Response to Invited Commentary

Mooney et al. Respond to “Observing Neighborhood Physical Disorder”

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We appreciate Dr. Jackelyn Hwang’s comments (1) on our paper in which we compared a virtual audit of Detroit, Michigan, using data from Google Street View (Google, Inc., Mountain View, California) with an in-person audit of the same city (2). Broadly, we concur with her observations regarding the benefits and limitations of virtual audits and share her excitement regarding how the technique might be leveraged in the future. We elaborate here on key points raised by Dr. Hwang, emphasizing decision points relevant to future research using virtual audits.

First, we concur that ordinary kriging, the interpolation technique that we and others have used for spatially sampled neighborhood data (3–6), does not account for block-by-block differences in neighborhood physical disorder that can arise in rapidly changing neighborhoods (7). More broadly, many built environment characteristics of researcher interest, including sidewalk accessibility (8), transit access (9–11), many aspects of urban form (12), and pedestrian safety (13) display microscale spatial patterns (i.e., block-by-block differences) that make spatial interpolation imprecise at that level of aggregation. However, these microscale patterns do not preclude the use of a virtual audit, only interpolation. That is, a virtual audit of every block in a neighborhood would capture the granular variation in these features as well as would an in-person audit of every block. Thus, researchers considering neighborhood audits should allow the expected microscale variation of the characteristics being audited to inform the sample design.

Second, we also concur that “big data” (14), such as 3-1-1 (nonemergency) and 9-1-1 (emergency) call records, could supplement virtual audits by measuring aspects of social disorder indicators that virtual audits cannot (15); however, these data may introduce biases because some demographic groups are more engaged with 3-1-1 and 9-1-1 systems than are others (16). Indeed, we expect that researchers will develop models that integrate indicators of disorder from multiple sources in future research; administrative and audit data used together in a single spatial model may provide better measurement accuracy than any one source alone. Such models, potentially leveraging universal kriging, will benefit from further work comparing the reliability and validity of available assessment techniques for similar domains of inquiry (17).

Finally, we caution researchers considering virtual audits or using other online geospatial tools that using subject’s home addresses to select block faces to audit may violate the privacy of those study subjects (18). Web browsers and virtual audit systems such as the Forty Area Study Street View (19) and the Computer Assisted Neighborhood Visual Assessment System (20) send location information to Google to identify the street segment to audit, thus passing identifying information to a third party. Spatial interpolation, as used in the present study, and spatial imputation minimize the risks of identity disclosure (2, 18).

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