer reviewed. The cog effects studies, I think, there are six or seven peer-reviewed papers at this point. In the last one we just finished, we took the cog effects study global. We had almost 450 office workers around the world who participated in a year-long study. They all wore Fitbits so we could track physical activity and sleep. We built an app to administer the cognitive function tests, and everybody got a sensor, an air-quality sensor on their desks that we could record real time air quality. The first set of papers from what we call the global cog effect study will start coming out in the next couple of months.

Ellen Kelsay:

So fascinating. I'm curious, you're going to tell about the results of your third study. What'd you find there?

Dr. Joseph Allen:

Well, those are in peer review right now. They should be out in the next couple of months. So, no teasers, I'm sorry.

Ellen Kelsay:

All right, we'll be watching that very anxiously to see what that shows. But yes, just fascinating work and when you think about that over a life span and the time that we spend indoors and you really think our ability to do strategic planning, critical thinking, decision-making, just by extension the massive impact that has on cognitive ability and an overall performance is extensive. Very, very fascinating work. Thanks so much for sharing that.

Dr. Joseph Allen:

We actually took the cognitive function data and said well, what if these higher ventilation rates were rolled out across buildings in the United States and we modeled it. We estimate that the costs are on the order of \$10 to \$40 per person, per year. We knew people would say, well, what's the cost for this healthier building. That's usually where the analysis stops and it has for a long time. They say, well, that's a cost center, right? We can't do that. But the reality is when we looked at our cognitive function results, we found that the benefit for workers, for knowledge workers, was on the order of \$6,000 to \$7,000 per person, per year, against costs of tens of dollars per person, per year. I think that speaks to the opening thing we talked about, the 90 percent. Once you factor in the human health and productivity benefits, it far outweighs any of the costs. The problem is we just haven't factored that in always in our decision-making, but we really should.

Ellen Kelsay:

Do you find that you are seeing more real estate brokers, landlords, real estate folks within corporate settings who are negotiating with potential building management, that they're starting to ask those questions? Is that now on the radar as table stakes, as individuals and companies are making decisions about which types of offices to be in and buildings to put their workforce.

Dr. Joseph Allen:

Yes, there's no doubt this conversation has shifted and it shifted fast. Prior to COVID, I had a book co-authored with Harvard Business School Professor John Macomber, called *Healthy Buildings*. It came out in April, of course we wrote it before COVID, came out last April 2020. There were a handful of organizations thinking about this, but really COVID has forced everyone to think about this. As you say, these are now table stakes, right? Who is going to go back to a building that's not a healthy building, at this point. No one, no one's going to go back, and no one should. What's happening is that organizations are now elevating these conversations around buildings and facilities, up all the way to the C-suite. It's even changed decisions on what properties to invest in and rethinking and rewriting lease terms. Maybe a typical lease, say once a year, we're going to have an indoor air quality assessment. Probably no one paid much attention to it, it was almost a check the box, but not anymore. I've been asked, what is a really robust indoor air quality assessment program, rather than, maybe what we had seen before, a kind of a check the box, sure, once a year we do basic indoor air quality, not anymore. Now it's critically important who verifies that your building is, in fact, safe and healthy. This conversation has just been remarkable, the shift that's just occurred in the last 12 to 14 months.

Ellen Kelsay:

It's so great to see that the shift is occurring and how important it is for all the reasons you've really highlighted throughout the conversation. I'm curious that you mentioned the science and you also mentioned earlier in our conversation, just how few of you there are out there in the world who commit your life's work to this field. Is the science fairly mature or do we expect to learn a whole lot more about this in the coming years?

Dr. Joseph Allen:

Well, you know, I'd say a little bit of both. It's mature in the sense that we know what needs to be done to provide people with a healthy building, right? The basics here, better air quality, better water quality, lighting views, acoustics, thermal conditions. We know this, but I'd be a fool as an academic to say we know everything and the science is always advancing. I think one area that's getting a lot more attention, and rightly so, is this area of healthier materials. Sometimes we build these big, beautiful buildings, and then quite honestly, we pollute them by putting garbage products inside of them. We're learning a lot more about toxic chemicals that are in all sorts of products we put in our buildings from carpets to chairs, to curtains, and everything else. It's mature in the sense that we know enough to act, right? We don't have to wait 10 more years to gather some data before we say we should make changes to our buildings, but at the same time, we should be vigilant and looking for opportunities to continue to advance and optimize health and buildings.

Ellen Kelsay:

Absolutely. You just mentioned a couple here, but I was going to ask you another question about a future post-pandemic world, which hopefully is not too far in the future for all of us. Where should the focus be, and certainly not just reducing infectious disease at that point, but also other examples of changes that employers can and should be making to their workspaces to promote optimal health and well-being. You mentioned some around furniture, carpeting, curtains, etcetera. What else would you state that employers should be mindful of as they are designing and building spaces and outfitting spaces really to optimize health and well-being?

Dr. Joseph Allen:

I think the most important thing is that as COVID hopefully gets under control in the U.S., that buildings stay a focus, before we even talk about what specific factors. It's not that, okay, we did this interim thing for 12 months to make our buildings safer and healthier and now we're just going to go back to the old way. Going back to normal shouldn't be the goal, because normal wasn't working. I don't want to get back to January 2020. We weren't doing our buildings right, at that point. I still think it's, again, the basics. We think about ventilation and air quality. Yes, we've been talking about better filters, bringing more outdoor air, and if that sounds boring, it shouldn't be. It's good for seasonal influenza. We've seen higher ventilation rates associated with fewer missed workdays, fewer missed school days. Then the cognitive function benefits I mentioned, too. It is some of those basics that we shouldn't lose sight of as we kind of get through COVID here. I do think across all of these *9 Foundations of a Healthy Building*, though, there are areas for optimizing for health that we don't always think about. That healthy materials area, thinking about the chemicals that eventually get out into air and dust, is an absolute key one you should be focused on it. It's the early days of that, but the market is moving. We just had a brand new science and engineering complex at Harvard, and we're touting, in fact, leading with the story that we chose healthier materials. That playbook is now out there, but I see organizations veering from it, because it's hard. It's hard, right? It's early days. It's hard. The early days of green buildings were hard, but that shouldn't be a barrier to going forward here.

I think some of these more, let's say, nuanced areas around things like biophilic design, I think are really kind of key, so reconnecting with nature. We've spent decades walling ourselves off from nature and disconnecting from nature when we need to reconnect. I think for decades, quite honestly, the field of biophilic design was lots of handwaving. Sounds good, right? You want to bring a plant in, of course it's more than plants. It's biomorphic shapes and patterns, but the science has really started to be advanced over the past couple of years. Even some of the work on my own team using VR and augmented reality. We show that when workers are in these offices designed with natural and natural looking elements, and shapes and patterns in these spaces, that people actually perform better, again, on these similar cognitive function tests, but here we focused on creativity. It's probably something that isn't always on the radar of a lot of folks, but if we start to think holistically about all these other factors beyond air quality, that's where the big gains happen.

Ellen Kelsay:

I know we've been certainly focusing a lot of our conversation today on the workplace and organizational environmental quality indoors, but I imagine the same holds true in any indoor setting, whether that be a mall, an airport, a home, a hospital. These principles hold true in any indoor environment and we could all apply them to the situations, whether a restaurant owner or a homeowner, these are all principles that are equally applicable in those environments as well. Is that correct?

Dr. Joseph Allen:

Yes. I love that you bring that up and you're thinking that way. It's a hundred percent correct. I think some of the markets where the value proposition is maybe more obvious, for example, worker productivity. Okay, I think commercial real estate gets that and big organizations get it, but you want a healthy home, too. Now with a whole lot of people working at home, productivity matters there, too. I also think about when I'm home, I want to relax, I want to rest, I want mental health, I want good sleep quality, and the building influences that. Similar with schools, certainly the benefits of indoor air quality, we see relationships between better buildings and student test performance on reading tests and math tests, but it certainly extends to the retail environment - airplanes, automobiles, hospitality, cruise ships, you name it. Everyone is dealing with the same fundamental underlying science. How do you improve overall indoor environmental quality for all of these outcomes and benefits. Again, collectively we spend 90 percent of our time indoors. We're an indoor species and where that breakdown happens depends on your lifestyle. Some of us will spend more time in a school, young kids certainly right now, some of us

more at home, some of us more at the office, and some of us spend more time traveling, maybe not so much this year, but probably getting back to a little bit of that soon.

Ellen Kelsay:

In closing, one last question for you. What's the one thing or the top one or two things that you would like our audience to know about why healthy buildings are so important. There's so much you shared, but if you could distill it down to kind of the top one or two things, what would you say?

Dr. Joseph Allen:

It's a really good question. I'd say healthy buildings are not expensive and it doesn't have to be hard. I can say that a bit better. I think there's this notion out there that it's too expensive, too hard, it could only be the new shiny buildings. It's not true; any building can be a healthy building. Second thing is that you're going to be pulled into this movement, whether you lead it or you get dragged into it by other forces. By other forces, I'll give you two examples. One is top-down. We see the large institutional investors already talking about investing in healthy properties and healthy buildings, so there's financial pressures. Two, it's coming from bottom up. Your employees are interviewing your building. People are interviewing their buildings. We have examples of it in our book where we see this publicly. People are talking about their building. The demand is coming and COVID just shifted that. As I said earlier, who's going to go into a building that's not a healthy building, so you see both the demand there.

The last thing I'll say that I think is really quite important is that it doesn't just stop with designing a healthy building. We have to be sure we're taking the pulse of the building. By taking the pulse, I mean measuring and verifying that the building is performing the way you think it is. With the merging of smart buildings with healthy buildings, there is new real time, lower cost, environmental sensors, which can actually give you a sense of how your space is performing. Because buildings change. You may design it one way, but even weeks or months later, it's going to be different and you don't know it's different unless you're monitoring that. I tie that into the question you asked, because this bottom-up pressure and being pulled into this healthy buildings movement for this reason, if you're not starting to monitor and verify the performance of your building, I guarantee the people who use your building are. These sensors, these low-cost sensors, I have one on my desk right here, people have these. It's no longer, well, I have to go hire a specialized firm to tell me that the carbon dioxide levels below a thousand parts per million. I can do this pretty cheaply. In fact, people are reporting right now on social media, they show - hey company X, I'm in your building, I'm in your airplane, I'm in your car - why is it 1500 parts per million? I've read this study that shows it's bad for my health. It's bad for infectious disease. It's bad for my cognitive function. This is happening. It's out there. People are not only interviewing their building, they are reporting with data on how buildings are performing.

Ellen Kelsay:

People are definitely paying attention, now more than ever, and if you weren't going to do it for all the right and altruistic reasons to do it, you better do it because people are paying attention and will be shaming you on social media, if you don't pay attention to it.

Well, Dr. Allen, thank you so much for just a fascinating conversation and the important work that you are doing. I really look forward to seeing how this field continues to evolve and appreciate you sharing your insights with us today.

Dr. Joseph Allen:

I really appreciate you having me on. We need these channels to get the scientific research out into the people who are actually making a difference every day in the field. I appreciate you having me on.

Ellen Kelsay:

I've had the great pleasure of speaking with Dr. Joe Allen, Director of the Healthy Buildings program at the Harvard T.H. Chan School of Public Health and author of the book, *Healthy Buildings, How Indoor Spaces Drive Performance and Productivity*. You can learn more about Joe's work at <http://forhealth.org/>, where you can also find a COVID-19 risk calculator.

I'm Ellen Kelsey, and this is a Business Group on Health Podcast, conversations with experts on the most relevant issues facing employers today. If you like today's episode, please share it with your network and give us a review. Thanks for listening.