Time for Collaboration in Health + Urbanism

Alan M. Berger, Professor, Research Director MIT Center for Advanced Urbanism

Alexander D'Hooghe, Assoc Professor, Director MIT Center for Advanced Urbanism

Adele Naude Santos, Dean, MIT School of Architecture + Planning

A recent 15-page critique of the MIT Center for Advanced Urbanism's (CAU) preliminary findings on the State of Health + Urbanism, by Howard Frumkin, MD DrPH, Richard Jackson, MD, MPH, AIA (Hon), and Andrew Dannenberg, MD, MPH deserves a response, to point out a few points of clarification and to avoid further misinterpretation. First, three of the largest systematic reviews[1] of the research align with the CAU report's primary finding about the *inconclusive* nature of the relation between urban form and public health. Frumkin et al. do not cite these reviews in their critique, which calls into question the authors' willingness to consider countervailing evidence from within their own fields. Second, attempts by myself and my colleagues at the Center for Advanced Urbanism to collaborate with this author group have been rebuffed, which renders their public calls for collaboration somewhat hard to comprehend.[2] Third, the authors do not disclose their association with the advocacy group Congress for the New Urbanism, an organization known for certain urban biases linked to their design agendas. Fourth, the critique does not situate the purpose of the CAU's report. Finally, their critique struck a caustic and personal tone, which detracts from a proper intellectual debate that the issues demand to bring our professional communities together to collaboratively innovate around health and urbanism.

The Context of Our Report

Our publication was titled a "report" because it was a preliminary summary of literature and accounting of work conducted by graduate students in a semester-long workshop held at MIT, which marked the first 3 months of a 10-year study. As such, it should not be misconstrued as either a peer-reviewed study, or as the concluding document of a 10-year study. We did not intend for the careful design and presentation of the report to foster misinterpretation, however we did explain this to Mr. Frumkin several weeks prior to the publication of their critique. Parallel to that working process, the class included lectures and input from public health professionals, political scientists, and geographic mapping specialists. These lecturers hailed from several universities and institutions. Their contributions plus the myriad exchanges and visits students had with public health officials from each city (we visited every city in the report), while regrettably underrepresented in the summary report, nonetheless significantly shaped the thought and final form of the report.[3] This introductory look at the breadth of health issues facing contemporary urban areas is only the initial stage of a 10-year project. The in-depth city investigation and further integration of public health professionals naturally follow this stage. The only conclusion that has been drawn in this initial phase is that it is premature to outline specific prescriptions for urban design action. Along the way, various contributors to the report discovered biases in the public health field. True or not, these biases were debated and tested by our students

without ideology or dogma. Clearing the air, and in the spirit of moving forward with our colleagues in public health, including the authors who penned such a personal critique of our work, we explain our report's intentions and limitations below, and will include these notes in the on-line version of the report.

The Intentions and Known Limitations of our Study

1. **Disclaimers were clear.** The report states twice that the findings from analytically visualizing the *County Health Rankings* data are merely a preliminary starting point for understanding the geography of health. We clarify that the analysis "calls for additional research into the suburban/urban performance divergence" and that our analysis was "a departure point for each individual city investigation" (pg. 34). These statements precisely mirror the intended use of the county data as stated by the CDC: "The maps are presented for displaying possible geographic patterns and stimulating further investigation."[4]

2. **Large scale data is rare and local data does not answer national questions.** We were primarily interested in large scale data and began with a national scale assessment, working down to a regional scale. As one of the only national-level datasets publicly available, the strength of the *County Health Rankings* data is that it can be used for initiating a large scale study examining prevalence of health outcomes. This geographic and parameter complexity is precisely why the report states twice that the findings from analytically visualizing the *County Health Rankings* data are merely a starting point for understanding the geography of health. Again, the report appropriately used the data in question, with caveats as to its limitations.[5]

3. **We only looked at largest differences.** Our visualization was based on the actual prevalence estimates and not their rankings. As we largely analyzed areas with sizable populations, it is not likely that the 95% confidence intervals around these prevalence estimates would be so wide as to negate our basic findings. For example, in Cadwell et al. Bayesian model-based estimate of diabetes prevalence, the average width of the 95% confidence interval was 4.35%.[6] Conservative application of this margin of error in the same direction of effect to all 9 estimates yields a total difference of 40% points, which is less than the difference between many of the inner suburbs and central city. In reality, the errors around the estimates should be random and in differing directions, preserving at least some portion of the original relationships reported.

4. **Even with conservative error accounting, differences still persist.** The goal of our analysis was not to test an *a priori* hypothesis using statistical inference methods that rely on derivations of the variability of a composite health measure. Rather, we sought to create a descriptive visualization that takes into account the totality of evidence available regarding 9 different health outcomes consistently measured in a national dataset. Reporting confidence intervals for a composite score is beyond the scope of the visualization, and would be an overshoot of the intended audience. While possibly advisable to include in a technical appendix, we did not find it appropriate for an introductory text to an ongoing project. To more formally compare composite health estimates across counties, we could not simply sum the variability, as we would need to correct for covariance of the metrics within each county. However, doing so

would only reduce the total inflated error value, likely expanding the magnitude of the observed difference above. We consider this level of analysis unnecessary for an introductory report but welcome its completion should someone be willing to conduct it.

5. **Minimized data error by combining scores and looking at higher populated areas.** As stated in Athens et al., the rankings are most questionable in mid-performing counties and those with small populations. [7] The latter is generally not an issue in urban and inner suburban areas, where the vast majority of the U.S. population is located, and is the focus of our report. Additionally, because some health factors were found to be more reliable than others (for example, self-reported health matched its original ranking while premature mortality rarely did), we chose to analyze a composite measure of health, which reduces some of the noise in less precise estimates by borrowing strength from others.

6. **More caveats.** The report warns twice about the dangers of converting correlations to causation. We also point out the possibility for unobserved confounding factors to explain our findings: "There may be other critical factors that control the outcomes reported that are not easily measured or logistically obtainable" (pg.34). Our report never suggests that we are at the conclusive stage and any suggestion otherwise is a misreading of the work.

7. **Peer-reviewed reports confirm our concerns.** Three systematic reviews of the evidence linking the built environment and health outcomes have all concluded that little can be learned from the body of work on the topic due to heterogeneous methodologies and highly varying results. The report from the New England Journal of Medicine, below, even calls the impact of the built environment on health an unsupported presumption.

The Evidence

-A systematic review on the relationship of health to physical activity published in the *American Journal of Public Health* in 2012 concluded that many of the studies on the topic are observational (rather than controlled studies, whose findings are less prone to confounding factors).[8] The limitations of built environment research in relation to physical activity are numerous including limited statistical power due to small populations studied, non-generalizable settings, relative rarity of objective measurement methods, and overall invalid study design to allow for causal conclusions (e.g. a temporal relationship between cause and effect cannot be verified from measures taken at a single time point). An additional review related to the one above, in the *New England Journal of Medicine* in 2013, concludes that the association between the built environment and obesity is an unsupported presumption due to issues raised by Ferdinand et al.[9] It states that "no conclusion can be drawn" since the studies suffer from inconsistent associations (i.e. varying in magnitude and direction, pg. 451).

-A third review in *Health and Place* from 2010 complains of the "great heterogeneity" of measures, designs, and findings across studies that restricts what can be learned from this body of evidence (pg. 178).[10] Furthermore, the authors warn:

> "While there is strong intuitive appeal to the notion that the built environment must be contributing to the obesity epidemic, existing scientific evidence does not tell a clear story." (pg. 186)

-Beyond these three reviews, an overarching analysis of 36 review papers from 2002-2011, published in *Health and Place* in 2012, found consistent research gaps, methodological shortcomings, and study designs "which cannot provide strong support for causality."[11] These reviews draw the same conclusions as the CAU report – that built environment research is inconclusive about causal relations between urban form and public health, and that it would be premature to advocate any particular policy at this juncture. By any objective measure, the consistent calls for caution from these major reviews form a resounding confirmation of the CAU report by public health professionals themselves. Frumkin et al. cite none of these significant reviews. These reviews were also omitted in our final editing and layout of the report, and we acknowledge this unfortunate oversight.

The Urgent Urban Opportunity (and why we need to remove personal agendas)

The intellectual debate that should be initiated by our report and rebuttal is clear and should not be derailed: How will we proceed in the future to design healthier places to live, work, and increase the well-being of humanity. We believe this debate is crucial to the design, planning, and public health fields and should not be sidetracked by the personal attacks and inaccuracies of Frumkin et al.'s critique, which voids the debate by choosing instead to parse minor nuances of our preliminary findings as its foundation. For example, our preliminary scan of scientific literature on the subject of air pollution suggests carbon dioxide may be linked to asthma-related deaths for a variety of reasons, including the higher pollen counts and temperatures.[12] They respond by saying carbon dioxide isn't linked to asthma mortality, strictly based on their cloaked scientific definitions (pp. 3-4). When our design and planning students read a scientific paper that states "Among the non-atopic factors (of childhood asthma), the level of CO2 emissions and its respiratory health effects are among the most important,"[13] we believe there is more to study and follow up on with connections between carbon dioxide and urban health. This excites and emboldens us to find out more, to use our creative energies and complex problem solving skills to address the problem with optimism and passion. Frumkin et al.'s parsing of terms to attack us with accusations of sloppy scholarship, not only misses the point of our efforts, but obfuscates the essence of the health and urbanism research, and highlights gaps in our mutual understanding of the scientific literature. Across the first two pages of the critique, the authors allege we form various unsupported "conclusions." Frumkin et al. use the word "conclusion" ten times in two pages in reference to the essays in our report. Yet those very essays never use that word—not once. Thus, the report utilizes phrases like "little consensus" (pg. 25), "limitations" (pg. 27), and "investigation" and "finding" (pg. 34) in reference to our work rather than the more final term "conclusions." Even in scientific literature, the results and discussion sections are removed from the actual conclusions, a distinction which is summarily ignored in the critique.

We did not intend to enrage the doctors working in the field of urban health, but rather engage them with our curiosity to work side by side in mutual respect. We have much to learn together. That is why we signed on with the American Institute of Architects for the Decade of Design project. As designers,

we are ready to collaborate with the medical community and work together to solve pressing urban issues, not question their science and parse language.

Most importantly, we believe that the critical solutions that will lead to better urban health do not stop at the kinds of design elements and development templates embraced by formulaic and uncritical New Urbanist imagery of sidewalks and mixed-use streetscapes.[14] Time and time again, our students reported contradictory evidence, professional biases, and naivety in the physical outcomes described by media outlets in delivering visions of healthy city form, largely coming from distorted second hand reporting of Frumkin's and Jackson's associations with The Congress for the New Urbanism.[15] One glaring example comes from an architect who writes about suburban infill: "Dr. Frumkin's work and that of his CDC colleagues have helped recognize the links between automobile-dependent development patterns and obesity, chronic diseases, injuries, and air and water quality degradation…The confluence today of the economic crisis, health-care crisis, and environmental crisis mean we can't afford to return to gas-guzzling development patterns."[16] These assertions are categorically untrue, and as these authors describe in their own critique, and we agree, all of us should be more careful in crafting our messages so that the media does not misconstrue or sensationalize our research.[17] As these authors say in their own book and our research aligns with, "There is no simple formula for deploying design features that are shown to promote physical activity. There is no guarantee that, say, increasing density of a neighborhood will result in more physical activity of its residents."[18] As alleged by their critique of our report, we agree that media outlets can often sensationalize and twist research outcomes, such as when these scientist's good work ends up in headlines that read: "Driving makes you fat, urban sprawl bankrupts you, other life-saving new urbanist epiphanies."[19] Rather than feed that fire by attacking each other, we should be working together to craft a more educated, well-rounded message about health and urbanism.

As designers and planners, a step forward will require mutual respect from the medical community regarding urban design and city planning, and our research methods. This deserves an open mindedness regarding many types of urban form in myriad contexts, and must include innovations in cross-cutting platform technologies, mobility systems, energy storage, and environmental engineering, to name a few of the things we excel in at MIT. It needs to be stated that we **do** have considerable overlap and agreement that a simplistic reversion to traditional mixed-use neighborhoods and tree-lined streetscapes will not solve our urban health problems. Subsequently, as we enter only the second year of our decadal project with AIA, we have already reached out to form new relationships with public health and planning agencies in our selected cities for further investigation.[20]

Bias and Methods Challenges Ahead

Urban design has a strong normative component that embraces complexity. The core business is to state what *should* happen, quite often with a fair amount of intended bias and searching for extended networks that celebrates complexity. As a field, it contains a series of positions, each of which arrive at different, contradicting statements that may not yield conclusive evidence. These positions reflect ideological judgments about our society and its political choices. Science, on the other hand, operates skeptically, interrogating, identifying, and if possible eliminating bias to understand complexity in isolated, measurable moments. In this case, the roles have been reversed. The CAU research team

operated under the assumption that no bias should be taken towards a given solution before the research would allow us to draw clear recommendations. Its statements only aim to demonstrate bias where it exists, and to question and interrogate it. Strangely, in their rebuttal, the authors from the scientific community are the ones having exhibited a strong bias towards a specific position.

Frumkin et al. assert that "review articles" were already summarizing new work about city planning and health, citing his own opinion piece from 2002 as evidence.[21] Self-citation is a trend that follows this three-author group. In 2003, this same set of authors published a research agenda to assess the impacts of land use and design on public health.[22] The opening sentence claims that "the design choices we make…can have major effects on health" (pg. 1500). The citation is the exact same opinion piece used in the critique, somehow transformed into evidence that design and health have been verifiably linked. Come on, man!

Moreover, the critique's discussion of expertise suggests a misunderstanding of the role of biostatisticians. Unlike field specialists, biostatisticians focus an impartial, analytic eye on the results of any data-based research to assess their validity and potential biases. They are experts in identifying bias and flawed study design, which are clearly at play in built environment research as evidenced by the reviews above. As Eid et al. observed, the "debate over urban sprawl and obesity is ideologically charged" (pg. 399).[23] Charged research areas especially benefit from impartial, outside observers like biostatisticians and the meta-level analysis of what can be known and what is conjecture.

On the topic of food deserts, the critique authors use a subtle shift of language to falsely allege we have no support for our statements. On pg. 7 of the critique, they have shifted what we called a lack of consensus into what they term "conclusions." The cited studies are never represented as the entirety of the field. Rather, they comprise a significant dissenting voice --all three citations support our contention that consensus cannot be claimed on the food desert issue. This topic is rarely represented as the ongoing debate that it actually is. The report cites both an essay and a peer-reviewed article by Helen Lee.[24] As a historical primer on the subject, her work at the Breakthrough Institute first attempts to describe the development of the idea of "food deserts." While perhaps not recognized in the public health realm as equivalent to peer-reviewed publication, the tracing of ideological developments is a method utilized by humanities scholarship to assess the roots, sociological underpinnings, and validity of ideas that enter the cultural sphere. The limited space and rigid structure of scientific journal articles do not allow for these more fluid argument constructions which link larger cultural movements and patterns together. These patterns are not easily reducible to quantized variables in isolation and certainly not as a collective set. More recent journal articles, not available at the time of our report's production, reaffirms that a "small but growing" group of studies suggest "that poor access to food retail environments may not always be associated with poor diet and obesity in children or adults."[25] This group of studies have extra robustness due to their larger sample sizes and longitudinal designs, both of which help avoid selection bias and the spurious associations often found in cross-sectional observational studies. Both the food environment and the built environment body of work have serious structural concerns that arise in reviews. The critique authors obscure the unresolved nature of these issues by simply listing groups of studies that find their correlations yet provide no assessment of the quality of study design.

Our Future

CAU supports no singular panacea, no prescribed rules of scale for what troubles urban areas (from neighborhoods to regions) and their populations. Dynamic urban futures will require diligent, multiscalar, inventive application of both public health knowledge, design expertise, and a whole host of other networked fields. Much work is yet to be done to devise future directions for urban habitats, and CAU plans to contribute to that critical project, in expanded collaboration with unbiased professionals in the public health field. This has always been our goal.

References and Notes

[1] See notes 8-11.

[2] Phone call between Frumkin and Berger on Thursday Feb. 20, 2014. On this call Berger invited Frumkin to come to MIT to collaborate on the project with the CAU team, all expenses to be paid by CAU. Frumkin did not respond.

[3] The contributors to our course are listed on the inside cover of the report publication. In addition, our students interviewed, by phone and in person, public health and planning directors in all eight of the cities we studied.

[4] http://www.cdc.gov/diabetes/atlas/countydata/County_Methods.html

[5] Ibid.

[6] Cadwell BL, Thompson TJ, Boyle JP, Barker LE. Bayesian small area estimates of diabetes prevalence by U.S. county, 2005. *Journal of Data Science* (2010) 8(1): 173-188.

[7] Athens JK, Catlin BB, Remington PL, Gangnon RE. Using Empirical Bayes Methods to Rank Counties on Population Health Measures. *Prev Chronic Dis* 2013;10:130028.

[8] Ferdinand A, Sen B, Rahurkar S, Engler S, Menachemi N. The relationship between built environments and physical activity: a systematic review. *Am J Public Health* (2012);102:e7-e13.

[9] Casazza K, Fontaine KR, Astrup A, Birch LL, Brown AW, Bohan Brown MM, Durant N, Dutton G, Foster EM, Heymsfield SB, McIver K, Mehta T, Menachemi N, Newby PK, Pate R, Rolls BJ, Sen B, Smith, Jr. DL, Thomas DM, and Allison DB. Myths, presumptions, and facts about obesity. *N Engl J Med* (2013); 368:446-454.

[10] Feng, J., Glass, T.A., Curriero, F.C., Stewart, W.F., Schwartz, B.S. The built environment and obesity: A systematic review of the epidemiologic evidence. *Health and Place* 16 (2010):175-190.

[11] Ding, D, Gebel K. Built environment, physical activity, and obesity: What have we learned from reviewing the literature? *Health and Place* 19 (2012);100-105.

[12] Fitter AH, Fitter RS. Rapid changes in flowering time in British plants. *Science* (2002) May 31; 296(5573):1689-91.

[13] Dosanjh A. Childhood asthma and anthropogenic CO_2 emissions. *Journal of Asthma and Allergy* (2011:4):103-105.

[14] For example, see Healthy Human Habitats: Howard Frumkin at TEDxRainier, scan to 6:20 mark. http://youtu.be/UfmR0LPfBX8

[15] As an "Honorary Chair" of the Congress for the New Urbanism's 2009 meeting, Frumkin, the primary author of the critique, has aligned himself with an advocacy organization, as has Richard Jackson as CNU's plenary speaker in 2012. This bias was noted by the author of a critique of Frumkin and his author group in a 2012 book review from the *Berkeley Planning Journal*. The reviewer states that a "lack of clarity" pervades the book and makes the reader wonder "if they are getting the whole story" (pg. 249). The review goes on to call some of the content "overly deterministic" by jumping past the "complex web" of causation (pg. 249). See Riggs, W. Review of "Making Healthy Places: Designing and Building for Health, Well-Being, and Sustainability" *Berkeley Planning Journal* 25 (2012):248-251.

[16] "New Urbanism: Rx for Healthy Places" May 19-22 will explore links between development patterns and health (12/1/2009). Available online: http://www.cnu.org/cnu-news/2009/12/cdc%E2%80%99s-dr-howard-frumkin-named-honorary-chair-cnus-18th-congress

[17] It should be noted that an article that appeared in Atlantic Cities after publication of CAU's report did not include any interviews or direct conversations with any authors of the report from CAU. Available online: http://www.theatlanticcities.com/neighborhoods/2013/12/much-what-we-know-about-public-health-and-urban-planning-wrong/7886/

[18] Frumkin H, Frank L, Jackson R (2004). *Urban Sprawl and Public Health: Designing, Planning, and Building for Healthy Communities*. Island Press, Wash DC, p. 106.

[19] Linsday, G, *Driving makes you fat, urban sprawl bankrupts you, other life-saving new urbanist epiphanies*. Fast Company, May 21, 2010. Available online: http://www.fastcompany.com/1650173/driving-makes-you-fat-urban-sprawl-bankrupts-you-other-life-saving-new-urbanist-epiphanies.

[20] For example, our most recent call with the City of Houston included Jeff Taebel: Houston Galveston Area Council, Dr. Faith Foreman & Carra Moroni: Houston Department of Health, Rocaille Roberts & Bakeyah Nelson: Harris County Public Health, Patrick Walsh & Brian Crimmins: Houston Department of Planning.

[21] Frumkin H. Urban sprawl and public health. *Public Health Rep*. 2002;117(3): 201–17.

[22] Dannenberg AL, Jackson RL, Frumkin H, Schieber RA, Pratt M, Kochtitzky C, Tilson HH. The impact of community design and land-use choices on public health: A scientific research agenda. *American Journal of Public Health*. 2003;93(9):1500–1508.

[23] Eid J, Overman HG, Puga D, Turner MA. Fat city: Questioning the relationship between urban sprawl and obesity. *J Urban Econ* 2008;63(2):385–404.

[24] Lee, H. (2013). The Making of the Obesity Epidemic: How Food Activism Lead Public Health Astray. The Breakthrough Journal, Spring. http://thebreakthrough.org/index.php/journal/issue-3/ the-making-of-the-obesity-epidemic/. Also see Lee, H. (2012). The role of local food availability in explaining obesity risk among young school-aged children. Social Science & Medicine, 74(8), 1193–1203.

[25] Cummins, S., Flint, E., Matthews, S.A. New neighborhood grocery store increased awareness of food access but did not alter dietary habits or obesity. Health Affairs February 2014 vol. 33 no. 2 283-291.