Published in final edited form as:
J Environ Psychol. 2009 December 1; 29(4): 485–492. doi:10.1016/j.jenvp.2009.08.004.

The Relationship of Place to Substance use and Perceptions of Risk and Safety in Urban Adolescents

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1. Introduction

A small body of research has demonstrated that subjective ratings of the physical and social characteristics of home neighborhoods have been found to be important and strong predictors of behavior such as substance use and mental health outcomes (Ellaway, Macintyre, & Kearns, 2002; Golledge & Stimson, 1997; Kawachi & Berkman, 2003; Lambert, et al., 2005; Latkin & Curry, 2003). Similarly, qualitative studies have shown that perceptions of particular places are thought to influence health and health related behaviors and are particularly suggestive of causal pathways linking place with health outcomes (Airey, 2003; Popay, Thomas, Williams, Bennett, Gatrell, & Bostock, 2003). What is less clear is how place is perceived by individuals within the context of their routine activities, or activity spaces- not just home locations- and how these unique place-based interpretations are linked to particular health behaviors such as substance use. Research that explores perceptions and objective indicators of activity spaces' risk and safety, and associated health outcomes, is likely to produce important new methods and findings (Hirsch, 2005; Korpela, Kytta, & Hartig, 2002; Korpela & Ylen, 2007; Twigger-Ross, Bonaiuto, & Breakwell 2003;Winkel, Saegert & Evans, in press).

An important construct that provides methodological guidance for spatial processes is activity space. Activity space has an interdisciplinary history with disciplines such as geography, public health, sociology, transportation studies, time-space studies, social psychology, and human-

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environment interactions. It can be defined as all the locations that an individual has direct contact with as a result of his or her daily activities (Miller, 1991). More broadly, activity spaces are the manifestation of our spatial lives, serving as an index representing routine locations and all the accompanying psychological, social, and health related experiences of these places (Golledge & Stimson, 1997; Sherman, Spencer, Preisser, Gesler, & Arcury, 2005). Recent research with urban youth informs us that the type of locations in which youth spend their time are varied and geographically dispersed, and are not delimited by traditional geographical boundaries such as census tract, home neighborhood, block group, or political ward (Mason, Cheung, & Walker, 2004). It is due to this unique spatial behavior of urban youth that traditional geographic boundaries are not effective in capturing teens' spatial signatures and associated health outcomes.

Often, researchers quantify environmental influences on human behavior by simply tallying geographic features hypothesized as risky within prescribed locations. For example, one may count the number of liquor stores within the census tract where someone lives to investigate how the availability of alcohol influences alcohol abuse. Recent research asserts, however, that this approach fails to address the primacy of meaning of place for individuals (Frohlich, et al., 2002; Cummins, Curtis, Deiz-Roux, & Macintyre, 2007). Likewise, we argue here that the meaning ascribed to various places is important, and is linked to and expressed through social practices and health behaviors. Specifically, the interpretation of meaning of places is the psycho-social mechanism by which geographic features exert influence on individuals. Therefore, without understanding the interpretative meaning of places by individuals, researchers mistakenly apply nomothetic approaches to idiographic problems (Daykin, 1993; Pavis, Cunningham-Burley, & Amos, 1997; Popay, Williams, Thomas, & Gatrell, 1998; Frohlich, et al, 2002; Goodchild & Janelle, 2004; Cummins et al, 2007). A goal of this study is to integrate data reflecting the meaning adolescents' ascribe to risky and safe activity spaces and to compare these perceptions with objective measurements of risk and safety for the same locations.

1.2. Theoretical Framework

Foundational to our theoretical framework is Bronfenbrenner's (1979) work on the social ecology of human development that provided a language to organize the interaction between the developing person and their environment. Specifically, this study is guided by the more recent Bioecological model (Bronfenbrenner & Morris, 1998) that understands individuals through an interaction of the developmental processes and social and environmental contexts that produces outcomes of competence or dysfunction. This model has demonstrated that without strong, close, overlapping connections between youth and their nested, interrelated systems, such as peers and neighborhoods, healthful development is threatened. In the present study, substance use is regarded as a dysfunctional outcome that is a product of individual, social, and environmental factors.

The present research advances the literature by focusing on independently measured conditions of participants' weekly routine locations (activity spaces) that go beyond residential location. Further, these objectively measured conditions are compared with adolescents' perceptions of their activity spaces in terms of safety and risk. Finally, our study uses both subjective (perceptions of spaces) and objective (physical environment) data to test associations with our primary outcome variable of interest, substance use involvement. In total, the present study addresses several recent recommendations made by Winkel, Saegert, & Evans (in press) for environmental psychology research: (1) studying environmental, social, and cultural contexts, (2) employing new measurement approaches to model multiple environmental contexts, (3) involving temporal factors, and (4) using both self-reports and objective environmental data.

1.3. Research Questions and Hypotheses

We focused on two primary research questions to guide our analyses and to frame our hypotheses: 1) How do subjects characterize and interact with their activity spaces in terms of risk and safety, and are there differences by substance use involvement, and 2) do adolescent perceptions of relative risk and safety differ from observed geographic characteristics which theory suggests actually make a place safe or risky? Based on the Bioecological model and the existing literature, we hypothesized that adolescent activity space locations, perceptions of safety and risk, and time spent at these locations would vary by substance use involvement. We further hypothesized that locations perceived as risky would be associated with a concentration of observed risky features, such as crime, vacant housing, poverty, and alcohol availability, as compared with locations perceived as non-risky. Finally, we hypothesized that locations perceived as safe would be associated with observed protective features such as recreation centers, churches, and after-school programs as compared with locations perceived as non-safe.

2. Data and Methods

2.1 Participants

The sample comprised 301 adolescent primary care patients at a Philadelphia Department of Public Health, health care center. Table 1 presents demographic data for this sample. As indicated in the table, the sample was 87% African American and 13% self-identified as mixed or other race/ethnicity, with the majority (60%) female which corresponds with other primary care gender distributions (Mason, et al, 2004). The high African American rate is representative of the urban area served by the health care center. Nearly one third- 30% - of subjects were living below the poverty line and 14 percent were on public assistance. Participants were eligible for the study if they met the requirements of age (13–20 years), Philadelphia residence, free from major mental health disturbance (active psychosis would exclude a patient from completing the interviews), literate or fluent in English, and for minor patients be accompanied with parents or legal guardians capable of providing informed consent.

2.2. Procedure

Parents or guardians of all adolescent patients were approached in the clinic waiting area, the study was explained, and eligibility screening questions were asked. Families who met eligibility requirements were recruited to participate in the study. Adolescents over 18 were approached directly while they waited for their appointments. Written informed consent was obtained from all parents and/or adolescent participants. Nominal incentives were used to acknowledge participants' time and effort and the study's consent rate was 90%. Participants completed a comprehensive battery of psychosocial and geographic study measures. Measures were administered in private (i.e., in a separate room from parents to protect patient confidentiality and obtain more valid data) and the procedure generally lasted 45 minutes or less. The first author's university and the city of Philadelphia Health Department's institutional review boards approved the research protocol and the study received a federal certificate of confidentiality. Substance use data was purposely collected to create two groups equally divided by substance users (n=151) and non-users, those who report never having used substances or having not used substances within the last year (n=150), creating a total sample of 301 adolescents.

2.3. Measures

All assessments were conducted by masters-level mental health counseling graduate student interviewers. All interviewers completed a training protocol that included role-play training, written critiques, and ongoing weekly supervision to ensure the collection of high-quality data

with each interview. Individual background characteristics such as age, sex, race/ethnicity, and social economic status of all participants were assessed.

2.3.1. Substance Involvement Measure—Substance involvement was measured with the Adolescent Alcohol and Drug Involvement Scale (AADIS) (Moberg, 2005). The AADIS is a brief measure of the level of alcohol and drug involvement in adolescents for use as a research tool and is highly accurate in differentiating between those who do not have any substance use disorders and those that have at least one (Winters, 2001). The AADIS has favorable internal consistency reliability (Cronbach's alpha .94) and correlates highly with self-report measures of substance use (r =.72) and with clinical assessments (r = .75), and with subjects' perceptions of the severity of their own drug use problem (r = .79).

2.3.2. Activity Space Measure—Activity space data were captured from the Ecological Interview (Mason, Cheung, & Walker, 2004) which produces a location-specific listing of the teen's weekly routine locations, as well as participant evaluations of these various locations. The Ecological Interview is a structured interview that uses a method known as "Free Listing" where participants are asked to list and describe all the elements that are part of a particular domain of interest, in this case weekly locations (Weller & Romney, 1988) and Recall Method (Verma & Saraswathi, 1992) where respondents report on their activities in sequential order for a given reference period, in this case one week. The Ecological Interview produces accurate and valid geographic data with previous studies successfully identifying and geocoding 90% of the collected geographic data (Mason, et al., 2004). Teens are asked to identify specific geographical information of their locations in a priority order such as (a) complete addresses if known, if not then (b) cross streets, and lastly,(c) names of known landmarks such as parks, subway stations, and the like that are close to the participants' activity space location. Subjects are asked to identify the mode of transportation, time of presence, day of the week, and duration of stay for each of these locations. Participants are asked which place from their locations is the (a) most important; (b) the safest; (c) the riskiest; and (d) their favorite. Safe places were defined as (safest place from harm, danger, or the likelihood of engaging in risky or dangerous activities) and risky places were defined as (the place where you are most likely to engage in risky or dangerous activities, cause trouble, or do illegal activities). For the present study, we only utilized locations perceived as safe or risky.

Subjects are asked when they identified a location as either safe or risky, "*What makes this place safe/risky*?" All responses were coded into four categories based upon similar research on adolescent place and emotional regulation (Korpela, 1989, 1992; Korpela, et al., 2001;Korpela & Ylen, 2007). Social reasons (based on peers, families, others), Environmental reasons (based on the setting), Psychological reasons (based on internally-focused responses such as comfort, calmness, security), and Individual Activity reasons (based on activities done alone, such as running, smoking). Coding procedures followed established practices with coded data checked for reliability between two research team members' final codes (Trotter, 1995). Inter-rater reliability was established using a Kappa statistic set at >.81 coefficient, with project coders reaching a Kappa of .85, indicating almost perfect strength of agreement (Landis & Koch, 1977).

2.4. Geographic Data Collection

We collected a variety of data that reflected the characteristics of the subjects' residential and activity space locations. These data were intended to capture a variety of geographic characteristics that have been theorized to influence adolescent substance use, including alcohol and drug availability, as well as indicators of the neighborhood's socioeconomic status and social disorganization. We grouped our geographic data into five categories to reflect their influence on adolescent behavior: adolescent programs (e.g. recreation centers), crime (e.g.

arrests for violent offenses), socioeconomic status (e.g. median household income), physical characteristics (e.g. zoning), and drug and alcohol use and/or availability (e.g. bars).

These data were acquired from a variety of sources, including various agencies of the City of Philadelphia, such as the Philadelphia Police department; the websites of various organizations, such as Alcoholics Anonymous (AA); online listings in the digital yellow pages; the Pennsylvania State Liquor Control Board (PLCB), the state agency that licenses all alcohol sales outlets in Pennsylvania; and the 2000 U.S. Census. Table 2 shows the 16 types of geographic feature data we collected based upon Social Disorder theory (Sampson, Raudenbush, & Earls, 1997) and our previous research in an effort to continue to test specific point locations for risk or protection of substance use and mental health outcomes.

2.5. Analytic Plan

Each home and activity space location provided by each subject was converted to a text format street address and geocoded using GIS. The 301 subjects listed 1,174 total locations, including home locations. The geocoding process ingests a list of street addresses and outputs a map of those address locations for integration with other spatial data, such as the other Census and feature data we collected. Geocoding yielded a map of 1,025 locations, a success rate of 87%. As a general rule of thumb, geoocoding success rates of greater than 85% are acceptable (Ratcliffe, 2004) due to street name misspellings or other errors.

GIS was used to identify spatial relationships between subjects' home and activity space locations and the Census data and other spatial data in order to generate a set of geographic characteristics for each subject's various types of locations. We hypothesized that certain geographic features had a direct effect on a subject's substance abuse behavior; for example, proximity to a bar selling packaged beer is likely to affect the likelihood of consuming alcohol. For features such as these we measured the distances from each subject's home and activity space locations to the nearest feature of that type (e.g. a bar), and encoded this distance as a variable. Other geographic features may best be viewed as indicators of the general character of the neighborhood. For example, arrests for violent crimes may be an overall indicator of criminal activity and social disorganization in the neighborhood and therefore have more of an indirect influence on substance use. For these features, we calculated the number of these features (e.g. violent crime arrests) within a distance of 500 meters from each location, a standard GIS density estimation procedure (Bailey and Gatrell, 1995), and encoded that density as a variable. Census data are available in aggregated form according to spatial units. We acquired Census data at the Census block group level, the smallest unit for which all our variables are available. Census variables were attached to a location based on the block group within which the location is contained. Zoning classification was attached to a location based on the zoned land use of the host (or nearest) parcel. Table 2 reports descriptive statistics for all geographic variables.

Statistical methods focused on comparing the geographic characteristics of risky versus non-risky, and safe versus non-safe, locations for both adolescent substance users and non-users. We employed the Mann-Whitney U test to determine whether there were significant differences between types of locations in the ranks of the means of continuous geographic variables. These tests were carried out to differentiate between the geographic character of subjects' home and activity space locations, as well as for substance users and non-users separately. For comparisons between types of locations with regards to zoning, which is a categorical variable, the Chi-square statistic was used.

3. Results

3.1. Characterization of home and activity spaces

Home is perceived to be a safe place far more often than a risky place, despite the fact that many of the subjects lived in neighborhoods characterized by theoretically risky properties, such as high levels of violent crime and drug sale arrests. However, less than half of the entire sample (48%) rated their home as their safest place. Subjects were also asked when they identified a location as either safe or risky, "*What makes this place safe/risky*?" For safe locations the results were distributed as: social reasons 50% (based on peers, families, others); psychological reasons 31 % (based on internally-focused responses such as comfort, calmness, security); environmental reasons 17% (based on the setting); and individual activity reasons 2%. Risky locations were distributed as: social reasons 59%; environmental reasons 40%; and psychological reasons 1%.

These reasons for safety and risk were tested by gender, age group, and substance use involvement, with differences found between younger (13–16) and older adolescents (17–20) regarding their reasons for safe locations, with the younger group providing social reasons more than older adolescents χ^2 (3, N=301) =8.181, *p*.<.05. Consistent with our first hypothesis, table 3 displays activity space locations (non-home) perceived as risky and safe differentiated between substance users and non-users. A Pearson Chi-square test indicated that substance use classification (user vs. non-user) was not independent from the listed safe locations χ^2 (8, N=301) =15.78, *p*.<.05 or risky locations χ^2 (7, N=301) =18.53, *p*.<.01. That is, the kinds of locations that participants identified as safe or risk varied in part because of substance use patterns.

Further Chi-Square analyses indicated that substance use classification was also not independent from subjects nominating their school as a safe place χ^2 (1, N=301) = 5.059, *p.* <. 05, or a risky place χ^2 (1, N=301) = 7.589, *p.* <.01. Non-substance users were 1. 4 times as likely to perceive their school as safe compared to substance users and 1.5 times as likely to perceive their school as risky compared to substance users. Recall that subjects were asked two separate questions about safety and about risk, so that two distinct comparisons were made about one location such as school. Therefore, more non-users perceived their schools as safe compared to substance users and when asked separately, more non-users perceived their schools as risky relative to substance users' perceptions of schools. Substance users then, were more likely to perceive their schools as neither risky nor safe, compared to non-users. This finding is discussed later in this paper in light of a proposed "heightened environmental sensitivity of non-users" hypothesis that interprets these differences. Another Chi-Square test also revealed substance use classification was not independent from subjects perceiving city places as a safe place χ^2 (1, N=301) = 6.671, *p.* <.05, with non-substance users 2. 7 times less likely to perceive city places as their safest place compared to substance users.

A final Chi-Square test found that substance use classification was also not independent for the day of the week and the length of time spent at subjects' risky locations. Substance users were 1.6 times as likely to spend more than 2 hours in their risky locations compared to non-users χ^2 (4, 301) =14.382, *p*<.01, and non-substance users were also 1.7 times as likely to go to their risky locations on weekdays versus weekends compared to substance users χ^2 (3, 301) =27.176, *p*<.001.

3.2. Observed geographic characteristics of perceived safe and risky locations

Initial exploratory analyses demonstrated that relationships of perceived safety and risk with observed geographic characteristics differed markedly between home and activity space locations. We therefore separated our locations into home and activity space groups, as well

as into substance user and non-user groups, to further investigate the differences in geographic character between perceived safe and risky locations. Table 4 reports the results of the Mann Whitney U tests comparing the observed geographic characteristics of perceived safe and non-safe home locations for adolescent substance users and non-users are reported in Table 4. Notably, there are no differences in the observed geographic characteristics of perceived safe and non-safe home locations. This is true for both substance users and non-users, with the sole exception being that substance users' safe locations are likely to farther from a recreation center. An analogous statistical test of comparing risky and non-risky home locations was not performed because there were only seven home locations perceived as risky.

Unlike home locations, differences in observed geographic characteristics between perceived safe and risky places were found for activity space locations. Table 5 shows the results of Mann Whitney U tests that compare the geographic characteristics of risky versus non-risky activity space locations, for both adolescent substance users and non-users. For substance users, risky places tend to be farther from churches and nearer to restaurants and bars serving alcohol, compared to non-risky places. For non-substance users, risky places tend to be located in neighborhoods with a relatively low proportion of African American, and high proportion of foreign-born, residents. Risky places for non-users also tend to be located nearby pawn shops.

Table 6 shows the results of Mann-Whitney U tests that compare the observed geographic characteristics of safe versus non-safe locations, for both substance users and non-users. For substance users no differences in geographic characteristics were found to distinguish between their perceived safe and non-safe places. Perhaps counter-intuitively, for non-users, safe places tend to occur in areas with a high concentration of drug selling arrests. More expected, safe places for non-users tend to be far from restaurants and bars selling alcohol and are relatively far from Alcohol Anonymous meetings.

Table 7 reports the results of a chi-square tests comparing commercial, residential and industrial zoning classifications for risky versus non-risky, and safe versus non-safe, locations, for both substance users and non-users. Risky places for both groups tend to occur disproportionately in commercial, as opposed to residential areas. For non-users, safe places tend to occur disproportionately in residential areas. This is not the case for substance users, for whom safe places are not concentrated in a particular type of zoned land use.

4. Discussion

The present study revealed that environmental characteristics influence urban adolescents' perceptions of safety and risk and that these perceptions vary between substance users and non-users. This study also supported the importance of investigating adolescents' routine locations (activity space) instead of using only their home location. Very few studies have taken into account the kinds and amount of objective spatial data that we used (16 different geographic variables) and coupled these data with perceptions of places. We maintain that this unique data collection methodology and database advances the field and can serve as a model for future prospective, longitudinal studies. In all, these findings add to the small, but growing literature on adolescent activity space as a robust mechanism to understand health outcomes and to develop contextually influenced interventions.

4.1. Geographic differences in activity spaces

One of the most important findings in the present study is that we found no differences between safe and non-safe places with regards to geographic character (e.g. density of crimes, distance from bars, etc.) for substance users. In contrast, non-substance users had significant differences between their safe and non-safe locations with regards to certain geographic characteristics. Two interpretations are offered. First, the non-users are locating safe places in areas that are

similar to their home neighborhoods. For non-users, contrary to risky places, safe places can be understood as those settings where there is more similarity to the subject's home neighborhood regarding race and ethnicity, poverty, and crime levels. Unfortunately for many of these adolescents, drug sales and poverty are indicators of similarity with their home environments. Nevertheless, safety is perceived not due to number of crimes or poverty levels, but is due to the social-psychological interaction occurring within familiar settings. For these youth safety is experienced through concerns about, (a) degree of similarity to their homes relative to racial and ethnic compositions, (b) degree of similarity to their homes relative to crime and poverty, and (c) how all these characteristics shape their subjective meaning-laden interpretations of these locations.

4.2. Heightened environmental sensitivity

A second related interpretation is that non-using teens may have a heightened sense of safety or a more sensitive discriminative ability of safety relative to their substance using peers. That is, they are more likely to interpret their safe locations in ways that correspond with observed safe features surrounding their safe locations. Non-users may perceive their environments through more nuanced interpretative frames and thus are more aware of environmental similarities (race/ethnicity, SES, crime) as well as risky locations, such as bars and even schools. This same level of awareness or sensitivity may not be as developed with substance users, or it may not be as important to them.

4.3. The importance of meaning-informed data

The above interpretations emphasize the importance of collecting meaning-informed data on perceptions of places along with objective counts of geographic features. For example, the answers adolescents gave to the question, "what makes this location safe?" highlights meaning-informed data collection. Recall that the reasons most subjects gave for a location being safe was with socially-based reasons (who is at the location). The next most common way that subjects described their safe locations was with psychological reasons, using words such as comforting, relaxing, no worries, trust, and fun. These psychological reasons were often paired with a social explanation, e.g., "My family is there and so I feel relaxed and calm." In contrast, for risky locations, only 1% of all reasons were categorized as psychological. These explanations add support to the quantitative findings and highlight the social-psychological nature of safe locations for these adolescents. Based on these data, a location is perceived as safe through interactions between the social context of the setting and one's psychological response to the social context.

The common interpretation for both substance users and non-users nominating *city places* as the most risky location is logical and is also supported by the explanation that these locations are regarded as risky for social (59%) and environmental (40%) reasons. Many of the subjects' explanations for risk were a blend of social and environmental reasons, such as, "There's lots of dangerous people around and it's a wide-open place." A common environmental reason for the safety or risky quality of a location was related to the concepts containment ("I am inside where it's safe.") and exposure ("You're wide open to whoever's there."). These reasons can be seen as critical and important survival skills for an often dangerous city. Using phrases like "lots of killing going on" or "anything can happen," and, "it's crazy there," to describe risky settings represent typical responses for many adolescents in our study. Thus, risky locations, whatever their type, (school, friend's home, park) appear to be perceived as risky due to interactions between risky people and risky settings.

4.4. Temporal differences and geographic risk exposure

The findings related to temporal differences between substance users and non-users supports the idea of risk exposure as related to duration of stay and day of the week. Even though users

and non-users are often nominating similar types of risky locations, the non-users are spending less time in these settings and are also limiting their interactions with risky settings to weekdays instead of weekends, and for less than 2 hours. This finding makes sense and can have implications for parenting practices- limiting time in risky settings to durations of less than 2 hours and on weekdays could be a simple, yet effective, protective parenting practice. As the research on adolescent time use indicates that increased amounts of unstructured time with peers increases the risk for deviant behavior such as substance use (Larson & Seepersad, 2003; Massimini & Delle Fave, 2000), it would follow that greater amounts of time in observed risky locations would further increase this risk, thus supporting the protective practice of limiting time in high-risk locations.

4.5. Geographic differences of risky locations by substance use involvement

The observed geographic differences found between substance users and non-users safe and risky locations are also very informative. These data provide objective insight into subjects' perceptions of safety and risk by examining observed risk and protective features that are most proximal to subjects' activity space locations. For example, the substance users' risk locations are closer to bars compared to the non-users' risk locations. Non-substance users locations can be characterized as having less African Americans and more foreign born residents, and can be broadly understood as places that are 'different' from their home neighborhoods. That is, locations with different demographic constitutions are associated with increased risk for non-substance users. It is interesting that other studies with urban youth have found that less homogeneity increases risk for poor outcomes, including substance use (Elliott, Menard, Rankin, Elliott, Wilson, Huizinga, 2006).

4.6. Limitations

There are limitations that should be considered when interpreting the findings from this study. First, the cross-sectional nature of our design limits our understanding of the causal processes behind many of the associations revealed in this study. In particular, when examining adolescent outcomes, being able to estimate the duration of these findings across time would be beneficial. Second, our assessment, while extensive in many regards, did not capture family measures as thoroughly as possible. We were limited to one scale within a measure that focused on parent relations from the adolescents' perspective. Clearly, understanding more of the family history and functioning would have added another important dimension to these data. Finally, more study is needed on why some adolescents are not using substances given the prevalence of the problem and the accompanying social and environmental risks. Addressing the non-users in more detail will inform future prevention-based research and intervention and thus needs to be considered.

4.7. Conclusions

Despite these limitations, our unique and detailed spatial examination of urban adolescents provides insight into the correlates of place and health behaviors. Four primary contributions were highlighted: (a) understanding the interactive nature of activity space (routine locations), meaning, and health for urban adolescents, (b) the variation of how, why, and when places are perceived as safe or risky, (c) the problem of assuming high-risk neighborhoods are experienced in a homogenous manner, and (d), the geographic differentiation of activity spaces by substance use classification. This study provides a foundation for testing longitudinal designs that ultimately could inform contextually-based preventive programming. By continuing to study the social-spatial lives of urban adolescents, it is reasoned that contextually-based interventions would provide meaningful relevance, and therefore would be likely to better engage urban youth.

Acknowledgments

The project described was supported by Award Number R21DA020146 from the National Institute on Drug Abuse. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institutes of Health. The project would not have succeeded without the cooperation of the Philadelphia Department of Public Health, the efforts of project coordinator, Amber Pomponio, MPH, interviewers Kayilu Sovinho, M.S. & Doris Valez, M.S., and data management Brittany McVaugh, Lynn Camire, and Dana Belletiere.

References

Airey L. “Nae as nice a scheme as it used to be”: Lay accounts of neighbourhood activities and well-being. Health & Place 2003;(2):129–137. [PubMed: 12753796]

Bailey, TC.; Gatrell, AC. Interactive Spatial Data Analysis. Longman, AW., editor. Harlow: Essex; 1995.

Cummins S, Curtis S, Diez-Roux AV, Macintyre S. Understanding and representing 'place' in health research: A relational approach. Social Science and Medicine 2007;65(9):1825–1838. [PubMed: 17706331]

Cummins S, Macintyre S, Davidson S, Ellaway A. Measuring neighbourhood social and material context: Generation and interpretation of ecological data from routine and non-routine sources. Health & Place 2005;11(3):249–260. [PubMed: 15774331]

Daykin N. Young women and smoking: Towards a sociological account. Health Promotion International 1993;8(2):95–102.

Dembo RB, W.R., Schemidler J, Burgos W. Perceived environmental drug use risk and the correlates of early drug use or nonuse among inner-city youths: The motivated actor. The International Journal of the Addictions 1986;21:977–1000. [PubMed: 3491796]

Duncan C, Jones K, Moon G. Smoking and Deprivation: Are there Neighbourhood Effects? Social Science and Medicine 1999;48(4):497–505. [PubMed: 10075175]

Ellaway A, Macintyre S, Kearns A. Perceptions of place and health in socially contrasting neighbourhoods. Urban Studies 2002;38:2299–2316.

Elliott, S.; Menard, S.; Rankin, B.; Elliott, A.; Wilson, WJ.; Huizinga, D. Good Kids from Bad Neighborhoods: Successful Development in Social Context. Cambridge University Press; 2006.

Fagg J, Curtis S, Clark C, Congon P, Stansfeld S. Neighbourhood perceptions among inner-city adolescents: Relationships with their individual characteristics and with independently assessed neighbourhood condtions. Journal of Environmental Psychology 2008;28:128–142.

Frohlick KL, Potvin L, Chabot P, Corin E. A theoretical and empirical analysis of context: neighbourhoods, smoking and youth. Social Science and Medicine 2002;54(9):1401–1417. [PubMed: 12058856]

Frustenberg, F.; Cook, T.; Eccles, J.; Elder, G.; Sameroff, A. Managing to Make it. Chicago: University of Chicago; 1990.

Golledge, R.; Stimson, R. Spatial Behavior: A geographic perspective. New York: Guilford; 1997.

Goodchild, MF.; Janelle, DG. Thinking spatially in the social sciences. In: Goodchild, MF.; Janelle, DG., editors. Spatially Integrated Social Science. New York: Oxford University Press; 2004. p. 3-22.

Hawkins JD, Catalano RF, Wells EA. Measuring effects of a skills training intervention for drug abusers. Journal of Consulting Clinical Psychology 1986;54(4):661–664.

Hirsch, B. A place to call home. New York: Teachers College Press; 2005.

Jang S, Johnson B. Strain, Negative Emotions, and Deviant Coping Among African Americans: A Test of General Strain Theory. Journal of Quantitative Criminology 2001;19(1):79–105.

Korpela K. Place-identity as a product of environmental self-regulation. Journal of Environmental Psychology 1989;9:241–256.

Korpela K. Adolescents' favourite places and environmental self-regulation. Journal of Environmental Psychology 1992;12:249–258.

Korpela K, Hartig T, Kaiser F, Fuhrer U. Restorative experience and self-regulation and children's place preferences. Journal of Environmental Psychology 2001;22:387–398.

Korpela K, Kyttä M, Hartig T. Restorative experience, self-regulation, and children's place preferences. Journal of Environmental Psychology 2002;22:387–398.

Korpela K, Ylén M. Perceived health is associated with visiting natural favourtie places in the vicinity. Health & Place 2007;13:138–151. [PubMed: 16386449]

Lambert S, Ialongo N, Boyd R, Cooley M. Risk factors for community violence exposure in adolescence. American Journal of Community Psychology 2005;36(1–2):29–48. [PubMed: 16134043]

Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33:159–174. [PubMed: 843571]

Larson, R.; Seepersad, S. Adolescents' leisure time in the United States: Partying, sports, and the American experiment. In: Larson, R.; Verma, S., editors. New directions for child and adolescent development. San Francisco: Joffey-Bass; 2003. p. 53-64.

Latkin C, Curry A. Stressful neighborhoods and depression: A prospective study of the impact of neighborhood disorder. Journal of Health and Social Behavior 2003;44:34–44. [PubMed: 12751309]

Mason M, Cheung I, Walker L. Substance Use, Social Networks and the Geography of Urban Adolescents. Substance Use and Misuse 2004;9(10–12):1751–1778. [PubMed: 15587950]

Massimini F, Delle Fave A. Individual development in a bio-cultural perspective. American Psychologist 2000;55(1):24–33. [PubMed: 11392862]

Miller H. Modeling accessibility using space-time prism concepts within geographical information systems. International Journal of Geographical Information Systems 1991;5:287–301.

Moberg DP, Hahn L. The adolescent drug involvement scale. Journal of Adolescent Chemical Dependency 1991;2(1):75–88.

Pavis S, Cunningham-Burley S, Amos A. Alcohol consumption and young people: Exploring meaning and social context. Health Education Research 1997;12(3):311–322.

Picket K, Pear M. Multilevel analyses of neighborhood socioeconomic context and health outcomes: A critical review. Journal of Epidemiology & Community Health 2001;55:111–122. [PubMed: 11154250]

Popay J, Thomas C, Williams G, Bennett S, Gatrell A, Bostock L. A Proper Place to Live: Health Inequalities, Agency and the Normative Dimensions of Space. Social Science and Medicine 2003;54 (1):55–69. [PubMed: 12753816]

Popay J, Williams G, Thomas C, Gatrell A. Theorizing Inequalities in Health: The Place of Lay Knowledge. Sociology of Health and Illness 1998;20(5):619–644.

Ratcliffe J. Geocoding crime and first estimate of a minimum acceptable hit rate. International Journal of Geographical Information Systems 2004;18(1):61–72.

Sampson R, Raudenbush S, Earls F. Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy. Science 1997;277:918–924. [PubMed: 9252316]

Sherman JS, Preisser J, Gesler W, Arcury T. A suite of methods for representing activity space in a healthcare accessibility study. International Journal of Health Geographics 2005:4–24. [PubMed: 15655078]

Skogan, W. Disorder and decline: crime and the spiral of decay in American neighbourhoods. New York: The Free Press; 1990.

Trotter, R. Drug Use, AIDS, and Ethnography: Advanced Ethnographic Research Methods Exploring the HIV Epidemic. In: Lambert, RAE.; Needle, R., editors. Qualitative Methods in Drug Abuse and HIV Research. Rockville, MD: U. S. Department of Health and Human Services, National Institutes on Health, National Institute on Drug Abuse; 1995.

Twigger-Ross, CL.; Bonaiuto, M.; Breakwell, G. Identity theories and environmental psychology. In: Bonnes, TLMBM., editor. Psychological Theories for Environmental Issues. Aldershot, England: Ashgate; 2003. p. 203-233.

Verma, S.; Saraswathi, TS. At the Crossroads: Time use by University Students. New Delhi: International Development Research Center; 1992.

Winters, KC.; Botzet, MA.; Anderson, N.; Bellehumeur, T.; Egan, B. Screening and Assessment Stud: Wisconsin Division of Juvenile Corrections, Alcohol & Other Drug Abuse. Minneapolis, MN: University of Minnesota, Center for Adolescent Substance Abuse Research; 2001.

Table 1

Participant and Resident Neighborhood Characteristics (N = 301)

	Count	%	Mean (SD)
Age			17 (2)
13–15	105	35	
16–18	116	39	
19–20	80	26	
Sex			
Male	118	39%	
Female	183	61%	
Race			
African American	262	87%	
Mixed Race	24	8%	
Other	15	5%	
Resident Neighborhood Characteristics			
Below Poverty Line		30%	
Receiving Public Assistance		14%	
Unemployed		8%	
Substance Use Involvement			
No Substance Use	151	50%	
Substance Use	101	34%	
Abuse or Dependency	49	16%	

Table 2

Geographic Feature Variables by Grouping Categories and Descriptive Statistics (n =16)

		Mean	Std. Dev.
Adolescent	Recreation centers (distance)	576 m	321 m
Programs	Churches (distance)	174 m	164 m
Crime	Adult drug sale arrests (density)	62 per km^2	66 per km^2
	Adult drug possession arrests (density)	67 per km^2	46 per km^2
Socioeconomic	Percent African American (block group)	72%	35%
Status	Percent foreign born (block group)	9%	15%
	Percent below the poverty line (block group)	32%	21%
Physical	Zoning (parcel)	n=1025	100%
Characteristics	Commercial	n=367	36%
	Industrial	n=67	6%
	Residential	n=591	58%
	Vacant housing rate (block group)	15%	10%
	Check cashing stores (distance)	474 m	359 m
	Pawn shops (distance)	1074 m	1072 m
Substance Use	Narcotics Anonymous meetings (distance)	776 m	1054 m
	Alcoholics Anonymous meetings (distance)	829 m	504 m
	Restaurants and bars (distance)	236 m	210 m

Table 3

Categorical Differences of Non-Home Activity Space Locations Attributed as Risky or Safe by Substance Use Involvement

Locations Attributed as Safe					
Non-Substance Users (N =151)			**Substance Users (N =150)**		
	Count	*Percent*		*Count*	*Percent*
Home	71	47	Home	73	49
Friend's Home	34	23	Friend's Home	41	27
School	22	15	City Places[1]	13	08
Church	11	07	School	10	06
Park/Nature	4	02	Church	5	03
City Places[1]	3	01	Park/Nature	5	03
Work	3	01	Other	2	01
Other	2	01	Work	1	006
Recreation Center	1	006	Recreation Center	0	n/a
χ^2 (8, N=301) = 15.789, p<.05					
Locations Attributed as Risky					
Non-Substance Users (N =151)			**Substance Users (N =150)**		
	Count	*Percent*		*Count*	*Percent*
City Places[1]	63	42	City Places[1]	76	51
School	27	18	Friend's Home	28	19
Park/Nature	17	11	Park/Nature	14	09
Recreation Center	17	11	School	11	07
Friend's Home	14	09	Recreation Center	7	04
Other	5	03	Work	7	04
Work	4	02	Other	3	02
χ^2 (7, N=301) =15.789, p<.01					

[1] City Places served as an omnibus variable for this table and subsumed these locations: city streets, subway stops, city parks, nightclubs, retail, restaurants, and movie theaters.

Table 4

Mann-Whitney U Test of Differences Between Safe and Non-Safe Home Locations in Geographic Variables for Users and Non-Users.

		Users Safe: n=71 Non-Safe: n=68		Non-Users Safe: n=64 Non-Safe: n=71	
		Mean Rank	**Mann Whitney U**	**Mean Rank**	**Mann Whitney U**
Adolescent Programs	Safe	77	1936*	70	2163
Recreation centers	Not Safe	63		66	
Churches	Safe	67	2196	73	1948
	Not Safe	73		63	
Crime					
Adult drug sale arrests	Safe	71	2376	64	2029
	Not Safe	69		71	
Adult drug possession arrests	Safe	67	2219	65	2075
	Not Safe	73		71	
Socioeconomic Status					
Percent African American	Safe	73	2171	69	2184
	Not Safe	66		67	
Percent foreign born	Safe	71	2372	71	2109
	Not Safe	69		66	
Percent below the poverty line	Safe	66	2127	65	2102
	Not Safe	74		70	
Physical Characteristics					
Vacant housing rate	Safe	72	2302	62	1879
	Not Safe	68		74	
Check cashing stores	Safe	67	2234	68	2247
	Not Safe	73		68	

		Users Safe: n=71 Non-Safe: n=68		Non-Users Safe: n=64 Non-Safe: n=71	
		Mean Rank	**Mann Whitney U**	**Mean Rank**	**Mann Whitney U**
Pawn shops	Safe	69	2329	69	2232
	Not Safe	71		67	
Drug/Alcohol Use					
Narcotics Anonymous meetings	Safe	65	2091	66	2167
	Not Safe	75		69	
Alcoholics Anonymous meetings	Safe	68	2263	67	2193
	Not Safe	72		69	
Restaurants and bars	Safe	71	2352	70	2149
	Not Safe	69		66	

* p<0.05

** p<0.01

*** p<0.005

Table 5

Mann-Whitney U Test of Differences Between Risky and Non-Risky Activity Space Locations in Geographic Variables for Users and Non-Users.

		Users Risky: n=128 Non-Risky: n=240		Non-Users Risky: n=120 Non-Risky: n=263	
		Mean Rank	Mann-Whitney U	Mean Rank	Mann-Whitney U
Adolescent Programs	Risky	195	13929	204	14298
Recreation centers	Not Risky	178		186	
Churches	Risky	198	13677*	204	14351
	Not Risky	177		187	
Crime					
Adult drug sale arrests	Risky	191	14585	183	14665
	Not Risky	181		196	
Adult drug possession arrests	Risky	194	14151	198	15024
	Not Risky	179		189	
Socioeconomic Status					
Percent African American	Risky	183	15213	173	13515*
	Not Risky	185		201	
Percent foreign born	Risky	96	13947	215	13018**
	Not Risky	179		182	
Percent below the poverty line	Risky	193	14318	199	14941
	Not Risky	180		189	
Physical Characteristics					
Vacant housing rate	Risky	196	13932	182	14571
	Not Risky	179		197	
Check cashing stores	Risky	176	14250	195	15437
	Not Risky	189		191	

		Users Risky: n=128 Non-Risky: n=240		Non-Users Risky: n=120 Non-Risky: n=263	
		Mean Rank	**Mann-Whitney U**	**Mean Rank**	**Mann-Whitney U**
Pawn shops	Risky	170	13493	173	13504*
	Not Risky	192		201	
Drug/Alcohol Use					
Narcotics Anonymous meetings	Risky	178	14492	194	15588
	Not Risky	188		191	
Alcoholics Anonymous meetings	Risky	182	15022	183	14691
	Not Risky	186		196	
Restaurants and bars	Risky	169	13370*	190	15577
	Not Risky	193		19	

* p<0.05

** p<0.01

*** p<0.005

Table 6

Mann-Whitney U Test of Differences Between Safe and Not Safe Activity Space Locations in Geographic Variables for Users and Non-Users.

		Users Safe: n=64 Not Safe: n=304		Non-Users Risky: n=65 Not Safe: n=318	
		Mean Rank	**Mann-Whitney U**	**Mean Rank**	**Mann-Whitney U**
Adolescent Programs	Safe	188	9510	176	9318
Recreation centers	Not Safe	184		195	
Churches	Safe	205	8400	205	9466
	Not Safe	180		189	
Crime					
Adult drug sale arrests	Safe	201	8645	217	8733*
	Not Safe	181		187	
Adult drug possession arrests	Safe	187	9587	184	9842
	Not Safe	184		194	
Socioeconomic Status					
Percent African American	Safe	191	9307	213	8939
	Not Safe	183		188	
Percent foreign born	Safe	168	8704	173	9104
	Not Safe	188		196	
Percent below the poverty line	Safe	181	9493	194	10212
	Not Safe	185		192	
Physical Characteristics					
Vacant housing rate	Safe	182	9564	191	10296
	Not Safe	185		192	
Check cashing stores	Safe	195	9080	206	9457

		Users Safe: n=64 Not Safe: n=304		Non-Users Risky: n=65 Not Safe: n=318	
		Mean Rank	**Mann-Whitney U**	**Mean Rank**	**Mann-Whitney U**
	Not Safe	182		189	
Pawn shops	Safe	189	9417	212	9019
	Not Safe	183		188	
Drug/Alcohol Use					
Narcotics Anonymous meetings	Safe	173	8978	201	9766
	Not Safe	187		190	
Alcoholics Anonymous meetings	Safe	204	8477	222	8381*
	Not Safe	180		186	
Restaurants and bars	Safe	185	9703	220	8489*
	Not Safe	184		186	

* p<0.05

** p<0.01

*** p<0.005

Table 7

Chi-Square Test of Differences in Commercial Zoning Between Risky/Not Risky and Safe/Not Safe Locations by Substance Use Classification

			Commercial	Industrial	Residential	Total
Substance Users	Risky	Observed	110	21	109	240
	Risky	Expected	97	21	122	240
	Not Risky	Observed	59	11	58	128
	Not Risky	Expected	72	11	45	128
	Total		169	32	167	368
	Pearson Chi-Square		9.08**			
	Safe	Observed	140	26	138	304
	Safe	Expected	146	27	131	304
	Not Safe	Observed	29	6	29	64
	Not Safe	Expected	23	5	36	64
	Total		169	32	167	368
	Pearson Chi-Square		3.77			
Non-Substance Users	Risky	Observed	140	26	229	395
	Risky	Expected	123	22	250	395
	Not Risky	Observed	44	8	71	123
	Not Risky	Expected	61	12	50	123
	Total		184	34	300	518
	Pearson Chi-Square		19.80***			
	Safe	Observed	138	26	225	389
	Safe	Expected	163	27	199	389
	Not Safe	Observed	46	8	75	129
	Not Safe	Expected	21	7	101	129
	Total		184	34	300	518

	Commercial	Industrial	Residential	Total
Pearson Chi-Square	30.56***			

*p<0.05

**p<0.01

***p<0.005