

## 'Cumulative risks need comprehensive responses'

An interview with Gary Evans, Elizabeth Lee Vincent Professor, College of Human Ecology, Cornell University, New York, USA



What we need to get better at is not just how we address issues related to children's physical environments, but how we address them together with related risk factors. Photo • © iStock.com/Danijela Pavlovic Markovic

**Gary Evans is an environmental and developmental psychologist interested in how the physical environment affects human health and well-being among children. Here he talks to *Early Childhood Matters* about the current state of evidence on risk factors such as noise and crowding, and how multiple risk factors add up to dramatically worse outcomes.**

*Why should we be interested in children's physical environments?*

There's a lot of evidence that poverty – or low socio-economic status (SES) – is bad for children's health and development. But what exactly is it about low SES that's bad for kids? There are many factors, among them the kinds of physical environment that are often associated with poverty.

*What are some of the ways in which poverty translates, through the*

*physical environment, into worse outcomes for children's health and development?*

For a broad overview, you can think about this in five categories.<sup>1</sup> First, there are the effects of hazardous materials in the environment – heavy metals, inorganic solvents, pesticides – which, by and large, better off kids are obviously less likely to come into contact with. Exposure to too much lead in early childhood, for example, is associated with outcomes such as lower IQ, and increased impulsivity and aggression.

Second, noise. I'm not talking here about noise levels high enough to cause hearing damage, but chronic noise exposure – say if you're living next to a busy highway, railway or under a flight path. There's some evidence of lower cognitive functioning in babies who grow up in households where it's impossible to get

away from the noise. There is evidence that parents in noisy households are less responsive to their kids, and teachers in noisy schools are less patient. And many studies have shown that noise causes deficits in reading acquisition.

The third issue is crowding. I'm talking about crowding within the home, not the city – the issue is not whether you're living in a busy city, but how many people there are to a room inside your home. Crowding is associated with children becoming withdrawn or aggressive and can reliably elevate physiological stress such as blood pressure.

Fourth, the quality of housing and neighbourhoods. Among the things the evidence tells us here is that different kinds of housing are suitable for different types of people. If you're a young, child-free professional, for example, then living in a high-rise apartment might suit you just fine – but there's evidence that it's socially isolating if you're bringing up a child, especially if you're a single parent. And there's evidence that children living in poorer-quality buildings get sick more often.

Finally, school and daycare quality. The evidence points to smaller and better-maintained schools, with adequate heating and ventilation and so on, being associated with better outcomes for kids.

*How robust is this evidence across cultures? Are we talking about research predominantly in wealthy Western countries, or also in the developing world?*

Certainly on the effects of noise and crowding, we have enough evidence to generalise – there's research from many countries and it's robust across cultures and nationalities. Interestingly, there are cultural differences in what is perceived to be 'crowded' – living, say, five to a room may be seen as normal in some cultures and unacceptable in others – but when you look at the relationships with children's mental health and cognitive development, there is no difference.

But some other variables are indeed primarily studied in a Western context, which is ironic as we know least

about places where the situation is worst. Almost all research on housing quality, for example, is from places like the USA, the United Kingdom, Scandinavia or Australia – and even the worst-quality housing in these places would be seen as pretty good in some other countries. So we're missing knowledge about actually most of the spectrum here.

*In your work you look at cumulative risk. Broadly, this is the idea that being exposed to one or two of these risk factors might be survivable, but the more risks you're exposed to, the worse it gets.*

That's right, and it's often the case that low-SES kids are exposed to many of these risk factors at once. As the saying goes, when it rains, it pours.

*How do you measure cumulative risk?*

It is challenging. Ideally what you'd want to do is compare how one spectrum affects outcomes on another spectrum. Say you want to look at the quality of housing and the quality of neighbourhoods, to understand the effects on kids of growing up in a poor-quality house but in a good neighbourhood or in a good-quality house but in a bad neighbourhood. You would draw the slope of how quality of housing affects children's outcomes, and do a statistical interaction to see how that is changed by the slope for neighbourhood quality.

Now say you want to study family turmoil, too – good house, bad neighbourhood, stable family; bad house, good neighbourhood, dysfunctional family, and so on. All these things are on a spectrum, and it starts to get pretty complex to figure out how they work together. Now add a fourth, fifth, sixth, seventh variable. The complexity gets out of hand really fast. Even if you've got a big enough sample to do the statistical work, it becomes very hard to conceptualise and articulate the findings.

So instead we use what's called an additive model. Rather than looking at a spectrum, you choose a cut-off point above which you say that the level of exposure is high enough to qualify as a risk factor. And you give those cases a score of 1 for that risk factor, and the others a score of 0. Then for each child you add up how many risk factors they have.

Clearly there are some downsides to this, as you're simplifying shades of grey into black-and-white. But actually it works pretty well, and it unambiguously shows that as you add more risk factors, the outcomes for kids get drastically worse.

*What's at the cutting edge of research in this field? How are these models getting refined?*

If you think about how a child in an urban environment moves through the day, you can see how there might be overlap among the different risk factors – waking up in a house to noise from traffic, walking along air-polluted streets to a school with crumbling walls and inadequate ventilation, playing in rubbish-strewn streets, trying to do homework in a crowded room, and so on. This kind of scenario is understood to some extent in academic terms through models such as Bronfenbrenner's (Bronfenbrenner, 1979), but we're behind the curve on getting to grips with what it means in practice.

There are now lots of technological tools like GPS that we can use to better capture this ecological concept of children's experience by tracking them over time. It could be a rich area of research to use the monitoring possibilities of new technologies to inform our theories on cumulative risk.

*And how much do we know about the psychological mechanisms through which these risk factors translate into worse outcomes for kids?*

What's really interesting is that the adverse outcomes may, in fact, to some degree come from the coping mechanisms kids use in response to the risk factors, rather than the risk factors themselves. That sounds counterintuitive because you'd think that coping is a good thing, but what's adaptive in one context can become maladaptive when it's generalised.

So think about how you might respond to finding yourself constantly surrounded by other people, as for instance if you're living in a crowded home. One coping mechanism might be to withdraw, and at a practical level that makes sense given the stress of your immediate surroundings. But what if that withdrawal

then becomes your habitual way of dealing with other people?

To take another example, studies of adults in Southern California show that people who've lived for a long time with the smog of Los Angeles actually stop noticing it – their perception changes, making them less able to discern pollution in a photograph. Again, it may generally be adaptive to stop noticing aspects of your environment that are always present, but then logically if you stop noticing something you're going to be less inclined to try to do something about it.

*So it's possible that a generation of kids growing up in smog-affected cities in, say, China might grow up inured to air pollution?*

It's a frightening notion. On a similar note, I wonder the same thing about how we communicate with children about climate change. We might unwittingly create a sense of helplessness, in which they grow up believing there is nothing they can do about their future.

There is a lot of evidence, from studies that started with Martin Seligman (see, for example, Seligman, 1967, 1975), that learned helplessness can be a reaction to environmental problems like uncontrollable noise. Once you conclude there's nothing you can do about an adverse stimulus, you stop even trying – so you don't notice if the situation changes in such a way that it does become possible to do something.

But it is also possible to unlearn helplessness. In animal studies, for example, physically taking animals and showing them how they can respond had the effect of shaking them out of their learned helplessness. This would be an interesting area to study in further depth in relation to how children respond to factors in their environment such as uncontrollable exposures to crowding and noise.

*We've talked about cumulative risk factors in the physical environment. What about cumulative protective factors? As the environmental risk factors are often correlated, are there resources that could potentially ameliorate multiple risks?*

This is another area where we need to understand more.

We already have good evidence that access to natural, outdoor space has many benefits. Another candidate is having a more walkable environment, with less traffic congestion. That could have influence over many outcomes – obesity, health problems from air pollution, encouraging outdoor play.

*Do you see evidence that politicians and city planners are taking an interest in these areas of work?*

I think more are realising that it's simply inefficient not to be interested in the public expenditures that mount up over a child's lifetime because of inequality in childhood.

Unfortunately, public bodies tend not to be set up to look at problems in a holistic way. We're learning that risk factors interact and add up to dramatically worse outcomes, but each of those risk factors tends to be addressed in a siloed way – one public body addresses drug abuse, one looks at childcare, one concerns itself with urban planning, and so on. So what we need to get better at is not just how we address issues related to children's physical environments, but how we address them together with related risk factors. Cumulative risks need comprehensive responses.

#### References

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#### Note

- <sup>1</sup> For further information on these points, see Evans (2006).