ASSESSING REAL-TIME RELATIONSHIPS AMONG PHYSICAL ACTIVITY, GREEN SPACE, AND COMMUNITY DESIGN IN CHILDREN

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BACKGROUND AND AIMS: Community design to promote active living may increase physical activity and reduce obesity. The mechanisms, however, by which the built environment affects behavior are not well understood. Through the Healthy PLACES study near Chino, California, we collected objective mobility and activity data with global positioning system (GPS) and accelerometer units to study cross-sectional and longitudinal associations among community design, micro-environments, and physical activity. This 4-year, quasi-randomized, natural experiment monitors personal behavior in free-living settings for 800 participants who either recently moved to a newly developed smart-growth community or reside in nearby conventional communities. Continuous personal monitoring presents new challenges for data processing. We highlight key methods from the literature and our own experience for processing biomonitoring data. We also present results associating a remotely-sensed indicator of green space, the Normalized Difference Vegetation Index (NDVI), with physical activity
METHODS: We analyzed GPS and accelerometer measures of neighborhood activity for 208 children (30-second epochs, 7 days). Geovisualizations including kernel density surfaces of moderate-vigorous physical activity (MVPA) were generated to detect spatial patterns. We tested the effect of green space (measured by NDVI) on the within-person variation of physical activity based on 30-second epoch data in a multilevel model clustered on the individual. We included a moving average term on MVPA to address lack of independence among momentary measures.
RESULTS: Geovisualization showed MVPA patterns in proximity to neighborhood green spaces. In modeling, we found NDVI positively associated with MVPA on a momentary basis (p-value < 0.001). For greener locations the odds of MVPA increased by 35% over the 10-90th percentile increment of exposure. We found a significant interaction with the smart-growth design, with effects of green space being larger there.
CONCLUSION: Using objectively-measured physical activity and locational data we demonstrated a strong association between elevated physical activity and green space.