BIG DATA IN THE BIG EASY:

How social networks can improve the place for young people in cities.

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ABSTRACT Access to social data on human experience of place has never been more available than now. Social media, smart phones, and the internet of things provide glimpses into individual activity across the globe. The nearly-boundless stream of information is called "Big Data". Today, physically and even socially disconnected individuals can benefit from the similar experiences of others to adapt and change their environment. I argue that big data provides two critical benefits for landscape architecture research and practice: (1) big data opens a window into previously inaccessible human experience of designed environments, introducing new metrics for evidence-based design and new ways of improving design literacy; (2) the design, planning, and management of the land, especially in cities, can benefit from scraping big data to support urban ecological design. My study using YouTube in New Orleans shows that big data can advance landscape research to support positive, interdependent relationships between people and built environments. Landscape architecture would benefit by harnessing this resource to better understand relationships with place and encourage individuals to participate in the design, creation, and evolution of cities.

KEYWORDS: Big Data; YouTube; Landscape Research Methods; Urban Design; Urban Ecology;

INTRODUCTION

While debates endure about how big data infringes on individual privacy and political control, big data promises access to information otherwise unavailable. Big data, potentially, offers insights into how landscape architecture can more effectively improve the land to support an increasingly diverse, centralized human condition. Further, big data is publicly accessible, not only in terms of how it is posted or provided by individuals, but also in terms of how it is viewed by others and becomes part of their reflexive knowledge of the world. Correspondingly, big data includes a feedback loop, and, with it, an epistemological *shift* from causality to reflexivity in how we acquire knowledge of the benefits of place.

To help situate its utility within interdisciplinary research on urban landscapes, I have framed the concept of big data in an urban ecological framework. Following the suggestion of Steiner (2014, 304), because of increased urbanization and resulting impacts on ecosystems, "the most fundamental human activities involve how we use the land and shape our communities." Urban ecology, he suggests, is best suited to advance four areas: application of ecosystem services, adaptation of settlements for natural disasters, ecological renewal of degraded urban places, and ability of people to link knowledge to action to affect positive change (2014). Research to support evidence-based design in the four areas is essential for landscape architecture's future in urban development. Urban ecology provides the conceptual framework necessary for landscape architects to recognize the "restorative potential of people" and embrace how communities adapt to change (Steiner 2014). I contend that one way of accomplishing this task is by harnessing big data to find evidence of the creative capacity of people to adapt urban environments for positive outcomes.

After reviewing big data and its meaning to landscape research, I will describe how I used YouTube to study the behavior of adolescent skateboarders in New Orleans. Further, I will show how their Do it Yourself (DIY) adaptation of a degraded urban place generated healthy solutions, previously unavailable. At the end of the paper, I will discuss how the reflexive nature of big data can be used as a tool to advance urban ecological design and open a door for landscape architecture to participate in DIY (Do It Yourself) public spaces promoted through social networks. I focus specifically on adolescent skateboarders because, as indicated above, they represent a population that is (a) difficult to access and asses their needs for public space, yet the big data they generate through YouTube shows how they access and participate in public space; and (b) because they are active participants in shaping public space to accommodate needs otherwise unaddressed.

What is Big Data?

Big data is best described as the aggregation and analysis of "data trails left from our digital footprints (Chandler 2015, 837)." The majority of literature delineates that it is not so much the volume or quantity of data as it is the ability to search, aggregate, and analyze (scrape) multiple datasets of information in a manner beyond its original intent (Figure 1). As Boyd and Crawford (2012, 663) note, "big data is less about data that is big than it is about capacity to search, aggregate, and cross-reference large data sets." For example, Facebook's social network permits friends to communicate while also generating data that corporations and governments can scrape meaningful information from, like changes to product design or identify threats of terrorism. Such extracted data is useful but even in the original algorithm the data generated is highly subjective and context dependent (Boyd and Crawford 2012). In this manner, I agree with Lambrou's (2014) criticism that big data is not a mirror image of reality and the centralization of

massive amounts of context-free information for predictive modeling is likely to lead to
apophenia—seeing meaningful patterns from random data (Boyd and Crawford 2012). Her
criticism of software programs like "LakeSIM"—currently being used to simulate everyday life
for a micro-city of 50,000 residents in the new Lakeside Development in Chicago and referenced
by others as "big data" (Hammon 2015)—has been echoed by others (Boyd and Crawford 2012,
Chandler 2015) as perpetuating modern reductionist and positivistic approaches to managing
ecosystems (Gano 2015). Such models have utility for energy or transportation modeling and
have long been successfully employed by planners; however, simply because of its massive
computing power, LakeSIM does not equate as much to contemporary notions of "big data" as it
echoes the ecosystem determinism of "big science" (Aronova, Baker, and Oreskes 2010).
Instead, big data represents a radical shift in how we approach research on human networks
(Boyd and Crawford 2012). For the sake of simplicity, I will follow the interpretation of big data
provided by Chandler (2015) for the duration of this paper:

> Big Data transforms our everyday reality and our immediate relation to the things around
> us. This 'datification' of everyday life is at the heart of Big Data: a way of accessing
> reality through bringing interactions and relationships to the surface and making them
> visible, readable, and thereby governable, rather than seeking to understand hidden laws
> of causality. Big Data is generally understood to generate a different type of 'knowledge':
> more akin to the translation or interpretation of signs rather than that of understanding
> chains of causation (836).

Chandler's description fits in well with the urban ecological approach for landscape architecture
identified by Steiner. Because of its ability to render relationships visible and provide researchers
with closer to real-time feedback loops, big data is an essential tool to assist communities in

adapting and changing urban conditions in the face of urban neglect, natural disasters, and ecosystem degeneration.

How is Big Data Relevant to Landscape Architecture?

Landscape architects design, plan, and manage the land. One important outcome of successful practice is the activation of landscape to support healthy, human activity. As populations continue to centralize, the majority of human activity will be found in cities. The growing asthma, obesity, diabetes, and cardiac disease epidemics suggest that urban land could be designed to more effectively support healthy, human behaviors. The capacity for cities to positively support healthy behaviors represents an ecological imperative to developing sustainable, resilient cities (Tidball and Stedman 2013). Contemporary social ecological theories, from political, urban, and human ecology, use a framework of interdependent, nested systems (Bronfenbrenner and Evans 2000, Bronfenbrenner 1977) to contextualize correlated effects of the environment surrounding the subject. A central theme is to study how people shape cities and how cities shape people (Lefebvre 1991, Harvey 1989). While limited, some urban ecology research has been done to support this approach in the professional disciplines responsible for building cities (McHale et al. 2013, Pickett et al. 2013, Steiner 2014), such as architecture, landscape architecture, and planning, in an interdisciplinary area appropriately called *urban design*.

Urban design responds to current societal needs, ranging from public welfare to economic development, and attempts to build a more desirable future given available resources (Dobbins 2009). Policy guiding urban design is critical to ensuring equitable access to resources, an even distribution of environmental benefits and burdens to everyone, opportunities to

participate in shaping cities, and a just, sustainable quality of life (Lopez 2012, Ferguson 2009).

However, instead of approaching urban life from a perspective of interdependence, where people

shape their environment and it shapes them, urban design too often falls prey to "silver bullet"

solutions that focus on economic development and not public welfare (Dobbins 2009). Urban

design and landscape architecture would benefit from evidence for how the built environment

supports interdependencies, especially for marginalized populations and underrepresentedt

minorities to access and participate in public life. In the following I address how big data

presents one possibility towards elevating the everyday relations of marginalized people as

creative problem-solvers.

BIG DATA IN THE BIG EASY

Experience of the land, as a measure of human activity in cities, can be found in the physical and

digital traces in cities. YouTube, for example, is a nearly boundless record of human experience.

Statistics from YouTube's product page, identify that it has 1 billion users, hundreds of millions

of viewing hours daily generate billions of views, represents 75 countries and 61 languages, and

300 hours of video are uploaded every minute: source, youtube.com/yt/press/statistics.html.

While the subject in YouTube tends to be a performer or some kind of performance, what is

incredibly meaningful for landscape architecture is the context supporting the performance.

William Whyte made similar observations using intentionally directed surveillance to

study how people actually used public space (Whyte 1980). Today, the anonymous lens of a

global social network shares similar content waiting for analysis. In New Orleans, I analyzed 105

videos, extracting 256 meaningful scenes of adolescents skateboarding in known urban locations.

I then compared adolescent behaviors across physical places to identify how much of their

behavior, 23%, was significantly correlated to context using multi-level modeling, a form of non-parametric statistical analysis that nests behavior in place. The study found that adolescents' behavior was interdependent with place and that adolescents demonstrated the creative capacity to improve decaying urban environments to support their desired activity. In the following I provide the background or context that logically situates my approach to access big data, summarize how data was collected and analyzed, and discuss some potential futures for this approach in landscape architecture practice, teaching, and research.

Context Matters: Adolescents, Urban Design, and the Need for Big Data

As recommended by others (Boyd and Crawford 2012, Chandler 2015, Halavais 2015), the successful use of big data for research requires framing inquiry in a relevant and realistic manner. Globally, urbanization is a relatively recent phenomenon causing urban designers and policymakers to reconsider the place of youth in the public realm. The number of young people living in cities corresponds to increased centralization of the population; i.e. while some move to opportunity (O'Dwyer et al. 2007) others fill the vacancy. Multiple agencies (Programs 2013) have identified the process of becoming disconnected—removed from traditional support mechanisms at home or school— as a serious threat to youth outcomes due to an increasing likelihood of engaging in deleterious activities.

One way to prevent youth from becoming disconnected is to help them to engage in public life outside of home and school (Di Masso 2012). Establishing youth rights to the city is a matter that requires a two-pronged approach involving both public policy and urban design. First, policy is needed to protect access. Multiple cities and countries, including the U.S., have created strategic plans and policies to make cities more "youth friendly" (Surrey 2009, University 2010, UNESCO 2013, Ragan 2006, Kingston et al. 2007). Such policies are built

from evidence that neighborhoods and communities are important to adolescent development into competent citizens (Di Masso 2012, Weller 2003). Second, urban design is needed that affords opportunities to participate in public life (Horton and Kraftl 2009) and change the landscape in which young people have historically been designed out or boxed in (Nemeth 2006, Vivoni 2009) to isolated environments (Howell 2008). Because of unique challenges due to age and experience, adolescents' performances— on-stage activity like skateboarding, hanging-out, or dancing—in unprogrammed landscapes is simply unaccounted for in public space. Policy controls, such as loitering, or the installation of physical controls, such as skate stoppers, are post-hoc responses to inadequate design policy and practice (Figure 2). The common reasons for depriving youth of access to public space is due to changes in land value (Howell 2005) or perceived increase in criminal activity (Robinson 2005)—two factors needing further study as they relate to youth activity. The outcome of current urban strategies encourages youth to seek more extreme measures to: (a) find sites in locations further from home; (b) accept higher levels of risk associated with more confrontational settings, such as busy public areas; or, (c) discouraged from activity, supporting sedentary activity and the national tendency towards obesity (Dunton et al. 2009, Potestio et al. 2009). Addressing both policy and design is important for addressing the current state of contradictory urban design practices and policies targeted at removal, control, and prohibition.

Current theory on *rights to the city* aims to advance equitable access for adolescents, especially those with socio-economic disadvantages, to participate in urban life (Darcy and Rogers 2014, Boydell and Searle 2014, Chaskin and Joseph 2013, Ruppert 2006). Numerous studies on adolescents' right to the city have identified barriers (social, political, and physical) that limit their ability to successfully access places or opportunities to achieve healthy, positive

outcomes (Chaskin and Joseph 2013, Travlou et al. 2008, Owens 2002, Shirtcliff 2015). Many of

these studies have found that neighborhoods near their home and/or school are in a state of urban

decay, with high levels of poverty, racial segregation, and general lack of opportunity. Numerous

studies further discuss how in disadvantaged neighborhoods with exceptionally high poverty and

segregation, young people are afraid to access places outside of home and school and are often

perceived as a threat by unknown adults, other youth, and law enforcement (Anguelovski and

Martínez Alier 2014, Anthony 2008, Browning 2008, Castro and Lindbladh 2004). More recent

studies have built upon the concept of "undesirable" adolescents by identifying that even in new,

mixed income redevelopments, young people, specifically black and/or poorer adolescents, are

quickly identified as trouble-makers and laws are enforced to prevent loitering (hanging-out) by

young people (Chaskin and Joseph 2013, McCray and Mora 2011, Todd 2010). In such

communities, social and physical inequalities leveraged against young people are furthered when

economic and racial dimensions are involved. For example, Chaskin found that a single, black

teenager hanging-out on the stoop in a new mixed-income neighborhood was perceived as a

threat to a separate home-owner's property values (Chaskin and Joseph 2013). The perpetuation

of such inequality, despite the stochastic change of physical and economic neighborhood context

from concentrated poverty to mixed-income, suggests the need to better contextualize correlated

neighborhood effects on racial and economic inequality (Carter and Reardon 2014).

A fundamental component of urban design is access and participation in public space.

Access to streets, parks, plazas, and open space is an important part of maintaining a healthy

lifestyle in cities (Voorheer 2011). Participation in public places is key to the development of

competencies as citizens (Di Masso 2012, Weller 2003) and the sustainable development of

cities (Rogers 2006). Unfortunately, failing to attend to the needs of youth has contributed to a

burgeoning public health concern with a range of minor health and wellbeing problems that

originate in youth and result in a whole host of problems magnified in adulthood (Francois,

Overstreet, and Cunningham 2011, Franzini et al. 2010, Fuller-Rowell, Evans, and Ong 2012,

Gamez et al. 2004, Harden et al. 2009, Jennings et al. 2011). This sets up adolescents with

persistent problems across the lifetime. Urban designers play a key role in improving upon

existing conditions—social, natural, and physical—to create places that encourage access and

positive participation in public space (Dobbins 2009, Duany, Plater-Zyberk, and Alminana 2003,

McGlynn and Murrain 1994). However, insufficient evidence exists to support urban design to

accommodate diverse adolescent experience in public space. Young people, free of adult

supervision, represent a paradox to designers for a couple of reasons:

(1) Adolescents and their needs are characterized by something in flux: age. Their needs
    change across generations and across development from children to adults (Nelson and
    Guyer 2011, Lerner 2005). How can urban landscapes evolve to accommodate the
    changing needs of this population?

(2) Adolescents do not have equivalent experience in public space but have alternative
    perceptions influenced by racial, income, and ethnic backgrounds. How can urban space
    be leveraged to ensure equitable access and opportunity?

Research is needed to restructure contradictory urban design and policy to meet the needs of

young people. Urban design research, teaching, and practice is beginning to embrace inequality

as the defining challenge of our time. Recently, professions responsible for designing built

environments that promote healthy lifestyles have embraced the need for policies on

environmental justice and public welfare that extend beyond site safety and accessibility.[1] This

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[1] The American Society of Landscape Architecture voted on the creation of an Environmental Justice Professional
Practice Network March of 2015. The Council of Landscape Architecture Registration Board has initiated a technical
advisory group that will outline new policies for professional practice to demonstrate positive impacts to public welfare

increased attention to how built environments impact unequal outcomes due to disparate environmental contexts is largely built upon new research in public health, sociology, anthropology, psychology, epidemiology, geochemistry, and others. Environmental burdens placed on young people at an early age, especially young people in vulnerable contexts—most often minorities, immigrants, and/or impoverished—are known to have damaging life course affects (Evans and Kim 2010, Whipple et al. 2010). However, how is urban design supposed to respond to the multiple, mounting inequality challenges that confront young, vulnerable populations? Current research on adolescent disparities primarily uses macro-scale data from census and surveys or micro-scale with small samples in specific areas. I have found no study to date that conducts an in-depth examination of the relationship between place and adolescent behavior across multiple settings. Such a study has been called for from others (Chaskin and Joseph 2013), as it has important implications for adjusting urban design and policy to benefit youth.

Fortunately, young people are already navigating and overcoming a multitude of barriers identified in previous research as contributing factors to outcome inequalities. As Skinner found, neighborhoods are less "areas with well-defined boundaries and more about routes, obstacles, and safe harbors" (Skinner and Masuda 2013). Adolescent skateboarders exemplify Skinner's finding about how youth are able to navigate neighborhoods (Borden 2001, Freeman and Riordan 2002) and suggest a means of reinvestigating how cities could better serve underrepresented minorities (Fredericksen 2002). Adolescents play in cities (Karsten and van Vliet 2006) and such play has benefits in developing competencies, identity, and better

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through the design of built environments. The state of Ohio has agreed to pilot this effort and I serve on the advisory group to develop measures to assess the success of built projects to respond to issues such as inequality.

citizenship (Bradley 2010, Karsten 2005, Korpela 1992, Maddison et al. 2009). However, adolescents, especially those stigmatized by socio-economic disparities, have no right to the city as consumers or property owners (Valentine and Sporton 2009, Valentine 2003). Commonly (Figure 3.), successfully appropriated places to skateboard are removed from youth access and participation (Vivoni 2009). Zoning policies, for example, are frequently referenced to justify removing youth from successful places (Howell 2005). Current urban design and policy needs to be reevaluated to support new modes of urban practice (Finn 2014).

Limitations in research on adolescents' access and participation in public space could be met with a study that follows urban ecological theory and looks across multiple contexts to reveal how adolescents benefit from participation in public space and, similarly, how niches in public space benefit from their DIY urban design. Observing adolescent behavior in public space has long challenged researchers, as the presence of an adult often terminates youthful play (Büscher and Urry 2009, Kusenbach 2003, Voorheer 2011, Valentine 1999). An alternative approach, one that builds upon the success of niches to support play, would begin from the end, so to speak. By nesting adolescent performances within niches using a mixed-method design, multiple locations could be analyzed for further inquiry. Such data would respond to current deficits in research on adolescents' participation in public life by measuring how adolescent skateboarders manipulate environments to support positive outcomes.

Big Data Sampling Strategy: YouTube as a Research Tool

Adolescent on-stage activity is an important part of how they successfully participate in public space (Goffman 1963). Adolescents' generate big data by recording and posting skateboarding performances on YouTube. YouTube videos and the publicly available, anonymous lens of the public eye is novel to research in the design fields, but is becoming a more common data source

in social and behavioral research (Giglietto, Rossi, and Bennato 2012, Konijn, Veldhuis, and

Plaisier 2013). Giglietto comprehensively reviewed the use of social media in current social and

behavioral research (Giglietto, Rossi, and Bennato 2012). Statistical approaches, such as the

current study, focus less on the video and examine the "traces of social behavior" embedded

within the video as a window into the community responsible for it (Giglietto, Rossi, and

Bennato 2012, 151). The approach has the potential to lend critical insights into the success of

urban design to support adolescents' access and participation in public space.

I collected 104 unique videos, which had been watched by that time 254,436 times, from

online video search engines such as YouTube and Vimeo. I entered key words such as Skate,

Sk8, Skateboard New Orleans, New Orleans Skate, and combinations thereof in internet search

engines such as Google and Bing. Videos often link to one another through authors and through

comments, permitting snowball sampling. As the number of videos collected increased, the time

period of posting, within the past week or month, became a more reliable means of filtering and

identifying videos. Approximately forty hours was spent searching for and downloading videos

over the 10-month period from November to August. Videos were downloaded from YouTube in

the Mozilla Firefox browser using an extension such as "Easy YouTube Video Downloader

Express." Videos ranged in length from 20 minutes to 8 seconds with an average length of 3:30

(*SD* 3:03). All videos retrieved from online search engines were completely archived. From the

five and a half hours of video that was scanned for unique content specific to known sites in the

New Orleans, approximately one hour (54.5 minutes) from 62 videos posted by 22 unique

authors was deemed acceptable for coding. An Excel spreadsheet was used to catalogue videos

by: numeric id, coded (y/n), time duration, title, author, URL, date posted, date acquired, hits,

location, youth (y/n), gender, estimated age, type of space, primary activity, and secondary

activity. Once acquired and inventoried, each video was converted into a standard MP4 format
for coding. Videos were then coded using StudioCode—a software typically used for improving
the performance of professional athletes. StudioCode improves reliability and efficiency of
coding by using a coding map to collect information from individual scenes.

A code book was developed during the study using grounded theory to code videos.
Interrater reliability was supported by reviewing 10% of the collected material from hourly,
graduate student workers and making requisite changes until an inter-coder reliability of Cohen's
kappa (k>.75) was attained (Haidet et al. 2009). Each scene was observed and coded at least
three times for different "levels" of video content: (a) for the site location and presence of youth;
(b) for individual and peer behavior; and (c) for the social and physical environment. Depending
on the complexity, scenes were viewed repeatedly to ensure accurate video coding of all 18
measures. All inferential statistics were calculated in SPSS 19.0. Data was then analyzed in
SPSS 19.0 Mixed Models software. Online media provided numerous examples of adolescent
unstructured activity. For more detailed information on reliability, external validity, behavioral
measures, analysis, and findings see Shirtcliff 2015 (publically available from New Prairie Press
at tinyurl.com/o7dm77h). Upon successful identification of sites, I collected information on
urban context and conducted multiple site visits across the 10 month period. Data was verified
for accuracy throughout the process. Of studies with multiple sites, published results (Forsyth et
al. 2008) have relied on 20 observations per focus area for a sufficient success rate. For the New
Orleans study, the average number of observations was 8 (SD=5) due to the inclusion of low
performing sites. Average *n*'s for studies thoroughly observing *in situ* behavior typically count
from as low as 30 to as high as 700 observations, with an average around 250. At the close of
data collection, 278 separate observations were successfully identified for coding and further

analysis—placing that study well within sample size boundaries established in similar studies

(Forsyth et al. 2008, Linkletter, Gordon, and Dooley 2010).

Identifying Sites of Adolescent Skateboarding Activity

The use of YouTube as a research tool successfully lead to the identification of multiple urban

sites in New Orleans historically and actively used by adolescents for skateboarding. Several

neighborhood parks, well-known city parks, popular plazas and squares, abandoned, urban, open

space, and accessible, semi-public plazas/building entrances were the primary focus of research.

Descriptive variables from each urban setting were measured in terms of urban context, observed

social/peer context, and the specific physical features found in each location. The primary unit of

analysis was the site in which adolescents skateboard in New Orleans. Upon identifying sites,

place measures focused on the affordances of each location to support adolescent activity.

Affordances, a term developed by the ecological psychologist James Gibson, describe the extent

to which perceived environments afford, support/constrain, experience (Gibson 1979). Urban

context, social/peer composition, and physical features are categorical measures used to capture

available opportunities and limitations of sites to support niches of adolescent play. Briefly, the

measures collected from video coding, site visits, and existing data sources follow.

   Urban context measured inventory total crime, walkability, neighborhood type, census

block-level data on income and diversity, and neighborhood activity in a 500-meter radius. The

inventory documented and mapped known measures that contribute to inequality in youth

outcomes, such as visible vacancy (such as the presence of empty lots), crime, economic

viability, census data on density, income, race, families, ethnicity, and education, and land uses

in the surrounding the area (Anthony 2008, Brenner 2011, Browning 2008, Cobbina 2008,

Franzini et al. 2010, Ries, Yan, and Voorhees 2011, Voorheer 2011, Fagan, Wright, and

Pinchevsky 2015, Neckerman et al. 2009, Patnode et al. 2010, Lopez 2012). Urban activity was entered in as a nominal-level variable describing whether the area was abandoned, busy urban area with lots of traffic, minimally used but not abandoned, moderately busy, a park area, and a residential area. Walk Scores (scale ranges from 0 – 100) were gathered from the publically accessible, online database walkscore.com and entered into a GIS database. Walk scores describe the number of destinations within a quarter-mile walking distance and are commonly used represent the accessibility of a given area to support pedestrians. Total crime was downloaded from online, government-supported databases, such as crimemapping.com/. Crime statistics extended back one year from the start of the study and were updated every six-months throughout the research period. Each site and its 500-meter context was be defined by the dominant land use (residential, business, mixed-use, and destination/tourist).

Social/peer composition measured group size, group gender, non-youth users, presence of police, and confrontations. Group size was entered as an ordinal level variable describing the size of the group present from small (1–5), moderate (6–10), large (10–19) and very large (20+). Group gender accounts for the variation of sex amongst the peers from all male, presence of one or more females, to mostly female. Group race/ethnicity described variability in terms of racial and ethnic profiles of young people in each location. Observed police activity was also be entered and observed confrontations with police or authority figure were entered separately.

Physical features were continuously updated as new observations make way to new features used by youth. Physical features were entered in as rail or barriers, driveway or sidewalk or street, street furniture, gaps, ramps, steps, walls, grass, feature or planter or fountain, landing, and other, such as playground equipment. Trickability was be coded as the observed play

activity, trick type, and trick completion (Woolley and Johns 2001). Trickability accounts for the affordances of physical features to support the activity.

ANALYSIS

Developing an appropriate analytic strategy is essential to successfully incorporating big data in research. The present study used statistical models in SPSS vs. 19.0 Linear Mixed Models software. Multilevel modeling (MLM) was used to analyze play behavior across urban sites. I selected this strategy when initially designing the study because MLM permits behavioral outcomes to be nested within niches and coded data can then be used to identify patterns related to play behavior. This is important for public space because it demonstrates how the behaviors observed at each niche are similar to each other, linking adolescent behavior to public life through the affordances of each niche. Foremost, MLM does not violate the assumption of independent observations when modeling nested data, thereby permitting a more accurate, real-world assessment. This strategy permits a more reliable means of calculating the similarities of differences (i.e., residuals) within sites as variance in behavior is statistically contrasted against other behaviors observed within that site rather than other behaviors observed at any point in the study. The multilevel modeling strategy employed the build-up method as suggested by Hoffman (2007). Upon setting up the model, I measured the intraclass correlation coefficient (ICC)—a key statistic that is commonly used to evaluate similarities for several "classes" in a school. The ICC measures how well residuals are correlated and can be used to indicate the degree to which observations taken at different locations are stable within each site. Statistically, a significant ICC indicates that traditional regressions would be inappropriate as the assumption of independence was violated by collecting multiple observations within each site. Of primary conceptual interest, a high ICC indicates that observations within a site are similar to other

observations within that site and observations within each site are dependent on one another by

virtue of the niche. In the New Orleans study, a significant ICC noted that 23% of adolescent

behavior was better explained by the niche than by individual differences. Further analysis

identified that adolescents' behavior was interdependent with place, meaning that as they were

better able to appropriate and manipulate places to play, their behavior became more supportive

and less risk-taking. This was most evident when skateboarders engaged in DIY practices to

adapt underutilized, urban environments to support play.

DISCUSSION

The use of Big Data via YouTube successfully lead to the identification of multiple sites

(17) in the city of New Orleans that had been historically or recently used by adolescents for

skateboarding. Such locations and documented experiences in public space would likely never

have been accounted for without access to data spanning multiple years and locations. While the

findings from the study have been discussed elsewhere as it relates to adolescent outcomes

(Shirtcliff 2015), the study has important implications for landscape architecture research and

practice to incorporate new, comparative, and generalizable metrics from big data. For example,

despite normalizing theory associating delinquency with the unstructured activity of adolescents,

particularly skateboarders, my research began with social media to focus on a particular behavior

and found evidence that, given the opportunity, young skateboarders' successfully worked

together to improve their skills and underutilized urban locations to create new places to play. In

New Orleans, for example, the DIY skate park "Parisite" eventually became the city's first

public skate park. The founders of the park, local skateboarders, relied on contacts with design

professionals, city council, and countless volunteers to build and maintain the park. Additionally,

they relied on social tools, YouTube, Kickstarter, a blog, and Facebook, to generate awareness

and advocate for their effort (Figure 4). The park continues to help a resource deprived city create new, meaningful opportunities for adolescents to play in an area of urban decay. Also, despite the stereotypical skateboarder identity of the white, middle-class, suburban male, I found that skateboarding was a popular activity amongst all young people, regardless of gender, race, class, or ethnicity, because it is fun, cheap, easy to coordinate amongst peers, and accessible (Figure 5). I contend that such behavior is characteristic of multiple positive factors associated with positive youth development (Lerner 2005) and an example of how landscape architecture can participate in improving youth outcomes. However, current zoning, land use, and ownership policies do not support such informal urban development practices.

The findings question traditional urban design approaches by focusing on how a highly marginalized population—young people, mostly minorities and low-income—living in urban environments successfully managed to: (1) create niches that afforded positive social and behavioral developmental outcomes; and, then (2) work with the design professionals, local stakeholders, and the city government to preserve the long-term success of such niches. While the skateboarders used social media to advocate for their cause, the continued presence of this DIY site on social media and YouTube further elevates the condition of young people living in other areas of disinvestment by providing them with a precedent to engage their creative capacity and improve their own quality of life. In such manner, new, reflexive knowledge from big data addresses racial, ethnic, and income inequality by providing much needed data on urban adolescents' participation in public space and by demonstrating a pathway for disconnected young people to create effective urban design. Landscape architects can provide the research tools and practical knowledge needed to empower young people and others typically unaccounted for in urban design practice.

What are some limitations of big data?

Even though it is a relatively recent phenomenon, only receiving notoriety in the past three years, the limitations of big data have been well discussed in the literature in terms of the learning curve needed to conduct complex statistical analyses (Hammon 2015), the context-dependent nature of the source (Boyd and Crawford 2012), and challenges of an exponentially increasing scale (Crosas et al. 2015), to name a few. One highly criticized limitation—that big data can be used to create a predictive, total system approach to comprehensive design (Gano 2015, Lambrou 2014, Chandler 2015)—is largely put aside when we recognize that unlike simulations big data renders visible previously concealed individual relations. One advantage of the approach is that rather than relying on systematic case studies to identify successful urban design practices and performance metrics, comparative analyses can be conducted across multiple, designed environments to generate highly generalizable findings and support further inquiry.

The Future of Big Data for Landscape Architecture

The possibilities for big data in landscape research may be as endless as the available content, but, following the New Orleans study, I will briefly discuss three potential directions for further research and scholarship. Post-occupancy analysis of designed environments and evidence-based design have come to the fore to show how design will have social, ecological, or economic benefits. As a measure of design to support human behavior, data collection and analysis in cooperation professional landscape architects may reveal nuances currently undiscussed or considered in the design process. The outcome of such efforts would help landscape architects to improve designed environments to support human experience. Following that, as a means to encourage design thinking and design literacy, curriculum that encourages

students to explore the multifarious interpretations of urban environments available through big

data would improve the capacity for urban design to respond to an increasingly heterogeneous

community. By encouraging students to search, aggregate, and analyze human experience in

cities, future landscape architects will be better prepared to support diverse spatial practices.

Additionally, since scraping millions of videos across multiple cities is time consuming, students

would also be supporting research. The strategy supports continued research on underrepresented

populations that remain inaccessible to the design fields. As Chandler (2014, p. 842) notes, "big

data does not empower people to change their circumstances but merely to be more aware of

them in order to adapt to them." Landscape architecture has a valuable role in the adaptation of

urban environments to support people by empowering an increasingly aware population with the

tools and direction needed to improve the urban ecology of cities.

Bibliography

Anguelovski, Isabelle, and Joan Martínez Alier. 2014. "The 'Environmentalism of the Poor' revisited: Territory and place in disconnected glocal struggles." *Ecological Economics* 102:167-176. doi: 10.1016/j.ecolecon.2014.04.005.

Anthony, Elizabeth. 2008. "Cluster Profiles of Youth Living in Urban Poverty: Factors Affecting Risk and Resilience." *Social Work Research* 32 (1):13.

Aronova, Elena, Karen S. Baker, and Naomi Oreskes. 2010. "Big Science and Big Data in Biology: From the International Geophysical Year through the International Biological Program to the Long Term Ecological Research (LTER) Network, 1957–Present." *Historical Studies in the Natural Sciences* 40 (2):183-224. doi: 10.1525/hsns.2010.40.2.183.

Borden, Iain. 2001. *Skateboarding, space and the city : architecture, the body and performative critique*. Oxford [England] ; New York: Berg.

Boyd, Danah, and Kate Crawford. 2012. "CRITICAL QUESTIONS FOR BIG DATA Provocations for a cultural, technological, and scholarly phenomenon." *Information Communication & Society* 15 (5):662-679. doi: 10.1080/1369118x.2012.678878.

Boydell, Spike, and Glen Searle. 2014. "Understanding Property Rights in the Contemporary Urban Commons." *Urban Policy & Research* 32 (3):323-340. doi: 10.1080/08111146.2014.901909.

Bradley, Graham L. 2010. "Skate parks as a context for adolescent development." *Journal of Adolescent Research* 25 (2):288–323.

Brenner, Allison; Baurmeister, Jose; Zimmerman, Marc. 2011. "Neighborhood Variation in Adolescent Alcholo Use." *Journal of Studies on Alcohol and Drugs* 72:9.

Bronfenbrenner, Urie. 1977. "Toward an experimental ecology of human development." *American Psychologist* 32 (7):513-531. doi: 10.1037/0003-066X.32.7.513.

Bronfenbrenner, Urie, and Gary W. Evans. 2000. "Developmental Science in the 21 [sup st] Century: Emerging Questions, Theoretical Models, Research Designs and Empirical Findings." *Social Development* 9 (1):115-125.

Browning, Christopher; Burrington, Lori; Leventhal, Tama; Brooks-Gunn, Jeanne. 2008. "Neighborhood Structural Inequality, Collective Efficacy, and Sexual Risk Behavior among Urban Youth." *Journal of Health and Social Behavior* 49 (September):18.

Büscher, Monika, and John Urry. 2009. "Mobile Methods and the Empirical." *European Journal of Social Theory* 12 (1):99–116. doi: 10.1177/1368431008099642.

Carter, Prudence L., and Sean F. Reardon. 2014. Inequality Matters. William T Grant Foundation Stanford University.

Castro, Paula Bustos, and Eva Lindbladh. 2004. "Place, discourse and vulnerability--a qualitative study of young adults living in a Swedish urban poverty zone." *Health & Place* 10 (3):259–272.

Chandler, David. 2015. "A World without Causation: Big Data and the Coming of Age of Posthumanism." *Millennium-Journal of International Studies* 43 (3):833-851. doi: 10.1177/0305829815576817.

Chaskin, Robert J., and Mark L. Joseph. 2013. "'Positive' Gentrification, Social Control and the 'Right to the City' in Mixed-Income Communities: Uses and Expectations of Space and Place." *International Journal of Urban & Regional Research* 37 (2):480-502. doi: 10.1111/j.1468-2427.2012.01158.x.

Cobbina, Jennifer; Miller, Jody; Brunson, Rod. 2008. "Gender, Neihborhood Danger, and Risk-Avoidance Strategies among Urban African-American Youths." *Criminology* 46 (3):37.

Crosas, Merce, Gary King, James Honaker, and Latanya Sweeney. 2015. "Automating Open Science for Big Data." *Annals of the American Academy of Political and Social Science* 659 (1):260-273. doi: 10.1177/0002716215570847.

Darcy, Michael, and Dallas Rogers. 2014. "Inhabitance, place-making and the right to the city: public housing redevelopment in Sydney." *International Journal of Housing Policy* 14 (3):236-256. doi: 10.1080/14616718.2014.934157.

Di Masso, Andrés. 2012. "Grounding Citizenship: Toward a Political Psychology of Public Space." *Political Psychology* 33 (1):123-143. doi: 10.1111/j.1467-9221.2011.00866.x.

Dobbins, Michael. 2009. *Urban design and people*. Hoboken, N.J.: Wiley.

Duany, Andres, Elizabeth Plater-Zyberk, and Robert Alminana. 2003. *The new civic art : elements of town planning*. New York: Rizzoli.

Dunton, G. F., J. Kaplan, J. Wolch, M. Jerrett, and K. D. Reynolds. 2009. "Physical environmental correlates of childhood obesity: a systematic review." *Obesity Reviews* 10 (4):393–402. doi: 10.1111/j.1467-789X.2009.00572.x.

Evans, Gary W., and Pilyoung Kim. 2010. "Multiple risk exposure as a potential explanatory mechanism for the socioeconomic status-health gradient." *Annals Of The New York Academy Of Sciences* 1186:174-189. doi: 10.1111/j.1749-6632.2009.05336.x.

Fagan, Abigail A., Emily M. Wright, and Gillian M. Pinchevsky. 2015. "Exposure to violence, substance use, and neighborhood context." *Social Science Research* 49 (0):314-326. doi: http://dx.doi.org/10.1016/j.ssresearch.2014.08.015.

Ferguson, Kim. 2009. "An Ecological Model of Urban Child Health." In *Urban Health and Society*, edited by Susan Klitzman Nicholas Freudenberg, Susan Saegert. San Francisco: Jossey-Bass.

Finn, Donovan. 2014. "DIY urbanism: implications for cities." *Journal of Urbanism* 7 (4):381-398. doi: 10.1080/17549175.2014.891149.

Forsyth, A., M. Hearst, J. M. Oakes, and K. H. Schmitz. 2008. "Design and destinations: Factors influencing walking and total physical activity." *Urban Studies* 45 (9):1973–1996. doi: 10.1177/0042098008093386.

Francois, S., S. Overstreet, and M. Cunningham. 2011. "Where We Live: The Unexpected Influence of Urban Neighborhoods on the Academic Performance of African American Adolescents." *Youth & Society* 44 (2):307-328. doi: 10.1177/0044118x11399109.

Franzini, L., W. Taylor, M. N. Elliott, P. Cuccaro, S. R. Tortolero, M. Janice Gilliland, J. Grunbaum, and M. A. Schuster. 2010. "Neighborhood characteristics favorable to outdoor physical activity: disparities by socioeconomic and racial/ethnic composition." *Health Place* 16 (2):267-74. doi: 10.1016/j.healthplace.2009.10.009.

Fredericksen, E. 2002. "Architecture that shreds (Designing skateboarding parks)." *Architecture* 91 (4):46–+.

Freeman, Claire, and Tamara Riordan. 2002. "Locating Skateparks: The Planner's Dilemma." *Planning Practice & Research* 17 (3):297–316.

Fuller-Rowell, Thomas E., Gary W. Evans, and Anthony D. Ong. 2012. "Poverty and Health: The Mediating Role of Perceived Discrimination." *Psychological Science (Sage Publications Inc.)* 23 (7):734-739. doi: 10.1177/0956797612439720.

Gamez, Jorge E., Beth Ann Johnson, Martha Selva, and James F. Sallis. 2004. Violent crime and outdoor physical activity among inner-city youth. In *Preventive Medicine*.

Gano, Gretchen. 2015. "Starting with Universe: Buckminster Fuller's Design Science Now." *Futures* 70:56-64.

Gibson, James Jerome. 1979. *The ecological approach to visual perception*. Rev. ed. Boston: Houghton Mifflin.

Giglietto, Fabio, Luca Rossi, and Davide Bennato. 2012. "The Open Laboratory: Limits and Possibilities of Using Facebook, Twitter, and YouTube as a Research Data Source." *Journal of Technology in Human Services* 30 (3/4):145-159. doi: 10.1080/15228835.2012.743797.

Goffman, E. 1963. *Behavior in Public Places*. New York: Free Press.

Haidet, K. K., J. Tate, D. Divirgilio-Thomas, A. Kolanowski, and M. B. Happ. 2009. "Methods to improve reliability of video-recorded behavioral data." *Res Nurs Health* 32 (4):465-74. doi: 10.1002/nur.20334.

Halavais, Alexander. 2015. "Bigger sociological imaginations: framing big social data theory and methods." *Information Communication & Society* 18 (5):583-594. doi: 10.1080/1369118x.2015.1008543.

Hammon, Mary. 2015. "DATA-driven: leveraging the potential of big data for planning." *Planning* 81 (4):23-29.

Harden, K. P., B. M. D'Onofrio, C. Van Hulle, E. Turkheimer, J. L. Rodgers, I. D. Waldman, and B. B. Lahey. 2009. "Population density and youth antisocial behavior." *J Child Psychol Psychiatry* 50 (8):999-1008. doi: 10.1111/j.1469-7610.2009.02044.x.

Harvey, David. 1989. *The urban experience*. Baltimore: Johns Hopkins University Press.

Hoffman, Lesa. 2007. "Multilevel Models for Examining Individual Differences in Within-Person Variation and Covariation Over Time." *Multivariate Behavioral Research* 42 (4):609–629.

Horton, J., and P. Kraftl. 2009. "What (else) matters? Policy contexts, emotional geographies." *Environment and Planning A* 41 (12):2984–3002. doi: 10.1068/a41362.

Howell, O. 2008. "Play Pays: Urban Land Politics and Playgrounds in the United States, 1900-1930." *Journal of Urban History* 34 (6):961-994. doi: 10.1177/0096144208319648.

Howell, Ocean. 2005. "The "Creative Class" and the Gentrifying City." *Journal of Architectural Education* 59:32–42.

Jennings, Wesley G., Mildred M. Maldonado-Molina, Jennifer M. Reingle, and Kelli A. Komro. 2011. "A Multi-Level Approach to Investigating Neighborhood Effects on Physical Aggression among Urban Chicago Youth." *American Journal of Criminal Justice* 36 (4):392-407. doi: 10.1007/s12103-011-9118-2.

Karsten, Lia. 2005. "It all used to be better? Different generations on continuity and change in urban children's daily use of space." *Children's Geographies* 3 (3):275-290. doi: 10.1080/14733280500352912.

Karsten, Lia, and Willem van Vliet. 2006. "Children in the City: Reclaiming the Street." *Children, Youth & Environments* 16:151–167.

Kingston, B., P. Wridt, W. van Vliet, L. Chawla, and L. Brink. 2007. "Creating child friendly cities: the case of Denver, USA." *Proceedings of the ICE - Municipal Engineer* 160 (2):97-102. doi: 10.1680/muen.2007.160.2.97.

Konijn, Elly A., Jolanda Veldhuis, and Xanthe S. Plaisier. 2013. "YouTube as a Research Tool: Three Approaches." *CyberPsychology, Behavior & Social Networking* 16 (9):695-701. doi: 10.1089/cyber.2012.0357.

Korpela, K. 1992. "Adolescent's favorite places and environmental self-regulation." *Journal of Environmental Psychology* 16:221–233.

Kusenbach, M. 2003. Street phenomenology: The go-along as ethnographic research tool. In *Ethnography*.

Lambrou, Nicole. 2014. "Big data, false data, smart data, dumb data: measuring the human condition." *ARPA journal* (2).

Lefebvre, Henri. 1991. *The production of space*. Oxford, UK ; Cambridge, Mass., USA: Blackwell.

Lerner, Richard M. 2005. Promoting positive youth development: Theoretical and empirical bases. edited by National Academy of Sciences.

Linkletter, M., K. Gordon, and J. Dooley. 2010. "The choking game and YouTube: a dangerous combination." *Clin Pediatr (Phila)* 49 (3):274-9. doi: 10.1177/0009922809339203.

Lopez, Russell. 2012. *The built environment and public health*. 1st ed. San Francisco: Jossey-Bass.

Maddison, R., S. Vander Hoorn, Y. A. Jiang, C. N. Mhurchu, D. Exeter, E. Dorey, C. Bullen, J. Utter, D. Schaaf, and M. Turley. 2009. "The environment and physical activity: The influence of psychosocial, perceived and built environmental factors." *International Journal of Behavioral Nutrition and Physical Activity* 6. doi: 19

10.1186/1479-5868-6-19.

McCray, Talia M., and Sabina Mora. 2011. "Analyzing The Activity Spaces Of Low-Income Teenagers: How Do They Perceive The Spaces Where Activities Are Carried Out?" *Journal of Urban Affairs* 33 (5):511-528. doi: 10.1111/j.1467-9906.2011.00563.x.

McGlynn, Sue, and Paul Murrain. 1994. "The politics of urban design." *Planning Practice & Research* 9 (3):311.

McHale, Melissa R., David N. Bunn, Steward T. A. Pickett, and Wayne Twine. 2013. "Urban ecology in a developing world: why advanced socioecological theory needs Africa." *Frontiers in Ecology and the Environment* 11 (10):556-564. doi: 10.1890/120157.

Neckerman, Kathryn M., Gina S. Lovasi, Stephen Davies, Marnie Purciel, James Quinn, Eric Feder, Nakita Raghunath, Benjamin Wasserman, and Andrew Rundle. 2009. "Disparities in Urban Neighborhood Conditions: Evidence from GIS Measures and Field Observation in New York City." *Journal of Public Health Policy* 30:S264–S285. doi: 10.1057/jphp.2008.47.

Nelson, E. E., and A. E. Guyer. 2011. "The development of the ventral prefrontal cortex and social flexibility." *Developmental Cognitive Neuroscience* 1 (3):233-45. doi: 10.1016/j.dcn.2011.01.002.

Nemeth, Jeremy. 2006. "Conflict, Exclusion, Relocation: Skateboarding and Public Space." *Journal of Urban Design* 11:297–318.

O'Dwyer, Lisel A., Fran Baum, Anne Kavanagh, and Colin Macdougall. 2007. "Do area-based interventions to reduce health inequalities work? A systematic review of evidence." *Critical Public Health* 17 (4):317-335. doi: 10.1080/09581590701729921.

Owens, P.E. 2002. "No Teens Allowed: The Exclusion of Adolescents from Public Spaces." *Landscape Journal* 21 (1):156–163.

Patnode, C. D., L. A. Lytle, D. J. Erickson, J. R. Sirard, D. Barr-Anderson, and M. Story. 2010. "The relative influence of demographic, individual, social, and environmental factors on physical activity among boys and girls." *International Journal of Behavioral Nutrition and Physical Activity* 7. doi: 79

10.1186/1479-5868-7-79.

Pickett, S. T. A., Christopher G. Boone, Brian P. McGrath, M. L. Cadenasso, Daniel L. Childers, Laura A. Ogden, Melissa McHale, and J. Morgan Grove. 2013. "Ecological science and transformation to the sustainable city." *Cities* 32, Supplement 1 (0):S10-S20. doi: http://dx.doi.org/10.1016/j.cities.2013.02.008.

Potestio, M. L., A. B. Patel, C. D. Powell, D. A. McNeil, R. D. Jacobson, and L. McLaren. 2009. "Is there an association between spatial access to parks/green space and childhood overweight/obesity in Calgary, Canada?" *International Journal of Behavioral Nutrition and Physical Activity* 6. doi: 77

10.1186/1479-5868-6-77.

Programs, Interagency Working Group on Youth. 2013. Pathways for Youth: Draft Strategic Plan for Federal Collaboration.

Ragan, Doug. 2006. "The Youth Friendly City." Environmental Youth Alliance.

Ries, A. V., A. F. Yan, and C. C. Voorhees. 2011. "The neighborhood recreational environment and physical activity among urban youth: an examination of public and private recreational facilities." *J Community Health* 36 (4):640-9. doi: 10.1007/s10900-010-9355-1.

Robinson, C. 2005. "Grieving home." *Social & Cultural Geography* 6 (1):47–60. doi: 10.1080/1464936052000335964.

Rogers, Peter. 2006. "Young people's participation in the renaissance of public space - a case study in Newcastle upon Tyne, UK." *Children, youth and environments* 16 (2):105–130.

Ruppert, E. S. 2006. "Rights to public space: Regulatory reconfigurations of liberty." *Urban Geography* 27 (3):271–292.

Shirtcliff, Benjamin. 2015. "Sk8ting the Sinking City." *Interdisciplinary Environmental Review* In Press.

Skinner, Emily, and Jeffrey R. Masuda. 2013. "Right to a healthy city? Examining the relationship between urban space and health inequity by Aboriginal youth artist-activists in Winnipeg." *Social Science & Medicine* 91:210-218. doi: 10.1016/j.socscimed.2013.02.020.

Steiner, Frederick. 2014. "Frontiers in urban ecological design and planning research." *Landscape and Urban Planning* 125 (0):304-311. doi: http://dx.doi.org/10.1016/j.landurbplan.2014.01.023.

Surrey, City of. 2009. Creating A Child and Youth Friendly City: What Does It Mean?

Tidball, Keith, and Richard Stedman. 2013. "Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems." *Ecological Economics* 86:292-299. doi: http://dx.doi.org/10.1016/j.ecolecon.2012.10.004.

Todd, Dugald McConnell and Brian. 2010. "Anti-loitering 'Mosquito' debuts in D.C." *CNN.com*. http://www.cnn.com/2010/US/09/03/district.of.columbia.noisemaker/index.html?hpt=C2.

Travlou, Penny, Patsy Eubanks Owens, Catharine Ward Thompson, and Lorraine Maxwell. 2008. "Place mapping with teenagers: locating their territories and documenting their experience of the public realm." *Children's Geographies* 6 (3):309–326. doi: 10.1080/14733280802184039.

UNESCO. 2013. Young People Today. Time to Act Now. edited by UNESCO. Paris, France.

University, Redland City Council and Urban Research Program Griffith. 2010. Redland City Council: Child and Youth Friendly City Report.

Valentine, G., and D. Sporton. 2009. "`How Other People See You, It's Like Nothing That's Inside': The Impact of Processes of Disidentification and Disavowal on Young People's Subjectivities." *Sociology* 43 (4):735-751. doi: 10.1177/0038038509105418.

Valentine, Gill. 1999. Being Seen and Heard? The Ethical Complexities of Working with Children and Young People at Home and at School. In *Ethics, Place & Environment*: Routledge.

Valentine, Gill. 2003. Boundary Crossings: Transitions from Childhood to Adulthood. In *Children's Geographies*: Routledge.

Vivoni, F. 2009. "Spots of Spatial Desire Skateparks, Skateplazas, and Urban Politics." *Journal of Sport & Social Issues* 33 (2):130–149. doi: 10.1177/0193723509332580.

Voorheer, Carolyn; Yan, Alice; Clifton, Kelly; Wang, Min. 2011. "Neighborhood Environment, Self-efficacy, and Physical Activity in Urban Adolescents." *American Journal of Health Behavior* 35 (6):16.

Weller, S. 2003. "Teach us something useful": contested spaces of teenagers citizenship. In *Space and Polity*.

Whipple, Sara Sepanski, Gary W. Evans, Rachel L. Barry, and Lorraine E. Maxwell. 2010. "An ecological perspective on cumulative school and neighborhood risk factors related to achievement." *Journal of Applied Developmental Psychology* 31 (6):422-427. doi: 10.1016/j.appdev.2010.07.002.

Whyte, William Hollingsworth. 1980. *The social life of small urban spaces*. Washington, D.C.: Conservation Foundation.

Woolley, Helen, and Ralph Johns. 2001. "Skateboarding: The City as a Playground." *Journal of Urban Design* 6:211–230.