



Nancy Ybarra is one of the caretakers of Pogo Park — a community project in Richmond, California.

STRESS

The privilege of health

Deprivation leads to stress, and stress to bad health. A park, and the science behind it, aims to break that chain.

BY AMY MAXMEN

Children play on foam mats bathed in late afternoon light as a few staff at Pogo Park hang Christmas lights. Kids squeal as they slide along a zip wire, and a few teenage boys bounce a basketball against concrete painted in pastel designs. It's hard to believe that this is the Iron Triangle — the most deadly part of Richmond, California, one of the most dangerous cities in the United States.

One of the park's caretakers, Nancy Ybarra, now 26, played in the park as a child when it was a dirt patch with two tire swings. Men rolled dice under the trees by day, drank beer and took drugs at night. Ybarra remembers days when police tape surrounded the park after shootings. But the park is safe now. It looks like "a park that could be in a white neighbourhood," Ybarra says. As we walk along the path that encircles it, Ybarra describes how the park is more than just well designed. It was built, and is now staffed, by people from the neighbourhood, and it serves a variety of functions, ranging from employment and childcare to empowerment.

These might seem like social issues, but the

park has been justified as a physical-health intervention. In Richmond, as in poor cities around the world, high rates of heart disease, asthma, diabetes and infant mortality correlate with certain social and economic traits. In 2010, unemployment in Richmond was 20%, 38% of the children were living in poverty and the city had the sixth highest crime rate in the United States.

Statistics such as these correlate with negative health outcomes in cities around the world. More than 25% of Richmond's children have asthma, compared with a Californian average of 15%. About 40% of the city's children (and 62% of adults) are overweight or obese, compared with the state's average of 30% for kids. A child born in Richmond is expected to die 11 years earlier than one in the richer city of San Francisco just across the bay. For these reasons, says Jason Corburn, an urban planner and epidemiologist at the University of California, Berkeley, "zip code matters as much as genetic code in understanding a person's susceptibility to disease and premature mortality."

Corburn focuses on how to improve the health of city residents. He argues that

cities must transform their physical and social environments — everything from their parks and housing, to the way that community members participate in their city's governance — to improve the health of citizens. Richmond is a short drive from Corburn's office at Berkeley, and the city council has been receptive to his ideas. One of the council's earliest moves was to support local entrepreneur Toody Maher to build Pogo Park. And in 2014, the city enacted a 'Health in All Policies' ordinance. This policy strategy required all municipal decisions to take into account both the physical aspects of health, such as safety and food availability, and social-health issues such as stress.

TOXIC STRESS

For the past 20 years, researchers have worked to solidify the links between chronic psychological stress and physical health. In 1996, Steve Cole, a genomics researcher at the University of California, Los Angeles, noticed that HIV progressed faster in gay men who concealed their homosexuality than in men who were open about it¹. Cole and his colleagues found that men who concealed their sexuality were

PRESTON GAINAWAY

more psychologically sensitive to social threats, and that stress correlated with increased activity of the sympathetic nervous system (SNS). The basis of the body's fight-or-flight response, the SNS kicks into action by releasing adrenaline and noradrenaline, priming the body for physical activity. Over the next decade, Cole and others described how SNS activation also shuts down proteins involved in fighting viruses, called interferons, allowing HIV to replicate without impediment.

The finding tempted Cole and Greg Miller, a psychologist at Northwestern University in Evanston, Illinois, to explore the connections between stress and other diseases besides HIV. They were particularly interested in subtle, chronic stress, as opposed to the panicky reaction triggered by, say, a near-death accident.

Epidemiologists knew that asthma was disproportionately common in children from poor urban communities, even when family history and air quality were controlled for. To find out whether stress played a part in the asthma prevalence, Miller and his colleagues asked children about their family relationships, friends, school life, home life and neighbourhood. Children with asthma from poorer backgrounds, and in more stressful situations, tended to have higher counts of white blood cells called eosinophils². Given the right allergic trigger, eosinophils kick off the production of molecules that constrict the airways as well as mucus production, resulting in shortness of breath. And eosinophil recruitment, the researchers found, follows SNS activation and the subsequent production of the inflammatory molecule interleukin-5.

Biological connections to chronic stress have also been found in conditions such as cardiovascular disease and type 2 diabetes. People from low socioeconomic communities regularly show signs of chronic stress — levels of stress-related hormones such as cortisol are often higher, for instance. Cole suspects that the chronic stress associated with poverty comes from a lack of certainty about what the future holds. “If you have economic resources, you might develop a blind faith that you can figure out problems,” he explains. “But without those resources, there’s a baseline of uncertainty.”

Stress can stem from a lack of control. In post-industrial cities in Finland, researchers have suggested that shame and low self-esteem arising from high rates of unemployment account for the heavy burden of health issues in these areas compared to the country’s wealthier cities. For Finnish men who were unemployed twice over a 3-year period, the small risk of death in the 3 years that followed was 168% greater compared with men who had been unemployed only once³.

Psychological stress among the urban poor is distinct from that of those who live in rural

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Pogo Park could help to improve physical health.

areas, perhaps because income disparity is not as obvious. “Cities expose you to inequality. You see what apartments in rich neighbourhoods look like, which you cannot afford, you know how much food costs at restaurants in those places,” says Eldar Shafir, a behavioural scientist at Princeton University in New Jersey. “Well-being is heavily impacted by comparisons,” Shafir adds. “It impacts your evaluation of self-worth and self-identity.”

REDUCING THE BURDEN

In poor areas of Richmond, there is no shortage of sources of stress. Violent crime makes a stroll daunting. Poverty means that people worry about where their next meal will come from. Undocumented citizens are on alert because of their precarious status. Institutional racism can lead to feelings of inadequacy and self-defeat. With stressors such as these at play, Richmond’s policymakers have realized that medical approaches, such as access to asthma medication, alone will not improve the health of Richmond. Gabino Arredondo, Richmond’s Health and Wellness Coordinator says, “when it comes to health, people usually think about doctors and clinics, but we’re focusing on upstream interventions.”

To understand what stresses residents, Corburn, Arredondo and their team combed through surveys of about 4,000 residents collected since 2007. They also spoke with community-based organizations and analysed geographical data. Areas where violence occurs, car accidents happen and supermarkets are rare were associated with stress. A wide variety of interventions were needed to address the many issues at play. As a result, Richmond has prioritized measures such as speed bumps, lead removal in houses, training to address implicit bias for police officers, and events that help residents to enrol in health insurance.

It may take a decade for Richmond’s comprehensive approach to have a demonstrable effect on disease — particularly for conditions such as cardiovascular disease that take years to develop. However, Arredondo argues that if policymakers hold out for this type of evidence before taking action, the biomedical repercussions of letting another generation grow up in stressful conditions will be costly. “We don’t have time to wait,” Arredondo says. “This is urgent.” So the city is plunging ahead.

As it proceeds, the team keeps track of quantitative indicators, such as the rate of asthma in children, as well as survey data that assess residents’ opinions over time. The results have provided some glimmers of hope. For example, Corburn says that according to the 2015 surveys, people who identified themselves as belonging to a non-white group and those of a low socioeconomic status reported better perceptions of safety, greater economic and recreational opportunities, and felt more included in the city compared to 2009. He has shared these results with the World Health Organization, and hopes that Richmond’s approach will provide insight that policymakers around the world can use to improve the health of the urban poor.

Maher initially pitched her dream of Pogo Park to members of Richmond’s community and to employees of the city, such as Arredondo. Collectively, they successfully made the case to the state of California that funding the park could help to ameliorate the isolation, low self-esteem and uncertainty that diminishes the health of Iron Triangle residents. Unlike previous Richmond green-space projects, which had fallen into disarray, Pogo Park was designed and constructed by residents. Today, they watch over it. Eddie Doss, a 59-year old who lives across the street, keeps an eye on the park at night: “If people come here to drink beer, I tell them no, that’s against the rules, and they say, OK Eddie.”

This year, Richmond secured a US\$6.2 million grant from the state to build just over 3 kilometres of safe streets that connect Pogo Park to another park in the Iron Triangle. Pogo Park’s success helped Richmond’s proposal to beat those from competitors in other cities. Residents who work and volunteer at the park could not be happier with the win — although they, more than anyone, understand that it’s just one of many components needed to reduce their burdens. “This park will not solve violence,” says Ybarra. But, she adds, “I hope that the kids I take care of here will not become that shooter, they will not become that dope dealer. I’m watching them grow up well.” ■

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2. Chen, E. et al. *J. Allergy Clin. Immunol.* **117**, 1014–1020 (2006).
3. Martikainen, P. T. & Valkonen, T. *Lancet* **348**, 909–912 (1996).