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## #381: Let's get physical: Designing cities with our health in mind

VOICEOVER

This is Up Close, the research talk show from the University of Melbourne, Australia.

LYNNE HAULTAIN

Hello, I'm Lynne Haultain, and welcome to Up Close. How we lay out and develop our cities no doubt has a profound effect on their functionality and our enjoyment of living in them. We've learnt a great deal in recent decades about the effects of elements like transport and urban design, and what we know is that there are measurable negative health impacts as a result of city planning, like pollution, noise, a huge reliance on cars rather than more active transport modes like walking or cycling, and social impacts like isolation and crime.

In a recent article in *The Lancet*, urban transport planning and urban design are described as some of the most fundamental causes of many serious global problems. So, how do we respond? These are valuable insights if you're planning a new city or substantially rebuilding one, but how do we retrofit? How do we make existing metropolises more accessible, healthier and more liveable, and what happens if we don't?

Mark Stevenson is an epidemiologist and he's been heavily involved in research in these areas, most recently as Professor of Urban Transport and Public Health at the University of Melbourne, and prior to that as Director of the Monash University Accident Research Centre, which is a leading transport safety research centre in Melbourne, Australia. Mark, welcome to Up Close.

MARK STEVENSON

Thanks very much, Lynne.

LYNNE HAULTAIN

Well, you've been involved in that series of articles in The Lancet about city planning and population health, which started as an assessment of six cities. They were Melbourne, London, Boston, Copenhagen, Sao Paulo and Delhi. Six very diverse cities and a very good spread geographically, but what was your thinking behind the choice of those six cities?

MARK STEVENSON

What we wanted to do was to quantify really for the first time the relationship between how our cities are planned and particularly then how that influences our transport choices, and then ultimately the health of citizens in those cities. We needed to select cities that would give us a good range of illustrations of what city planning might be like and what health outcomes you might get dependent on that. So we chose high-income cities, we chose middle-income cities. We chose cities that had high levels of motorisation; we chose cities with very low levels of motorisation; we chose a city like Delhi which is rapidly motorising. So there was a really good contrast with those six cities that we chose for the work.

LYNNE HAULTAIN

And clearly for their differentials. But this is the first time that this work has been done to draw those threads together?

MARK STEVENSON

There's been quite a lot of literature around the relationship between city planning and transport and the effects of that, but this is really the first time where we've actually quantified well, what's the burden on our health system as a consequence of those city planning and transport choices?

LYNNE HAULTAIN

So the results, which we'll get to in more detail in a moment, things like risk of injury, sitting too long, physical inactivity, unhealthy diet, stress, social isolation, I think we would bundle those up and call those the Western condition, but clearly they have effects well beyond the west.

MARK STEVENSON

They certainly do, and in this piece of work what we're doing is attributing what we

can that we know is related to our land use and our transport choice. We're not trying to attribute stress and our diets necessarily, but we are focusing around the effects of our land use and transport on inactivity, on how we breathe, the air we breathe because clearly our transport has a major role in terms of the emissions and consequently then pollution. We are looking at elements like diabetes because of inactivity leads to a greater prevalence of diabetes, as we know. So we looked at elements that are directly associated with those elements of our city design and our transport choices.

LYNNE HAULTAIN

And the three baseline measures were the immediate risk, i.e. death or injury on the road as a result of accident; the effect of inactive transport, as you've described, so cardiovascular effects of inactivity?

MARK STEVENSON

Yes. We actually undertook a very detailed, systematic review of the literature, identified clear links between the transport use and health outcomes. We know for example that if you're highly inactive then you don't expend a great deal of energy on a day-to-day basis. We were able to measure actually just well, how much energy do you expend if you walk versus cycle versus sitting in a car commuting on a day-to-day basis.

LYNNE HAULTAIN

And you overlaid that against the cities depending on what, on their transport infrastructure and the number of people who would use different modes?

MARK STEVENSON

Yeah, and partly why we had to select these cities as well is that the cities had to have very comprehensive transport data, what we call travel survey data, that tells you on a daily basis how many people in that city travel by what means and by how far. So we were able to quantify those sort of measures that I was just alluding to earlier, based on their travel survey data.

LYNNE HAULTAIN

So in addition to the inactivity then the pollution effects that you described?

MARK STEVENSON

Yeah.

LYNNE HAULTAIN

And I suppose the effects on your lungs?

MARK STEVENSON

Exactly. We know from the research evidence that there is quite a strong relationship now between particularly what we call particulate matter 10 and particulate matter 2.5, which is very fine particulate matter which actually affects the lungs. We know there is quite a strong relationship between those and lung disease, so in this sort of research we could attribute elements of exposure to CO2 emissions, particularly PM2.5 and PM10, to types of lung disease. And so we actually attributed that in this study to that for each city.

LYNNE HAULTAIN

I think we could probably take a guess at what the results might be in terms of the health impacts that more active cities were probably healthier but those that had less particulate matter would also have advantages. Is that generally what you found?

MARK STEVENSON

It is, but I guess the findings were highlighting that it's rather more complex than you might expect, because you might say for a city like Delhi, which really has very high levels of emissions, you would expect that. But what we found in a city like Delhi is there's quite amazing mixed multi-modes of travel, which in essence has a real protective factor as well because they're much more active. There's a greater use of public transport, there's much less reliance on private motor vehicles, so their energy expenditures are much higher than say they might be for general population in Melbourne, for example. On the flipside of that you've got a whole array of other elements like the emissions and so on that are just overpowering in terms of the contribution to the burden of disease.

LYNNE HAULTAIN

How did you tally that; how do you compare? Because clearly we've got highly-motorised and yet highly-inactive but with less particulate matter; there are pros and

cons in each of those.

MARK STEVENSON

I guess that's what's unique about the approach we took, which is what we refer to as a health impact assessment framework. What we did was we standardised the measures so that we could directly compare city with city. We knew what their risk of road trauma was, for example, in Delhi, just as we do in Melbourne, just as we do in London. We knew what their health burden was as well, because there's been a fantastic study called the Global Burden of Disease, which has actually allocated the burden of disease across countries. We were able to extrapolate that down into the city level for India and Delhi, for example, and London and so on. We could control for a number of these elements that you might think are pretty challenging to control for, so that we could get a reasonably robust outcome.

LYNNE HAULTAIN

What about the social and the economic effects? You said that these were the three base measures, and clearly these are the ones that you can in all rigorous analysis look closely at, but there are obviously ripple effects of these. Did you look into those?

MARK STEVENSON

We didn't, but it comes up often now that we've presented these results. I'd love to look at the economic costs of this. The outcome we've used is a thing called a DALY, which is disability-adjusted life year. It's a fantastic measure in that it takes account of premature years of life lost and life lived with a disability. It's a WHO metric and it's used globally. By applying that as an outcome, which we did, there's an opportunity to also apply costs associated with the DALY as well. We haven't done it but it would be incredibly valuable just to look at well, what are the cost implications of changing our city designs, our transport mode choices? We know there are going to be health gains but what social and economic gains are there as well?

LYNNE HAULTAIN

But you did take the next step in terms of modelling around what's called the Compact City. Tell me, what is a compact city?

MARK STEVENSON

Once you set up these frameworks, there's an opportunity for you to look at a whole

array of policies. The one that's really motivated me based on my career is focusing on safe and sustainable transport policy, and I'll get to that in a moment. What we were keen to look at was this concept of a compact city, and a compact city is a city that really is defined as a city of short distances. It's a city that is amenable to good urban design in relation to design that allows you to walk and cycle. It's a city of short distances between your place of residence and your public transport nodes. It's generally a city that has considerable mixed land use; you do not have these massive, sprawling suburbs like we have in Australia and North America and parts of the UK and New Zealand, but you have greater land use mix between industry employment hubs and recreational facilities all together.

LYNNE HAULTAIN

So you would live closer to your work?

MARK STEVENSON

You would live closer to your work, you would live closer to your amenities, yeah.

LYNNE HAULTAIN

What does that show us? It's a lovely concept, but how do you apply it in the real world?

MARK STEVENSON

There would be a lot of good people who could answer that better than I could as an epidemiologist, but basically what we are beginning to see in a number of the large city plans, like we have here in Melbourne, we have a Melbourne Plan. I'm working at the moment in Sydney with New South Wales Transport, and they have a very comprehensive plan as well, both transport plan and city plans. What you see in both of those cities for example was that they are talking about what we call 20-minute cities, and in Sydney it's a 30-minute city. What they're doing is they're trying to densify around nodes in a city, not just the central city area.

LYNNE HAULTAIN

So that increases the land use density, increases the diversity of that land use and, as you've said, reduces the time and the distance?

MARK STEVENSON

And the distance, that's right.

LYNNE HAULTAIN

By around 30 percent is that it, right?

MARK STEVENSON

Well, the nice thing about what we did in our paper was once you've created the framework, you can actually modify that proportion any way you would like. Previous research which informed this sort of work I felt was not particularly pragmatic. It was really quite ambitious. It was about saying we're going to get half the city, for example, cycling, and I just felt if you want people to really see the vision that you have for changing your cities towards having better health outcomes, I think they need to be quite pragmatic. To say in 10 years we'll get half the city riding to work every day, it's a challenge. So what we focused on are proportions that are pragmatic. 30 percent were saying we're taking it from now and if we were to look at densifying our city and making it more compact by about 30 percent, which is for many of the metrics not a considerably onerous task, you could achieve these sorts of health outcomes.

LYNNE HAULTAIN

You're listening to Up Close, and today I'm talking to urban transport and public health epidemiologist Mark Stevenson about the close interrelation between health and the way we live in cities.

Let's take that next step, Mark, and talk about okay, how do we change the city? And as you've described, pragmatism is pre-eminent here, so let's talk about the physical dimension, because the hard infrastructure of cities is very long term; planning can take decades if not hundreds of years to roll out. Infrastructure is expected to last for 50, 60-odd years and the investments are massive. Planning a new city or planning a more dense, compact arrangement is fine if you're looking at significant redevelopment, but how do you retrofit? How do you take a long-established city, like Melbourne for example, and change it? Because we've got say a high-income, highly-motorised, sprawling metropolis of Melbourne with five-odd million people and big, extensive suburbs; how do we begin?

MARK STEVENSON

Look [laughs], maybe the Mayor of Melbourne is going to be listening to this.

LYNNE HAULTAIN

[Laughs] We live in hope.

MARK STEVENSON

But how do you? Look, it's an incredibly good question, and I guess what comes to mind for me first and foremost is the desire to make the change, and that is that requires leadership. I'm certainly no urban planner and so I would certainly not get into the technical details of it, but what I find is there is a lack of leadership in terms of pursuing policies that will embrace much better outcomes for our cities, in relation to our health, in relation to our recreation and sustainability particularly.

LYNNE HAULTAIN

Let's unpack that policy bit a bit. You're in the business of presenting the evidence, and in this series of papers you've gone a long way to presenting some pretty compelling evidence around what makes an impact and what makes a difference. So presenting the evidence is one thing; making it pragmatic, as you've said, is the next step and then you've got to make sure that the decisions get made in good time too, which is another dimension. So take the Australian example. We have three tiers of government that would be involved in this, very complex decision-making processes; how do we proceed through that? You need, I suppose, as a researcher and as a leader in your field, to make the compelling case.

MARK STEVENSON

Most certainly, and I guess I'm becoming increasingly challenged by how do you do that. Depending on what window I'm looking through, it is incredibly complex. If I'm working as I said, with Transport for New South Wales, I might be looking simply at a journey from point A to point B and wanting to ensure that that journey is safe, it's sustainable, can deliver on productivity for a city, and yet the governance across that journey highlights, just as you mentioned, it has three levels of governance. In many instances they pass through a federally-managed road network, they then go into a state-managed network then they go into a local government road network. The funding associated with each of those is vastly different, and it could be that across that journey 50 percent of that journey could be managed by the local government, who have very little or very few resources to actually take on board some of these findings.

This is the complexity of cities that we're going to be dealing with in the 21st century, and I feel we're not even close to beginning to solve some of these challenges. You highlighted also in relation to infrastructure, infrastructure is a long-term investment but our level of governance that we have in this country is so short term that what



seems to be missing is the investment in infrastructure, so that the cities and its populations, we're the ones missing out. We're the ones missing out on what needs to be done for our future, simply through, I believe, through some of the governance structures that we're operating with.

LYNNE HAULTAIN

Are those structures replicated in the cities that you looked at, similar levels of governance challenge?

MARK STEVENSON

We didn't explore that to that extent but we know that probably some of those layers aren't present in a number of those. In India you'll have a state and you'll have a provincial government but whether you get right down into local government and the governance around it is probably not there. So there are yeses and nos but I think what you do see is that there are governments that are incredibly proactive and centralised and are focused around the future, and those are the cities that we're seeing, like Copenhagen, like Zurich, like Helsinki, that are really proactive in this space and are saying we want our cities to be sustainable into the future and we're going to enforce new changes and policies and they are driving those rapidly. There's not enormous layers to their governance in those cities.

What we're starting to see in cities like Copenhagen, who have been doing this now for quite a time, you will see from this series that their health outcomes are phenomenal. Now, some of that is attributed to a whole array of other elements; what we're talking about here are just what we can attribute to their land use and their transport, but just on those elements alone they're getting huge gains.

LYNNE HAULTAIN

The instance we've recently experienced in Melbourne, which I think is one that would be familiar to many countries and cities around the world, is the tension between roads and public transport or rail infrastructure. A decision was made to abandon a road project and proceed with a rail project, but if the government were to change again that may come unstuck. Who knows? Is that the fundamental hurdle, that there isn't complete acceptance of a particularly defined way forward around what kinds of infrastructure cities need? Is that the problem?

MARK STEVENSON

Look, I think in part it is. I think it highlights the complexity of what we're dealing with in terms of how government's integrating with industry and what's being advocated

for at a certain time. It reflects seasonal flavours in terms of light rail versus bus rapid transits, and I often feel that the economics really miss out; they're not there sufficiently to inform what we should be doing. Our resources are finite.

Having just come back from Bogota, for example, I found it fascinating that they were the first city, or one of the first cities to introduce a bus rapid transit; very, very successful. And yet the mayor at this meeting just recently stood up and said we're the only city that doesn't have a subway so we're going to be building a subway, and yet the reality is, if you look at their transport plans a subway is not really necessary. They just need to extend their bus rapid transit; the public will get a much better service. And so there are an array of levers that get pulled that aren't necessarily the right ones for the right reasons.

LYNNE HAULTAIN

Let's talk about Bogota a bit further, because cycling is a really interesting, I think, case study which is replicated around the world, and to varying levels of success, where cycle paths or access to transit bikes, those sorts of schemes have been introduced. That is one way I think where certainly we've seen in Melbourne, and I know it's the case in many American cities and in the UK as well, where governments have come together to promote this with, as I've said, various levels of commitment. That would seem to be one way, where people are prepared to say okay, we all need to cycle more, we need to get more active, we can give over some of our road space to make cyclists safer. Is that a good news story in all of this?

MARK STEVENSON

Look, it is, I think.

LYNNE HAULTAIN

It doesn't demand huge new infrastructure I suppose is one upside.

MARK STEVENSON

Yes, and no. Just going back to Bogota, Bogota was the first city to really introduce what we call a Ciclovía, which is cycleways in Spanish, in 1974. They open their city streets now every Sunday for the public to use for cycling, walking, skateboarding, and so they're bringing this significant infrastructure back to the people, not just to the cars. I think that's incredible value. They have measured - just for example, on Sundays, the emission reduction is phenomenal compared to any other day of the week when the Ciclovía is not working. So we've got very good evidence about what's working.

And yes, by committing to a cycling, active transport mode you are going to be contributing an enormous amount to your city. But there are challenges, and as this series highlights in relation to Melbourne, if we move to much greater levels of active transport, we're going to see levels of road trauma increase exceptionally. That's going to be a real challenge for any government because road trauma is a here-and-now, it's acute. They're measuring the death rates on a daily basis and no government wants to preside over an exponentially increasing road trauma rate. And that's what would happen with greater use of active transport. So yes, we need to be supporting cycling but we need to be providing a safe infrastructure for cycling, and that's the biggest challenge we have, particularly in cities like Melbourne where it's a great challenge across the network.

LYNNE HAULTAIN

Yes. There is considerable anxiety and tension around whether or not roads get given over to cycle paths.

MARK STEVENSON

Yeah.

LYNNE HAULTAIN

And what impact that has on travel times for people in cars.

MARK STEVENSON

Yeah.

LYNNE HAULTAIN

It's very vexed. This is Up Close and I'm Lynne Haultain, and today we're talking to epidemiologist Professor Mark Stevenson about how our cities are making us sick, and what we can do to ameliorate that.

Let's flick forward, Mark, and talk about the future, because we've described a fairly frustrating environmental context now. But there are a whole lot of technological changes that could really change this game. What if our freeways fell silent? What if we had electric cars and suddenly the noise pollution just disappeared? What if we had autonomous cars that didn't bash into cyclists because they were sensed and drivers stopped before they had any kind of collision? Is this pie in the sky or is this

real, is this foreseeable?

MARK STEVENSON

This is real; it is foreseeable. It will certainly ameliorate road trauma levels but it still won't deal with the inactivity in terms of our transport system. Having said that, I am incredibly excited about the future based on autonomous vehicles, because it is going to allow us to open up a whole array of opportunities, particularly I believe for marginalised societies, those in our outer suburban areas that have no access to public transport, for example, or very limited access to public transport, by transforming our public transport system, by ensuring we can use autonomous vehicles for the last mile, for example, linking them to our public transport nodes to give them access.

LYNNE HAULTAIN

Explain that a bit further. So we'll have, say, trams and trains and buses?

MARK STEVENSON

Yes.

LYNNE HAULTAIN

And then there's another autonomous link?

MARK STEVENSON

Well, the challenge we have with our public transport network is that it can't be everywhere, and it's incredibly expensive if you're wanting to put rail everywhere, and even trams. The opportunity is to build bus rapid transits, there's opportunity now with autonomous vehicles though to ensure that there could be autonomous vehicles running around suburban areas and on demand, using your phones to call them up, delivering you to your public transport node. Maybe we should be investing in those areas rather than just saying we've got to extend our rail network. By bringing this new technology to the fore, it allows us to rethink how we operate our systems and how we operate our cities. That's what I think is just incredibly exciting, because that is what's going to be transformational.

LYNNE HAULTAIN

One thing we haven't taken into account, which has a massive bearing on all of this too, is climate change, the contribution made to it by the way in which we choose to get around is significant. Is that a major factor in the decision-making process to just return to how the policymakers respond? It must be a key factor in what they take into account when it comes to determining how we spend our infrastructure dollars from here, surely.

MARK STEVENSON

It has to be. It has to be, but Australia hasn't been loud in that area, at all. Again, in the series, we actually even quantify the changes in emissions that will occur through a compact city and actually having some modal change, and it's phenomenal. We have a major carbon footprint here and we're doing very little to change that. I feel as an academic we need to be much more proactive and much more adversarial around this, because it's not sufficient to simply publish in the best medical journal and highlight the evidence, because that doesn't get us that far.

So there are phenomenal opportunities for us to contribute to climate change reductions in terms of the modes of transport. We highlight cities like Delhi that have just huge levels of emission. They have been very proactive around ensuring that all of their public transport now operates on natural gas versus what it was previously, which was diesel and lead petrol, massive emitters. So they're making really positive strides. We need to be doing very similar throughout Australia.

LYNNE HAULTAIN

You mentioned Helsinki and Zurich and European cities. Is this part of their decision-making matrix when it comes to this?

MARK STEVENSON

Yeah, it is. Copenhagen has a 2020 zero emissions. They're doing incredibly well but their daily modal choice I think is something like 53% private motor vehicles, about 23% cycling and maybe 13% walking and a few other modes. What they're really pushing for is what they call a 3/3. They want only a third of all journeys being in private motor vehicle and the remainder on public transport, walking and cycling, and their public transport is all clean. So there's a real movement in many of these cities now to say we're going to be 100 percent sustainable and we're going to be clean, and they're committing to it. Transport contributes to a majority of that. This is a terrific framework to move forward with.

LYNNE HAULTAIN

Transport is very central, isn't it? As you've said, it has personal effects in terms of your own health and wellbeing, it has climatic effects and it has very profound social effects in the way in which a city is liveable or not.

MARK STEVENSON

Yeah, and with living in this beautiful city of ours here in Melbourne, it's amazing if you live within a 10km radius of the city because the amenities and the public transport systems are phenomenal and it changes your whole life and how you live. But beyond that, it has major effects as well. So you can really see that the urban systems, the transport system, we focus a lot on our education system and our health system but our transport system is integral to the viability of a city and the health of the city. It's really been something I have focused on in my career. It's not necessarily typical for an epidemiologist who typically looks at infectious diseases to really become quite microscopic around focusing on transport for health.

LYNNE HAULTAIN

Are you getting anywhere?

MARK STEVENSON

I don't know. Look, I feel like we are getting somewhere. Much of my research in the early years when I was looking at transport we were focusing on things like the use of mobile phones and the contribution that played in terms of road trauma. I worked on that and showed the risk and we were able to put in policies to change that, but they were all very linear in focus. I think what I'm finding now is the more upstream I look in terms of how we designed our cities, the greater likelihood we're going to get much better returns. And so I am becoming more excited, but as I get more excited, the more challenges I see are ahead of me as well.

LYNNE HAULTAIN

It's been a great pleasure talking to you. Thank you so much for your time.

MARK STEVENSON

You're welcome.

LYNNE HAULTAIN

I've been speaking with Mark Stevenson about urban planning and health. Mark is an epidemiologist and Professor of Urban Transport and Public Health and the University of Melbourne. He's also one of the lead authors of a recent series of articles in The Lancet on city design and health, and the evidence base for change. You'll find links on the Up Close website, as well as a transcript of this program and all our other programs. Up Close is a production of the University of Melbourne, Australia, and this episode was recorded on 18 October 2016, and was produced by Eric van Bommel with audio engineering by Gavin Nebauer. I'm Lynne Haultain; thanks for listening and I hope you can join us again soon.

#### VOICEOVER

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