

DataSpeak: Effects of the Built Environment on Maternal & Child Health

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PROGRAM TRANSCRIPT

*[Download a PDF of the slide presentation from the [DataSpeak archive](#).
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Introduction

Michael Kogan, PhD

Director Office of Epidemiology & Research – Maternal & Child Health Bureau

[slide 1] Good afternoon. Welcome to today's program, the Effects of the Built Environment on Maternal and Child Health. My name is Michael Kogan and I am the Director of the Office of Epidemiology and Research in the Maternal and Child Health Bureau.

The DataSpeak series is sponsored by the Maternal and Child Health Bureau. We know that our built environments can have a major impact on our health. Recent research highlights how positive attributes like green space and sidewalks can improve health and negative attributes like pollution and traffic can hurt health.

Well, today our speakers will describe how the built environment can affect mental, as well as physical health, across the lifespan from pre-birth to the school-age years. **Research on health throughout the life course is a top priority for the Maternal and Child Health Bureau.**

[slide 2] Today, we are excited to have 2 speakers with us who can give us an overview on the built environment and reproductive health, child development, and mental health.

First, **Dr. Lynne Messer** from Portland State University will discuss how she has used data on environmental quality to explore health disparities in reproductive and mental health outcomes.

Our second speaker will be **Dr. Gary Evans** from Cornell University and he will present research on how the built environment affects child development and learning.

Sarah Lifsey

Analyst – Altarum Institute

[slide 3] Thank you. I would like to welcome our presenters and everyone who is in the audience today, thank you all for joining us. Before we begin our presentations I have some brief technical guidance for everyone.

First, I would like to call your attention to the [DataSpeak website](#), which we hope you will visit after today's program, and there you will find resources on today's topic including some other speakers they will highlight in their presentations, and you will also find archives of all the DataSpeak programs going back to 2000. The slide on your screen [slide 3] shows some of the most recent programs that are available and the address you can use to access them.

[slide omitted from PDF] I would also like to point out that you are able to download [today's PowerPoint presentation](#) and [additional resources](#) directly from the screen you are seeing right now. Once you are finished, you may click the continue button to proceed with the presentation.

At the completion of the program we will be having a question and answer session.

The Built Environment and Women's Reproductive Health Outcomes

Lynne C. Messer, PhD, MPH

College of Urban & Public Affairs – Portland State University

[slide 4] Thank you Sarah, Dr. Kogan, Dr. Evans, and everybody in the ether who is listening to this. It is a privilege today to talk about the built environment and women's reproductive health outcomes.

[slide 5] In the presentation today, I will begin with a motivation for this type of research followed by a conceptual model. I will then describe two different research projects on which I have been employed collecting built environment data and looking at maternal and child health outcomes. I will conclude by discussing the limitations of the research that I have conducted and I think some of the strengths going forward.

[slide 6] First, motivation. Why should you care about the built environment and its influences on health?

[slide 7] I would like to begin with an article written in 2000 by Dr. Camara Jones in which she describes a gardener and a gardener has two different flowerpots and one of the flowerpots is empty but another flowerpot has some soil in it. It is a little bit rocky, he does not really know the history of the soil but it looks good enough to put some seeds in.

So, into the empty pot the gardener places some rich soil and then plants his or her seeds and the gardener also plants seeds in the second pot, the pot containing the soil of questionable quality let's say but certainly not an enriched environment.

So, seeds doing what they do, they grow and gardeners doing what they do watch them grow and take a lot of pleasure in that. And the seeds that were planted in the rich soil grow to be large beautiful flowers they are tall, robust and just a joy to behold.

The seeds planted in the other pot also grow but they do not get quite as big. Frankly, rich soil will ensure better growth anybody who gardens knows that and so while these plants grow they are not quite as big and robust as the others.

Over time this process repeats itself over and over again and at some point the gardener begins to prefer the flowers that were planted in the enriched pots forgetting of course that he or she was the one responsible for those underlying conditions.

While Dr. Jones wrote this particular article about levels of racism I really like thinking about it in terms of the built environment, because we know that places structure health and health disparities. We are all planted in different neighborhoods and some of our neighborhoods are richer and some of our neighborhoods have more dis-amenities in them let's say, and we cannot blame the flowers for the neighborhoods in which they were planted.

[slide 8] Another reason why I like to think about the built environment is because places matter to resident's health. We know that context is more than the sum of the individuals who live within them. They have amenities like parks or green spaces. They also have dis-amenities like hog farms or same-day lending institutions and that these characteristics also influence the people who live there.

Neighborhoods matter to the residents. Even folks who belong to gangs report being more willing to intervene on criminal activity closer to their own home even if they are willing to commit criminal activity farther away from their home.

Contexts are intervenable units meaning we can touch 1,000 individuals with an individual level intervention or we can touch tens of thousands of people by locating a health clinic in a given neighborhood. And finally, modest but persistent associations have been demonstrated with health.

[slide 9] Thinking about places or thinking about the built environment expands our thinking and allows us to consider non-individual explanations for persistent disparities. This is kind of an old article now, but in 2003 Debra Masset wrote a paper in which she described 65% of women and 59% of men think that premature infants result from a woman's poor self-care during pregnancy, and she also found that almost 75% of respondents thought a woman who delivered preterm could have prevented it.

While we might not know all of the causes of adverse birth outcomes, I think we can be fairly certain that it is not just a personal problem, and so thinking about the built environment allows us to think beyond that.

[slide 10] Why might we worry about adverse birth outcomes? Well, I have given here the definition of preterm birth which is one of the most widely publicized adverse birth outcomes. It is birth occurring at less than 37 weeks completed gestation. Preterm birth and other adverse birth outcomes like some that I have listed below, are important causes of perinatal mortality and morbidity.

Preterm birth in particular had remained largely unchanged for many years, but just last week the March of Dimes reported 2013 had the lowest rate of preterm birth at 11.4%. Again, we do not know all of the causes of preterm birth but some established risk factors are identified here.

[slide 11] One of the reasons why I like to think about preterm birth especially is because there are significant health disparities associated with preterm birth and other birth outcomes. For instance, in 2010, the preterm birth proportion for white women was almost 11% but for black women it was 17%, and this disparity has remained about the same over time. And it is also similar for many of these other birth outcomes.

[slide 12] So, with this particular motivation in mind I will present the conceptual model, how I think social factors including the built environment can construct these pregnancy outcomes.

[slide 13] Starting here on the far left side we know that we live in a macro-level context and this macro-level context has policy, contains a policy environment, there are environmental justice implications, and then demographic characteristics.

This macro-level context gives rise to neighborhoods and neighborhood-level features. A couple of neighborhood-level features that get written about significantly include racial residential segregation and the built environment which we will be discussing today.

These neighborhood-level features in turn help structure or at the very least influence both health behaviors—like smoking, drinking, physical activity or even age at first pregnancy, and also psychosocial status, stress, coping and depression are a few examples of that.

We know that health behaviors and psychosocial status work together to influence our physiological responses—including cortisol or inflammation—and that these physiological perturbations are likely what give rise to these adverse pregnancy outcomes. So it is within this conceptual model that the research that we have conducted has been housed.

[slide 14] The first research project that I would like to describe for you is called contextual influences on birth outcomes. I might refer to it as CIPO, and in it, we collected some directly observed built environment data.

[slide 15] First, the aims of CIPO are these 3, to identify independent associations between 5 built environment features and maternal behaviors and outcomes. We also sought to assess the reliability of indices across multiple units of aggregation, geographic aggregation in particular and then third to explore if the associations that we observed were the result of how we constructed our neighborhoods and I will spend a minute on that toward the end of this presentation.

[slide 16] The outcome data for this particular project included geocoded birth records, 5 years' worth of them, for women residing in 4 counties in North Carolina. We excluded some of the typical characters: less than 22 weeks or greater than 42 weeks completed gestation, improbable weights, stillbirths or congenital anomalies. These analyses were restricted to non-Hispanic white and non-Hispanic black births.

[slide 17] We also collected built environment data. I call this sometimes directly observed because we went street by street to look at the neighborhoods in which the data was collected. This data collection took place in 4 counties, over 7,000 road miles. We hired a 10-member team and trained them extensively, over extensively some of them might claim, and then we conducted inter-rater reliability every other week to make sure that all of the team members were still reading, seeing, rating the environments in the same way.

The team's rated street segments and a street segment here I have defined as one block face both sides of the street and these street segments were rated daily between May and August of 2008. Because this rating was done in North Carolina, North Carolina can have a lot of long and rambling roads and May through August are pretty warm months to do this rating so these raters assessed the street segments from the car and they rated almost 11,000 street segments which came up to almost 26% of the total street segments possible to be rated and they rated them on 43 different variables.

[slide 18] The variables were meant to help us estimate a few psychosocial or social constructs. The constructs that we were trying to represent are identified here. We were looking for markers of physical incivilities, which are markers of neglect, decreased social control. We looked for markers of walkability. These are properties of streets like street lights and such that might facilitate people's movement and physical activity. We looked for indicators of social spaces, places for people to gather thinking that these social spaces would promote social cohesion and neighborhood identity. We also looked for markers of territoriality which are physical or symbolic barriers. Finally, we looked for arterial features which are properties of roadways which were designed to move people through space.

[slide 19] And you can see here the list of each of the variables that went into each of these 5 indices that I have identified for you here. So, for instance, physical instabilities we combined markers of condition of residential units, account of residential grounds, the presence of burned or abandoned units, litter, pedestrian oriented lighting, and no trespassing signs and those variables were combined in a manner which I will describe shortly to create our measure of physical incivility.

[slide 20] I have been advised...so I am an epidemiologist by training, and I tend to think that the methodology is one of the most important and interesting parts of any presentation. I have been advised that perhaps it is not the most

gripping part of this presentation, so I will only tell you that we used principal component analysis to reduce the many, the 43 variables, into the 5 different indices that I presented a moment ago.

[slide 21] In terms of analysis, I ran fix slope multilevel logistic models, and I will only say that the goal of multilevel modeling is to help distinguish what part of our association is attributable to the neighborhood-level variable, for instance neighborhood-level physical incivilities accounting for individual level co-variants.

[slide 22] So, this is the first of the outcomes slide and I will spend a minute explaining it to you because there are a few slides that follow that look sort of like this. On the left-hand side you find the...or on the Y axis rather there is the adjusted odds ratio. Across the bottom you can see the different quartiles. So, increasing quartiles means more of something. I am only presenting the results for incivilities because you might imagine this would be a lot of data to present and the 20 minutes is probably insufficient to get through it all.

So, I will only be showing results for incivilities and the red diamonds are non-Hispanic white estimates and the black diamonds are non-Hispanic black estimates.

So in general, we found that higher incivilities were associated with smoking and inadequate weight gain for both black and white women. It was also associated with pregnancy induced hypertension, term low birth weight, and preterm birth, but only for white women. I will tell you that we also saw interesting associations for walkability and social spaces, but again those are not presented here in the interest of time.

[slide 23] The next CIPO-related finding that I wanted to share with you is one in which we needed to determine if the associations that we observed, like those associations I showed you on the previous slide, were the result of how we constructed neighborhoods or whether they were robust across different neighborhood constructions. This is an important notion in the built environment data because the way we construct neighborhoods may actually influence some of the findings that we see. So we wanted to ensure that this was not the case.

So what we did was we constructed the indices at four different units of geography at the census tract, at the block group, this unit that we have called the secondary polygon which is a neighborhood bounded by secondary or busier streets and then tertiary neighborhoods and that is a neighborhood that is constructed only by small little tertiary roads without ever having to go out onto a larger road.

[slide 24] So, we constructed these indices at each of these four units of geography, and what we found was this. We found that there...let me back up. I would like to ask you to look at the slide in a very specific way. You are not looking for is this statistically significant or is this not statistically significant rather in looking at these slides if you can look at them and think would we draw the same conclusion about the association between incivilities and smoking, for instance, looking at each of these units of geography, meaning are each of these diamonds at approximately the same place.

So, what we find is that for physical incivilities and health behavior they largely are. It does not really matter at what unit of geography we constructed physical incivilities whether it was a census tract, a block group, the secondary polygon or the tertiary neighborhood the conclusion that we would draw, physical incivilities is associated with increased odds of smoking, is approximately the same.

[slide 25] In terms of health outcomes we would draw many of the same conclusions regardless of the unit at which these variables were constructed. There is a little bit of bouncing around for sure but not as much as we might expect.

So, we would summarize this by saying that neighborhood scales, the neighborhood scale matters for some of the exposures that we saw. For instance, I did not show you the results for walkability, but walkability matters, it matters at what scale you are defining walkability when you are looking at associations but not so much for others. Physical incivilities it does not appear to matter that much.

The other important thing that we have found, in my opinion, was that, census are not necessarily a bad proxy for some of these neighborhood variables which is good news for researchers because census data are generally easy to collect.

[slide 26] So I would like to move in the remaining minutes onto the children's environmental health initiative and the research that this team conducted that I was a part of after some of these data were collected.

[slide 27] I will begin by letting you know that CEHI collected built environment at approximately the same time that we in CIPO were collecting. They were collecting it in Durham County and they were collecting it at the tax-parcel level so every house was its own unit.

They then summed the tax parcels to be a block and then they created this thing called this primary adjacency community as their neighborhood unit. And they collected data much at the same time only they were collecting in a much smaller geography and so these data were collected on foot. But again, May through August.

[slide 28] And these were the different indices that CEHI was representing. They collected variables on housing damage and property damage, security measures, amenities, tenure, vacancy and crime. I will say that tenure and crime were not actually collected by direct observation. They were collected by Durham County for tax parcels and the county-level crime data.

[slide 29] Similar to CIPO when we look at the relationship between the built environment and maternal health behavior what we see is that the things that are sort of proxies for incivilities housing damage and property disorder, those were also associated with increased smoking for the white and black non-Hispanic women.

Also interesting to see that among black, non-Hispanic women residing in a neighborhood with more rentals, which is what tenure variability represents, and higher vacant properties, and higher nuisances were also associated with increased smoking.

[slide 30] One of the things that CEHI did was they constructed a cohort in Durham, North Carolina and that cohort is called the "Healthy Pregnancy - Healthy Baby."

[slide 31] And it was a prospective cohort of pregnant women in Durham and they recruited women between 18 and 28 weeks completed gestation from Durham County clinics and you can see here the exclusions an important one of which was not planning to deliver at Duke.

[slide 32] They began steady enrollment in 2005, June, and had a 90% consent rate and a 92% retention rate which is very useful. 723 of the women who anticipated in the cohort also lived in the audit area which enabled us to look at their built environment variables and some of their birth outcomes but in particular what I will be reporting on here is their psychosocial state.

[slide 33] So, as part of the cohort, there were lots of things that were collected biometrics and delivery outcomes, and they also did a lot of survey-data collection. And so here the psychosocial scales were collected. There was a support evaluation list, self-efficacy, depression, John Henryism, active coping, there was a perceived racism scale, perceived stress score and negative paternal support.

[slide 34] Similar to what we had done in CIPO, in CEHI we used principle component analysis for constructing the indices. We used tertiles in many of those psychosocial variables and the models were adjusted for potential confounding.

[slide 35] Because the figures are incredibly complicated, not complicated they are just complex, they are very busy, given the multiple psychosocial variables and the multiple-built environment variables, I have just presented a summary here in which we found that women who live in neighborhoods or PACs with more housing damage, for instance, reported higher perceived stress, property disorder was associated with negative paternal support, perceived stress and depression, renter, living in neighborhoods with more renters was associated with higher John Henryism, negative paternal support and perceived racism, vacancy was associated with less interpersonal support, crime, less social support, nuisances was associated with more perceived racism and security measures were mostly not associated with anything.

Following adjustment for the covariates that I showed you previously only living in a neighborhood with more rental properties was statistically significantly associated with John Henryism and negative paternal support.

[slide 36] So, while I am actually very excited about these built environment data and what we have learned about psychosocial health, health behaviors and health outcomes there are obviously some important strengths and limitations to note.

[slide 37] First, in terms of limitations. We are still not certain what aspects of neighborhoods are important. So, when we do our built environment data collection we are not...we are doing the best job we can estimating constructs that we think might matter. There maybe things that matter that we are not collecting and that is an important limitation.

Limitations of birth records include the quality of some of the birth record data elements maybe questionable and we obviously do not know the length of time a woman spends in a given residence or geography.

In terms of cohort data we can be somewhat limited in generalizability and by excluding women who are over 28 weeks gestation we may be missing some pregnancy experiences. These data however also have a lot of strengths

[slide38] the built environment data collection that methodology is thorough, it is pretty easy to replicate and it is actually not even all that expensive to do. So it is a useful approach to estimating the built environment.

When we use birth record data obviously we have large numbers of women across many races which ensures we have plenty of women for most statistical modeling and it is possible to use highly reliable data elements and then when we use cohort data the perspective cohort outcomes we know at least occur after the exposure assessment which is important and in this particular Healthy Pregnancy - Healthy Baby cohort we used a large number of validated psychosocial scales.

[slide 39] Before concluding I did want to note current work and some future directions for this built environment data. I am currently in contract with the Environmental Protection Agency under Danelle Lobdell, the PI, and we have constructed an environmental quality index which includes variables representing air, water, land, built and socio-demographic domains. We have constructed both domain specific and an overall environmental quality index for the entire United States and the indices and the data from which they are constructed are about to become publicly available.

Given these data we have several papers in progress including one, looking at preterm births and environmental quality, adverse birth outcome disparities and environmental quality, and cancer and environmental quality.

[slide 40] Again, before concluding please let me acknowledge the funders of this work including the MCHB branch of HRSA for R40 and the Environmental Protection Agency.

[slide 41] And I would like to thank you for your attention and I will be happy to answer any questions.

Sarah Lifsey

Great, thank you so much. As a reminder to our listeners if you have a question for Dr. Messer you can submit it online at any time using the questions form at the bottom of your screen, and at the end of the presentations today we will have a question and answer session. I would like to turn to our next speaker now, Dr. Gary Evans.

Timestamp 26:45

Early Childhood and the Built Environment

Gary W. Evans, PhD

Departments of Design & Environmental Analysis and of Human Development – Cornell University

[slide 42] Okay, my name is Gary Evans. I am a faculty member at Cornell University, and I am a child psychologist, and I do research, and I'm an environmental psychologist, so what that means is I am interested in the role of the physical environment in a child's development both physical as well as psychological.

[slide 43] Dr. Messer talked about a couple of very important and complex research projects. I am going to take a slightly different tack and what I am going to do is kind of give an overview of some of the characteristics of the physical environment that attract children's attention, that they pay attention to and that may have an influence on their cognitive, psychosocial as well as their physical development.

It is pretty clear that children pay attention and notice the environment just casual observation of your own children or others, or perhaps even some of your earliest memories may be about special places in the environment that you can still remember.

[slide 44] It is also the case that the environment matters. As we just heard from Dr. Messer variables such as the quality of the neighborhood can have influences on birth outcomes. The more immediate environment that children spend time in, such as housing and day care, and even local neighborhoods in which they live and where their parents might also spend time can influence children's development as well.

[slide 45] So what I am going to do today is I am going to talk about some principles or some ideas about qualities or dimensions of the physical, the built environment that might matter for children's development.

So I want to start off by just reminding all of us that of course this is something that we have been looking at for a very, very long time. This traditional perspective is primarily focused on two kinds of qualities or dimensions of the physical environment.

[slide 46] One is the toxicological. So there of course we have long had interest and concerns about ambient quality of the environment such as the tenements that came out of the industrial revolution and the kinds of concerns that happen when people live in polluted environments such as this one which clearly is just not healthy.

[slide 47] But in addition to these toxicological we have concerns about safety and hazards so another traditional approach is to be concerned about physical injury and we know for example that interactions between pedestrians and automobiles is always hazardous and clearly is a major concern of many parents and caregivers of children. So in addition to these traditional perspectives we also have some ideas and some principles of aspects of the physical environment that can make a difference in a child's development.

[slide 48] So, the first one I want to talk about is called loose parts.

[slide 49] Loose parts are kind of what it sounds like, it is the idea that one of the things that may be good for children's development, their motor development, their cognitive development is the ability to manipulate, to be able to change things, to be able to easily reconfigure and interact with the environment.

[slide 50] Another way to think about that is one of the ways that children learn that they can make a difference that when they act on the environment their actions lead to different outcomes is things that I like to call loose parts.

[slide 51] And when we have environments even though they might be designed for play if you take a close look at a traditional playground it is actually very unresponsive. There are not a lot of different things that children can do or
[slide 52] you can contrast that with what the British, for example, call an adventure playground where there is just a much more open ended, many more different possibilities.

One of the things that we know when we observe play in a systematic way on different kinds of playgrounds the playgrounds that have more options, more loose parts, more variability you find higher levels more sophisticated play.

[slide 53] Another quality or another principal of the built environment that I find useful to think about is called scaffolding and scaffolding is sort of what it sounds like. It is sort of building a structure in a symbolic way to help children reach beyond what they are currently capable of doing.

[slide 54] Another way to think about scaffolding is stop and think for a minute, when do people learn, how do they learn and one of the things that we know about learning is when you are right on the edge of what you currently are competent at it is sort of when you are close to what you are able to do and then to slightly extend beyond that with some support, hence the word, scaffolding, that is when people learn.

[slide 55] The way I often think about this is for adult imagine you are a tennis player so you could play with someone who is a lot worse than you, you can play with somebody that is equally skilled to you, you can play with somebody who is much, much better than you are. But if you play with a person who is slightly better than you are that's probably where you are going to make the most progress that is this idea of scaffolding.

Another thing about scaffolding that is an interesting concept is of course it means you have to adjust so as the child's competencies increase the scaffolding then is going to keep extending slightly beyond what the child is capable of doing and of course the built environment can play an essential role in providing scaffolding ways to sort of [slide 56] extend beyond what we are currently capable of doing but supporting us in what we are sort of giving a foundation but then extending beyond what the child is currently able to do.

[slide 57] And one of the things that is also interesting when you see children doing this there is almost always just such elation, it is just such a wonderful thing to sort of realize, oh, I can do a little bit better, I can do a little bit stronger, a little bit faster, a little bit cleverer—whatever the particular dimension is they were looking at. So, this is called scaffolding and again the physical environment can play a really critical role in providing avenues for scaffolding to occur.

[slide 58] Another dimension of the physical environment, the built environment is privacy. [slide 59] And privacy is a tricky term because everybody understands and has a definition for privacy and usually we think of that as solitude but I think there is actually a better way to think about privacy. A better way to think about privacy is to regulate social interaction.

[slide 60] So one of the reasons an environment like this is so difficult for child development and probably for everyone because of the high level of crowding it makes it really difficult to regulate social interaction. So it is not just being alone or solitude it is regulating social interaction that I think is a more useful way to consider privacy and the role of the built environment and thinking about children's development.

[slide 61] So children of course when they grow up they grow up in settings that are social as well as physical. So a setting like this, particularly if you are a single-parent, probably more difficult if you are a low income parent, children and young families living on the upper floors of these buildings have greater difficulty to regulate social interaction. You cannot really escape from each other so to speak if you need too. On the other hand you are going to be unlikely to let your child just go away on his or her own, particularly if they are younger, because you cannot monitor them.

[slide 62] One of the kinds of qualities of the physical environments that can foster privacy and support the regulation of social interaction is a hierarchy of social spaces. So, in other words having spaces that are nearby and relatively well-connected where you can be by yourself, you can be with a small group, you could be with a slightly larger group or maybe at times you could even be in a large crowd because remember the idea is to regulate social interaction.

[slide 63] Another quality that we know is absolutely critical for healthy physical and psychosocial development is attachment having a secure bond with a primary caregiver this usually occurs between 18 months and 2.5 years and when this bond is formed that provides sort of a safe anchor, a safe place.

[slide 64] This attachment is what allows children and all of us to explore the world and to grow physically and psychologically and without attachment, attachment disorders are strongly linked to many very negative adverse developmental outcomes.

So how might the physical environment facilitate and support attachment? [slide 65] One quality may be diminutive spaces. Spaces that are sort of enclosed not too large a certain degree of acoustic privacy or quiet, [slide 66] having a place where you can interact one-on-one with a child without a lot of distraction or interruption.

[slide 67] Here is an example unfortunately of a nursery in an orphanage in Malawi and Malawi has been devastated by the AIDS epidemic and among other things that has led to a high level of children who are orphans and in this culture traditionally they did not have orphanages so they are grappling with how to care for large numbers of children who become orphaned.

[slide 68] And as you can probably infer just from looking at the space or from this one it is going to be probably challenging for these children to develop a secure attachment with a primary caregiver in part because of the physical

space. Because there is just not enough time, not enough space, not enough break in the routine to have some close one-on-one quiet interaction with a primary caregiver.

[slide 69] Here is a nice illustration I think of how the built environment here, not inside the home but slightly outside sort of in between the home and the neighborhood, sort of the doorstep so to speak, and one of the things you notice if you look closely at this slide is it provides sort of some scaffolding as I was talking about earlier. So as the child gets a little older, maybe a little braver, he or she could get a little bit further away from their mother or their father, or whoever the primary caregiver is, but at the same time you can maintain visual contact, you can sort of keep in touch so to speak. So this I think is a nice example of thinking thoughtfully about the physical environment in a way that might afford attachment and development, and the maintenance of attachment.

[slide 70] So this idea of being attached it is not literally physical attachment but it is analogous to that, it is really a psychological attachment. It is a secure base from which we can then go out and discover and explore the world. Children need this secure attachment and the environment can facilitate or inhibit the development of that attachment.

[slide 71] Chaos is an interesting word all of us have some sense of what this means and what it is about [slide 72] no surprise chaos is not a good thing for child development. So settings that have too much stimulation that are not well regulated make it difficult for the child to self-regulate. One of the critical skills children need to develop in order to be successful is called executive functioning and part of executive functioning is to be able to regulate your emotions, to pay attention, to switch your focus of attention from one aspect of a task to another when it is appropriate to do so.

[slide 73] So settings that are overly stimulating that have too much noise, too much unwanted social interaction these kinds of settings make it very difficult these more chaotic elements.

[slide 74] In addition to thinking about the spatial aspects of chaos another way to think about chaos is in terms of predictability and structure. So, children need routines, they need structure going to bed at more or less the same time, having a time to share meals, as they get older having a time to do their school work, having various routines and rituals within a family the way you might celebrate a holiday or a birthday. These are part of the backbone of what helps children learn how to become a self-regulating individual which is critical for both cognitizant success but also for interpersonal adaptability as you get older.

[slide 75] So having places where if it is chaotic where a child can escape sort of a little timeout. This is a space in an open classroom which was having a lot of difficulties and this space was created to provide sort of a way to sort of check out for the teacher or a teacher and a student or a couple of students together to sort of take a break from the hub-bub of the overly stimulated classroom.

[slide 76] Another quality, another dimension of the physical environment is called restoration and restoration is sort of this idea of therapeutic experience. One of the things that we know that is important about nature, is nature for many people is often at the top of their list of favorite places. So if you think about your own life where was a favorite place for you either now or when you were growing up, just proportionally nature, some aspect of the natural environment is going to come up.

[slide 77] So one things that nature may provide is a break, a change in routine or change scenery quite literally sort of taking a break from what you normally experience. [slide 78] It could be an avenue for reflection and solitude.

[slide 79] Another aspect of restoration that may be important is sometimes called flow or an experience of mindlessness. People who garden often will report that the time just goes by. It is a task, it is hard work but somehow it

is not a struggle you just get so involved in the activity that it is called flow so restore environments may have qualities that support and facilitate flows. [slide 80] Some people think this might be something related to fascination or involuntary attention.

You can think about attention in two ways, one way to think about attention is it is something that takes work. It takes effort. We even use the expression “pay attention” it is kind of an interesting phrase if you think about it “pay attention.” It costs something to pay attention because it is effortful, it is voluntary, it takes work. Well that capacity may be limited and one of the things that may help restore that capacity are experiences of involuntary attention where it is fascinating your curiosity is held and pulled by the exterior environment, a beautiful view out your window, sitting around a campfire are two examples that I can think of, looking at a fish tank in a waiting room in an office. These all have this quality of involuntary attachment. You do not have to work to pay attention. That may help us restore this capacity for voluntary attention or effortful attention.

[slide 81] Another element, another quality of the built environment that is critical for children’s development is to have a sense of self-efficacy or mastery the notion that I am able to act on my environment and make a difference.

[slide 82] So when we overly restrict children’s options one of the things that we may be doing, probably not on purpose of course, is but subtly by restricting children’s options, their ability to explore, to self-locomote to do things on their own they may start to have a sense of themselves as not having mastery, not having control.

[slide 83] So it is important when we think about elements of the physical environment including toys for younger children a quality of toys that looks like it is important for cognitive and motoric development is that it is responsive. So what this means is when this child acts on this toy object in different ways she gets differential feedback. So when she does one thing to the ring, one thing will occur. She does something different to the ring, the feedback will change. What will happen will be different.

[slide 84] So children need to be able to act on their environment, they need to learn over time that they are capable. Part of what we mean by competency is the ability to effectively interact with the physical environment.

This is a very clever changing table in a nursery school and rather than pick the child up and put him or her on their back and change their diapers here the child can actually actively participate in the process of changing their diapers and among other things learns about the relationship between physically what they are feeling and what they need to do in terms of changing their diapers and becomes more accelerated as they learn to use the toilet on their own.

[slide 85] The environment can also be designed in ways in thinking about control and mastery that are sensitive to differences in stature. Children are smaller quite literally they usually are not as strong. So, here is a nice example in this graphic where a way is provided to facilitate the younger child interacting with an adult, in this case in meal preparation, by the simple addition of a slide out step that can slide back in like a draw.

[slide 86] So, what I have tried to do is to introduce some ideas and some concepts about ways in which the physical environment might make a difference for children’s development. We started off we talked about some traditional approaches, toxicological, pollution for example, poisons, toxin means a poison, safety hazards an example there might be burns, falls, traffic.

And then we talked about various qualities of the physical environment that are not so traditional but may in fact have some implications for child’s development, loose parts, the idea of being able to manipulate and change and maneuver,

scaffolding, taking the child out to the edge of their current competency and then supporting them as they go beyond what they can already do, providing sort of a safe platform for risk-taking would be another way to think about that.

Attachment, this is an idea of a fundamental secure relationship with a primary caregiver and a child. Children need to develop a secure base and there is evidence that a healthy attachment winds up being a resource throughout life and the physical environment can facilitate interactions with children and adults that can help with the development of secure attachment.

Chaos, when we have too many different things happening, too much stimulation and we do not enough prediction, enough structure, enough regularity one of the things appears to interfere with is children's ability to develop their own self-regulation competencies.

Restoration, this is the idea that the physical environment can be therapeutic; it can help us recover some of our resources such as the ability to use voluntary attention or to pay attention.

And finally control or mastery, this is the notion that self-efficacy the sense of being able to act on the environment to make a difference to be a competent person, part of what that means is having a sense of mastery and settings can facilitate or they can inhibit it.

One other final thing I want to point out is although we have been emphasizing the role of the physical environment in children's development of course it can also influence adults and adult caregivers. So let me give you a concrete example of that. Crowding, which an important element of crowding is people per room that's the element that seems to be most important in terms of how humans respond to that. Adults, family members who live in more crowded higher density environments, more people per room, are less responsive, less sensitive to their children. Why might that be?

Well the adult probably in that context learns to cope, learns to adapt to the unwanted social interaction by socially withdrawing. It is a way to sort of get the system back into equilibrium. If I have too much interaction I withdraw a little bit. So what that means somewhat paradoxically is if you live in very close quarters you are actually less likely to have close connections with the people that you live with. So here the environment is affecting the adult by making them less responsive, less sensitive to the child's needs, which of course, in turn also has important implications for child development.

So thank you very much and I hope I have given you some principles and ideas to think about in terms of the physical environment and child development.

Timestamp 48:46

Questions and Answers

Sarah Lifsey

[slide 87] Great, well thank you so much Dr. Evans, and thanks again to Dr. Messer who presented earlier. It has been a very engaging program, and we have just a little over 5 minutes left for some questions and answers. The first question I have is for Dr. Messer.

Have you looked at how protective factors like family and community resilience impact the pregnancy outcomes in early childhood outcomes?

Lynne C. Messer

No, that is a great question and I think an important factor and one of things that we do not often do is look at positive features. I am thinking specifically about positive features of the environment but the question had to do with positive family features. So we do not have family structure as one of the variables to consider but thinking about new ways to construct something called resilience or not construct it but how to estimate resilience is definitely an important frontier for ongoing research.

Gary W. Evans

I get asked a lot about resilience and factors that promote growth and promote health and I understand why that is important but I think it is also important for people to understand and recognize that risk factors predict outcomes much better than resilience factors. So resilience makes a difference. It is important, it is useful.

So for example, if you are in an environment where there is a lot of chaos, maybe a lot of turmoil, it is of course going to be helpful if you have, for example, a parent who is able to be more warm and more responsive and more sensitive, more supportive. That would be an example of a resilience factor. But the risk of the turmoil, the chaos usually is a more powerful predictor of the child outcome, physical or psychological than the resilience factor and I think that is an important perspective to keep in mind.

So for example, when we talk about poverty we know that poverty is a very powerful variable in influencing physical development as well as psychological development and so we can say, well what about the poor children that do well despite the odds? That would be the resilience question and that is important and it is a valuable question to study and to think about but it does not predict as well as poverty does.

So, the point there I am trying to make is if we pay attention to those risk factors usually reducing the risk exposure is going to be much more effective at the macro scale, as Dr. Messer was talking about, or some of the more micro scales that I was talking about, that is going to work better than trying to buffer by adding resilience.

Sarah Lifsey

Okay, thank you. The second question I have, it looks like it is for Dr. Messer from Todd, who wants to know if you could...

Expand briefly on what is meant by John Henryism.

Lynne C. Messer

John Henryism goes back to the old folklore story about...well, so first off, the developer of John Henryism active coping is Sherman James, who has recently retired from Duke University, but spent time at UNC and at Michigan, and sort of a famous social epidemiological researcher, in any case, John Henryism goes back to the folk story of the African-American male who was going to beat the locomotive in some physical task, and forgive me I cannot at this moment remember what the physical task is, but he beat this machine and then proceeded to drop dead because the exertion required, the active coping required ended up trashing his system.

So John Henryism is an active coping psychosocial measure that suggests that among African-American people in particular, but socially disadvantaged or even potentially just non-white people living in the United States may have to try harder and harder, and harder in order to get the same level of recognition or appreciation as white people

would be afforded sort of automatically by virtue of their majority status. So that is what the scale is designed to collect and it has been very useful, it has been very predictive for several different health cohorts.

Gary W. Evans

Sarah, this is...John Henryism also is an interesting example of what I was just talking about a second ago in that you could think about coping, right, as a resilience factor. So if you have a stressor or an environmental demand having resources, intellectual, social, whatever they might be, physical that helps you cope so we would think about coping as a positive, a good thing and of course it is, but there is no free lunch, as the economists like to say.

So John Henryism is a nice example I think of, yes you may have some resilience if you have a coping resource but you are probably going to have to pay some price for that and John Henryism, as Dr. Messer just said, one of the things that people when they actively cope, particularly if they have a demand, a stressor that is chronic or very difficult to control it leads to negative outcomes for example hypertension. So, high blood pressure is one of the things that you see with people who have John Henryism as sort of a...either because of the situation as well as their own approach to coping with it.

So, it is a nice example where again the risk, there is a resilience, there are resources, in this case the resource in and of itself is also it turns out to have some problems.

Sarah Lifsey

So, I think we can fit in just one quick last question for Dr. Evans, from Chrissy.

What role do childcare environments play in the built environment and is there any education for childcare providers with this kind of information that is going on?

Gary W. Evans

That is a great question, thank you for asking it. Open planned classroom is a classic example of...it is a really interesting idea, clearly children have a lot of intrinsic motivation and curiosity and it makes sense to sort of harness that and provide a setting like an open classroom where they can see different things and kind of follow their interests, but if you do not train daycare providers, if you do not train teachers how to use open classrooms they do not work too well because they wind up being very chaotic and it is interesting to go and observe a lot of open classrooms. Usually teachers have done all kinds of interventions to make them less open.

And again, the problem is not the openness per se it is probably there is a need for a balance to regulate social interaction for example and the caregivers are not provided training. So, yes, in some, particularly in daycare and nursery school around that age if you talk to preschool teachers and many of them are very aware of how critical the physical environment can be and sort of setting the table for what they want to do that day. So, I think in that arena, but usually in the older grades not enough in service training, not enough support for people who are trying to do a difficult job.

Timestamp 57:06

Sarah Lifsey

[slide 87] Great, thank you. Well, I am afraid that is all the time that we have for discussion today. Answers to any questions that were not addressed during our Q&A period will be posted in writing along with the program archive in a few weeks, and you will be able to access the Q&A and the program archive at your convenience. If you think of any more questions, you can submit those to us via email through the end of this week using the email address on

your screen dataspeak@altarum.org. We would like you to know that we will be broadcasting more DataSpeak programs in the coming months. Announcements about future programs will be sent out via e-mail to anyone who is registered for today's program and will also be posted on the [DataSpeak website](#).

[slide 88] Finally, before you log out, we would really appreciate you taking a moment to provide us with some [feedback on today's program](#). It is really important to us that we have your input on this session as well as recommendations for future programs. It's a very short survey, and to fill it out, just click on the [evaluation link](#) that's on your screen now and the survey will open in a new window. Today's program is now complete. Thank you to both of our presenters and thank you to everyone for joining us and have a great afternoon.

About DataSpeak

The MCHB's DataSpeak webinar series is dedicated to the goal of helping MCH practitioners on the Federal, State, and local levels to improve their capacity to gather, analyze, and use data for planning and policymaking. DataSpeak is funded by the MCHB's Office of Epidemiology and Research.

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