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Objective and Perceived Neighborhood Characteristics and Tobacco Use Among Young Adults

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Abstract

Background—In the US, past month tobacco use is higher among young adults aged 18–25 years than among any other age group. Neighborhood disorder may be a malleable environmental determinant of tobacco use among young adults; its correlation with tobacco use is understudied. The purpose of this study is to examine whether perceived and objectively measured neighborhood factors are associated with tobacco use among young adults in Baltimore City.

Methods—This cross-sectional study of predominately African American young adults (n=359) used logistic regression models via generalized estimating equations (GEE) to estimate the association of perceived and objective neighborhood disorder with past month tobacco use, adjusting for race, age, sex, income, and other substance use. Two measures of perceived neighborhood environment –neighborhood drug involvement, and neighborhood social cohesion – were derived from the Neighborhood Environment Scale. Objective neighborhood disorder was measured via trained field raters using the Neighborhood Inventory for Environmental Typology instrument.

Results—Sex modified the relationship between perceived neighborhood drug involvement and past month tobacco use, and the association was significant among women only (aOR = 1.49; 95% CI = 1.19–1.88). Perceptions of neighborhood social cohesion (aOR = 0.97; 95% CI = 0.83–1.13), and objective neighborhood disorder (aOR= 1.17; 95% CI=0.98–1.38) were not significantly associated with past month tobacco use.

Conclusion—Understanding the correlation between perceived and objective neighborhood disorder, and their independent association with tobacco use can potentially lead to environmentally based interventions aimed at reducing tobacco use among young adults who live in urban environments.

Keywords

Tobacco; Neighborhood Disorder; Young Adults; NES; NifETy; African American

I. INTRODUCTION

The prevalence of tobacco use is higher among young adults (roughly defined as age 18–25 years old) than for any other age group (U.S. Department of Health and Human Services (USDHHS), 2012). Young adulthood is a particularly critical period for tobacco use (Gilpin et al., 2005). First, 18 is the minimum legal age to purchase tobacco products in the United States (DiFranza, 2012). Second, young adults are subject to less supervision from authority figures, such as parents and school personnel (Arnett, 2000; USDHHS, 2012). Not surprisingly, then, there is a concomitant increase in the prevalence of current tobacco use from mid-late adolescence to young adulthood. Nearly 41 percent of 18–25 year olds report past month tobacco use, as compared to 10.7 percent of 12 to 17 year olds, and 27.2 percent of persons 26 years old and older (Substance Abuse and Mental Health Services Administration (SAMHSA), 2011). The US Surgeon General's report insists that targeting prevention efforts toward young adults is a crucial next step in tobacco control (USDHSS, 2012). Importantly, those who do not begin tobacco use by young adulthood are unlikely to take it up later in life (USDHSS, 2012).

Developing effective strategies for preventing tobacco use among young adults requires a comprehensive review of the determinants of tobacco use. A recent report from the Office of the Surgeon General organized the determinants of tobacco use into three ecological levels: biological, psychosocial, and social/physical environment (USDHHS, 2012). Relative to biological and psychosocial influences, less is known about the influence of social/physical environment factors on tobacco and other substance use (Lambert et al., 2004).

Research examining the association between tobacco use and the physical environment has used multiple methods of inquiry, including: Census data to assess neighborhood economic status, survey research to assess perceptions of neighborhood well-being, and systematic social observation methods to assess neighborhood disorder. Systematic social observation studies employ trained field raters to quantify disorder. Census level factors (e.g., area level poverty, and education level; Diez Roux et al., 2003; Matheson et al., 2011), perceptions of community social cohesion (Patterson et al., 2012), perceptions of neighborhood drug involvement and safety (Lambert et al., 2004), and objective measures of neighborhood disorder (e.g., graffiti and litter; Miles, 2006) have been shown to be significantly associated with tobacco use.

The current study aimed to examine the correlation between objective and perceived measures of neighborhood disorder, as well as the association that each dimension of neighborhood disorder has with tobacco use among young adults. We hypothesized that objective and perceived neighborhood disorder would be correlated, and that living in highly disordered neighborhoods versus neighborhoods with lower levels of disorder would be significantly associated with higher odds of tobacco use.

The study population is made-up primarily of African American young adults living in low-income urban neighborhoods in Baltimore City. This type of population has not been the focus of previous research in this area. Understanding the correlates of tobacco use among African American low-income, urban young adults is important because they are likely to experience higher exposure to tobacco via higher concentrations of tobacco outlets in their communities (Fakunle et al., 2010; Peterson et al., 2011; Rodriguez et al., 2012; Schneider et al., 2005; Yu et al., 2010). Furthermore, marketing effort theories highlight that low-income neighborhoods are more likely to have tobacco advertisements featured prominently throughout the community, which may increase the urge to use tobacco and make it more difficult to quit (Datta et al., 2006; Kendzor et al., 2012; Miles, 2006). Specifically, point-of-sale tobacco advertisements are more common in neighborhoods with a high proportion of

African Americans and with a high proportion of low-income residents (Henriksen et al., 2012; Widome et al., 2012).

2. METHODS

2.1. Participants

Participants in this cross-sectional investigation were 359 young adults interviewed one-year post high school in 2006. The analytic sample was derived from a larger cohort study of 799 students who participated in the Johns Hopkins Second Generation Baltimore Prevention Program (BPP) in the first grade. The BPP is a field trial of two universal first grade interventions; respondents were followed through adulthood (Ialongo et al., 1999).

For the current study we included those BPP participants who were residing in Baltimore City one-year post high school and who had provided their addresses. These restriction criteria were established because objective neighborhood data (i.e., NifETy data) were only collected for Baltimore City neighborhoods. A total of 597 participants completed the BPP interview one-year post high school, and 362 of those lived in Baltimore City and had NifETy data matched to their individual level data. Of the 362 young adults who met inclusion criteria, three were missing information on either the outcome variable (i.e., past month tobacco use) or at least one covariate, and were excluded from the analytic sample.

Participants included in the analytic sample (n=359) did not differ significantly from those who were excluded (n=440) with respect to gender or intervention group. Participants did however differ by race. Participants included in the sample were more likely to be African American than those who were excluded (94% versus 77%; $p<0.001$). This is due to the fact that residents in Baltimore City are predominantly African American (U.S. Census Bureau, 2013), and the study sample was restricted to participants residing in Baltimore City.

2.2. Data Source: Baltimore Prevention Program (BPP)

In 1993, 678 first grade students and their families, representative of the number of students entering first grade in nine public elementary schools in Baltimore City, were recruited to participate in the BPP field trial intervention to evaluate both a classroom-based and family-based intervention aimed at improving academic success, reducing concentration problems, and aggressive and shy behaviors, with a long term goal of reducing risk of substance abuse, depression, and antisocial behavior (Ialongo et al., 1999). Three classrooms from each of the schools were randomized to either of the two interventions arms or the control condition (standard classroom setting; Ialongo et al., 1999). An additional 121 participants transferred into the participating schools after the baseline assessments, for a total of 799. Participants completed annual assessments in grades 1–3, 6–12, and each year post high school until age 25. A description of the original study sample is reported in previous research (Ialongo et al., 1999). The Institutional Review Board at The Johns Hopkins Bloomberg School of Public Health approved data collection for the BPP and NifETy studies.

2.3. Measures

2.3.1. Outcome: Current Tobacco Use—Current tobacco use was assessed via self-report. Participants who reported having used tobacco within the past month were considered current users. Audio computer-assisted self-interview (ACASI) methods were used to assess tobacco use to promote privacy, and to obtain accurate and complete responses (Furr-Holden et al., 2004).

2.3.2. Correlates of tobacco use—Two facets of neighborhood disorder were explored as potential correlates of past month tobacco use: perceived neighborhood disorder based on

participants' perceptions assessed via questions from the Neighborhood Environment Scale (NES), and objective neighborhood disorder assessed by trained raters using the NifETy instrument.

2.3.3. Perceived Neighborhood Disorder—The NES was used to evaluate perceived of neighborhood disorder. The NES is a self-reported measurement scale used to summarize perceptions of neighborhood disorder, and includes perceptions about violent crime, and neighborhood drug activity (Crum et al., 1996; Lambert et al., 2004). Based on an exploratory factor analysis (EFA), two neighborhood disorder scales were developed from the NES: a perceived neighborhood drug involvement scale and perceived neighborhood social cohesion scale. Each scale was created by summing the factor loadings of the scale's items when the items were present.

2.3.3.1 Perceived Neighborhood Drug Involvement: Four items loaded together (loadings: 0.591–0.878) on the perceived neighborhood drug involvement scale: 1) I have seen people using or selling drugs in my neighborhood, 2) In the morning or later in the day, I often see drunk people on the street, 3) In my neighborhood, the people with the most money are the drug dealers, and 4) There are people in my neighborhood who have offered me drugs. The fit indices for the EFA were good; the chi-square test for model fit was not significant ($p = 0.166$), indicating that the model fits the data, the Standardized Root Mean Square Residual (SRMR) was 0.028, and the Root Mean Square Error of Approximation (RMSEA) was 0.047 ($0.08 > \text{SRMR}$ and $0.06 > \text{RMSEA}$ indicates a good fit; (Hu and Bentler, 1998). The coefficient alpha for the total scale used in this study was 0.74.

2.3.3.2. Perceived Neighborhood Social Cohesion: Four items loaded together (loadings: 0.631–0.811) on the perceived neighborhood social cohesion scale. The items were: 1) I like living in my neighborhood, 2) My neighbors would help me in an emergency, 3) My neighbors can tell if someone is a stranger, and 4) The people who live in my neighborhood always take care of each other and protect each other from crime. The fit indices for the social cohesion scale were also good, the chi-square test for model fit was not significant ($p = 0.17$), the Standardized Root Mean Square Residual (SRMR) was 0.021, and the Root Mean Square Error of Approximation (RMSEA) was 0.047. The coefficient alpha for the total scale used in this study was 0.73.

2.3.4. Objective Neighborhood Disorder—The objective neighborhood disorder scale was derived from the NifETy instrument, and based on previous investigations (Furr-Holden et al., 2011a, 2011b). The NifETy instrument is a standardized tool for evaluating characteristics of the neighborhood environment related to violence, alcohol, and other drug (VAOD) exposures (Furr-Holden et al., 2008). Metric properties for the NifETy instrument are reported in previous research (Furr-Holden et al., 2010). For the current study, trained field raters conducted NifETy assessments from February, 2006 to May, 2006 on the block face (e.g., 600–699 Wolfe St.) where young adults lived during the time of their BPP assessment. Eleven items that consistently loaded together (loadings: 0.51–0.90) were used to create the scale: 1) total broken windows, 2) unboarded abandon buildings, 3) unmaintained property, 4) trash in open places, 5) broken bottles, 6) graffiti, 7) noisy, 8) people yelling, 9) public intoxication, 10) drug paraphernalia, and 11) discarded alcohol bottles. The resulting objective neighborhood disorder scale was comprised of the sum of the factor loadings of these 11 items, when the item was present. The coefficient alpha for the total scale used in this study was 0.77.

2.3.5. Covariates—The following covariates were controlled for: race (African American vs. other), age, gender, past month alcohol use, past month marijuana use, and income (i.e.,

having at least enough money to meet needs versus not enough). Using ACASI methods, past month marijuana use and past month alcohol use were controlled for because in previous research perceptions of neighborhood disorder differed by drug use status. In one study, people who had not used heroin, cocaine, or both were significantly more likely than those who had to have negative perceptions about their neighborhood (Latkin et al., 2009). Very few in our study sample reported use of cocaine or heroin. By contrast, many did endorse current use of alcohol and marijuana, and thus these drugs were controlled for in the analyses.

2.4. Statistical Analysis

Logistic regression models via generalized estimating equations (GEE) were used to estimate the strength of association between each of the three neighborhood disorder scales and past month tobacco use. The use of GEE accounted for possible correlation of responses among participants residing in the same neighborhood by providing parameter estimates with robust standard errors (Zeger and Liang, 1986). Crude and adjusted odds ratios were estimated between: (1) past month tobacco use and perceived neighborhood drug involvement; (2) past month tobacco use and perceived neighborhood social cohesion; and (3) past month tobacco use and objective neighborhood disorder. Interaction terms were created between the individual scales and each covariate in the model to test for effect modification. Spearman's rank correlation was used to assess the correlation between measures of perceived and objective neighborhood disorder. Collinearity was assessed by estimating variance inflation factors (VIFs). Variables were not collinear. All data were analyzed using Stata/SE statistical software version 12 (StataCorp LP, College, Station, TX) and Mplus 5.2 (Muthen and Muthen, 1998–2007).

3. RESULTS

3.1. Sample Description

Among this sample, 16.4% of participants used tobacco within the past month. Past month tobacco use was not significantly associated with intervention group ($\chi^2=0.64$, $df=3$, $p=0.89$). The sample was predominantly African American (94.4%); respondents ranged in age from 18 to 20 years old (mean=19.0 years; $SD=0.38$ years). Approximately half of the participants were male (50.7%), and about the same proportion did not have enough money to meet their basic needs (48.5%). The majority of the participants did not use alcohol (80.2%) or marijuana (88.6%) within the past month. Sample characteristics according to past month tobacco use are reported in Table 1. Among the pooled sample, measures of perceived neighborhood disorder (i.e., perceived neighborhood drug involvement, and perceived neighborhood social cohesion) were not correlated with objective neighborhood disorder assessed via trained field raters. However, when stratified by gender both perceived neighborhood drug involvement and perceived neighborhood social cohesion were significantly correlated with objective neighborhood disorder among women (Table 2).

3.2. Perceived Neighborhood Drug Involvement Scale

Scores on the perceived neighborhood drug involvement scale ranged from 3.0 to 12.0, with higher scores indicating higher levels of perceived neighborhood drug involvement. Men had significantly higher mean scores for perceived neighborhood drug involvement than women (6.67 vs. 6.03, $p=0.03$). Sex modified the effect of the relationship between perceived neighborhood drug involvement and past month tobacco use. The association between tobacco use and perceived neighborhood drug involvement (adjusted for race, age, sex, income, past month alcohol use, and past month marijuana use) was statistically significant among women (aOR =1.49; 95% CI =1.19–1.88), but not among men (aOR = 0.98; 95% CI = 0.85–1.13). Furthermore, perceived neighborhood drug involvement was

correlated with objective neighborhood disorder only among women ($\rho = 0.25$; $p = 0.001$) (Table 2).

3.3. Social Cohesion Scale

Scores on the perceived neighborhood social cohesion scale ranged from 2.90 to 11.54 (mean = 8.79; SD = 2.30), with higher scores indicating that participants perceived their neighborhoods to be more cohesive. Perceived neighborhood social cohesion was not significantly associated with past month tobacco use (aOR=0.97; 95% CI= 0.83–1.13) (Table 2). However, it was inversely correlated with objective neighborhood disorder among women ($\rho = -0.17$; $p < 0.05$; Table 2). None of the covariates appeared to modify the relationship between perceived neighborhood social cohesion and past month tobacco use.

3.4. Objective Neighborhood Disorder Scale

Scores on the objective neighborhood disorder scale ranged from was 0 to 7.45 (mean = 2.08; SD = 1.86), with higher scores indicating increased levels of neighborhood disorder. Objective neighborhood disorder was not significantly associated with past month tobacco use (aOR= 1.17; 95% CI= 0.98–1.38) (Table 2).

4. DISCUSSION

4.1. Summary

The aims of this study were to examine the correlation between objective and perceived neighborhood disorder, as well as their independent association with past month tobacco use among a sample of primarily low-income, African American young adults in Baltimore City one-year post high school. There were three central findings. First, measures of perceived and objective neighborhood disorder were correlated only among women. Second, gender modified the relationship between perceived neighborhood drug involvement and tobacco use and this relationship was significant only among women. Third, perceived neighborhood social cohesion, and objective neighborhood disorder were not significantly associated with past month tobacco use.

4.2. Perceived Neighborhood Drug Involvement

Bandura's Social Cognitive Theory highlights the interactions between a person's behaviors, cognitions, and the social environment (Bandura, 1986). Based on this theory, it can be posited that through social learning (i.e., seeing drug involvement in the immediate environment) young adults may adopt drug use behaviors. Perceptions of drug involvement in the immediate environment may be interpreted as a cue that tobacco and other drug use are acceptable. This is one possible explanation for the significant association between perceived neighborhood drug involvement and past month tobacco use. This association was modified by gender, with the magnitude of effect higher and statistically significant among females. Previous literature suggests that females are more likely to obtain tobacco products from commercial sources and less likely to be required to show proof of age (DiFranza et al., 1996; Proctor et al., 2012; Robinson et al., 1998). The high density of tobacco outlets, which are generally present in disordered and disadvantaged neighborhoods (Fakunle et al., 2010; Peterson et al., 2011; Rodriguez et al., 2012; Schneider et al., 2005; Yu et al., 2010), and the increased ability for females to obtain tobacco products from commercial sources may partly explain the interaction between gender and perceived neighborhood drug involvement and tobacco use in females.

4.3. Perceived Neighborhood Social Cohesion

Perceived neighborhood social cohesion was not significantly associated with past month tobacco use among young adults in this sample. Previous research establishes the significant role social cohesion has in tobacco use behaviors (Nebbitt et al., 2012; Patterson et al., 2004). For example, among low-income, urban, African American youth 12 to 19 years olds, social cohesion was significantly and inversely related to tobacco, alcohol, and marijuana use (Nebbitt et al., 2012). Adults 18 and over, who endorsed higher levels of social cohesion were less likely to use tobacco (Patterson et al., 2004). Neither of these studies focused exclusively on young adults, and only one study (Nebbitt et al., 2012) targeted a sample that was predominantly African American. Furthermore, social cohesion was measured differently across studies, which can help explain the varying results. Nevertheless, research assessing the association between social cohesion, tobacco and other substance use among African Americans is sparse (Nebbitt et al., 2012). This study gives insight on the role of social cohesion in tobacco use behaviors among African American young adults, however further research is needed to corroborate these findings.

4.4. Objective Neighborhood Disorder

Contrary to our hypothesis, objective neighborhood disorder was not associated with past month tobacco use. However, it is plausible that the cumulative effect of objective neighborhood disorder measured over time would be significantly related to tobacco use. In this study both objective and perceived neighborhood disorder were measured at one point in time. However, participants may have answered questions related to perceived neighborhood disorder based on their cumulative experience of living in their neighborhood over their life-course, whereas trained raters assessed objective neighborhood disorder during one time point only. This may help explain why the relationship between objective neighborhood disorder and tobacco use was not statistically significant, versus the significant relationship between perceived neighborhood drug involvement and tobacco use.

Additional evidence to support the potential association between the growth of objective neighborhood disorder, and tobacco is garnered from previous research involving this cohort. When participants were in the 12th grade, living in neighborhoods deteriorating over time (objectively measured using the NIfETy instrument) was associated with a higher likelihood of marijuana use two years post high school as compared to living in always good neighborhoods (Furr-Holden et al., 2011a). Research established that people who use marijuana likely use tobacco as well (Brook et al., 2010; Ford et al., 2002; Leatherdale et al., 2007; Richter et al., 2004), and in some instances marijuana use predicted tobacco use (Fielder et al., 2012; Ford et al., 2002; Patton et al., 2005; Timberlake et al 2007). Therefore, it is possible that the growth of neighborhood disorder over time would be significantly associated with increased tobacco use, mediated by marijuana use. However, a longitudinal study is needed to test this hypothesis.

Objective neighborhood disorder may also have an indirect effect on tobacco use mediated via stress. Stress theories emphasize that living in low-income and poor neighborhoods contribute to feelings of powerlessness, helplessness, fear of violence, and depression, all of which increase the risk for tobacco use as a strategy to manage a stress response (Datta et al., 2006; Kendzor et al., 2012; Lambert et al., 2004). Objective neighborhood disorder (i.e., abandoned buildings, graffiti, drug paraphernalia) is prevalent in low income, African American neighborhoods (Furr-Holden et al, 2011a; Kelly et al., 2007), and was found to be associated with a higher odds of seeing people using or selling drugs among a cohort of Baltimore City youth (Milam et al., 2013). Seeing people using or selling drugs and being exposed to other facets of neighborhood drug involvement are potential sources of stress for low-income, inner-city youth. Findings from the current study elucidate that among women

there is a positive and significant correlation between objective neighborhood disorder and perceived neighborhood drug involvement (e.g., stress), as well as higher odds of tobacco use for every unit increase in perceived neighborhood drug involvement. Considering these findings, and findings from previous research, it is logical that the relationship between objective neighborhood disorder and tobacco use may be mediated by perceptions of neighborhood drug involvement, particularly for women. A longitudinal study is needed to definitively test this hypothesis.

4.5. Limitations

Inferences made based on this study's findings must be interpreted in light of important limitations. For example, this study is limited by its cross-sectional design, thus causation cannot be inferred. Additionally, the majority of the study participants were African American young adults, all living in Baltimore City. Considering the demographic composition of this sample, inferences may not be generalizable to other populations, age groups, or non-urban areas. In addition, tobacco, marijuana, and alcohol use were assessed via self-report, thus there was the potential for recall bias in the reported use of these substances.

4.6. Strengths

Despite the limitations, this study has several strengths. For example, the study sample is representative of the target population – African American young adults, of low income, who live in urban environments – and was similar to the local community with respect to race and income (Baltimore Neighborhood Indicators Alliance - Jacob France Institute, 2013; U.S. Census Bureau, 2013), and the percentage of young adults, 18 to 24 years old, who were current tobacco users (18.7%) in 2006 during the same year the study sample was assessed (Centers for Disease Control and Prevention, 2006). Additionally, this study elucidates the association between neighborhood disorder and tobacco use among a segment of the population identified to be at high risk for tobacco use (USDHHS, 2012; Vidrine et al., 2009). Furthermore, this study identified sex as a potential modifier of the relationship between perceived neighborhood drug involvement and tobacco use, emphasizing the importance of considering gender differences in environmental correlates of tobacco use. These results may lend to the development of gender specific interventions. Also, two dimensions of neighborhood disorder (e.g., perceived and objective) were robustly measured using the NES and NIFETy instruments. Lastly, this study demonstrated that the exploration of both perceived and objective measures of neighborhood characteristics provide a more complete understanding of the association between the neighborhood environment and tobacco use, as compared to examining one measure alone.

4.7. Conclusion

Neighborhood disorder is a potential malleable environmental correlate of tobacco use among young adults. Understanding the correlation between perceived and objective neighborhood disorder, and their independent association with tobacco use can potentially lend to environmentally based interventions aimed at reducing tobacco use among young adults who live in urban environments. Practitioners should consider that objective and perceived measures of neighborhood disorder may influence tobacco use differently, and the effects may vary by gender.

REFERENCES

- Arnett JJ. Emerging adulthood: a theory of development from the late teens through the twenties. *Am. Psychol.* 2000; 55:469–480. [PubMed: 10842426]

- Baltimore Neighborhood Indicators Alliance - Jacob France Institute. Vital signs. 2013; 11 http://bniajfi.org/vs11_report://bniajfi.org/vs11_report.
- Bandura, A. Englewood Cliffs, NJ: Prentice-Hall; 1986. Social Foundations of Thought and Action: A Social Cognitive Theory.
- Brook JS, Lee JY, Finch SJ, Brown EN. Course of comorbidity of tobacco and marijuana use: psychosocial risk factors. *Nicotine Tob. Res.* 2010; 12:474–482. [PubMed: 20231241]
- Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System: Prevalence and Trends Data: Maryland 2006 Adults Who Are Current Smokers. 2006 <http://apps.nccd.cdc.gov/BRFSS/age.asp?cat=TU&yr=2006&qkey=4396&state=MD>.
- Crum RM, Lillie-Blanton M, Anthony JC. Neighborhood environment and opportunity to use cocaine and other drugs in late childhood and early adolescence. *Drug Alcohol Depend.* 1996; 43:155–161. [PubMed: 9023071]
- Datta GD, Subramanian SV, Colditz GA, Kawachi I, Palmer JR, Rosenberg L. Individual, neighborhood, and state-level predictors of smoking among US Black women: a multilevel analysis. *Soc. Sci. Med.* 2006; 63:1034–1044. [PubMed: 16650514]
- Diez Roux AV, Merkin SS, Hannan P, Jacobs DR, Kiefe CI. Area characteristics, individual-level socioeconomic indicators, and smoking in young adults: the coronary artery disease risk development in young adults study. *Am. J. Epidemiol.* 2003; 157:315–326. [PubMed: 12578802]
- DiFranza JR. Research opportunities concerning youth and the Family Smoking Prevention and Tobacco Control Act. *Nicotine Tob. Res.* 2012; 14:54–61. [PubMed: 21975309]
- DiFranza JR, Savageau JA, Aisquith BF. Youth access to tobacco: the effects of age, gender, vending machine locks, and "it's the law" programs. *Am. J. Public Health.* 1996; 86:221–224. [PubMed: 8633739]
- Fakunle D, Morton CM, Peterson NA. The importance of income in the link between tobacco outlet density and demographics at the tract level of analysis in New Jersey. *J. Ethn. Subst. Abuse.* 2010; 9:249–259. [PubMed: 21161808]
- Fielder, Robyn L.; Carey, Kate B.; Carey, Michael P. Predictors of initiation of hookah tobacco smoking: a one-year prospective study of first-year college women. *Psychol. Addict. Behav.* 2012; 26:963–968. [PubMed: 22564201]
- Ford DE, Vu HT, Anthony JC. Marijuana use and cessation of tobacco smoking in adults from a community sample. *Drug Alcohol Depend.* 2002; 67:243–248. [PubMed: 12127195]
- Furr-Holden CDM, Campbell KD, Milam AJ, Smart MJ, Ialongo NA, Leaf PJ. Metric properties of the Neighborhood Inventory for Environmental Typology (NifETy): an environmental assessment tool for measuring indicators of violence, alcohol, tobacco, and other drug exposures. *Eval. Rev.* 2010; 34:159–184. [PubMed: 20479211]
- Furr-Holden CD, Ialongo NS, Anthony JC, Petras H, Kellam SG. Developmentally inspired drug prevention: middle school outcomes in a school-based randomized prevention trial. *Drug Alcohol Depend.* 2004; 73:149–158. [PubMed: 14725954]
- Furr-Holden CDM, Lee MH, Milam AJ, Johnson RM, Lee SK, Ialongo NS. The growth of neighborhood disorder and marijuana use among urban adolescents: a case for policy and environmental interventions. *J. Stud. Alcohol Drugs.* 2011a; 72:371–379. [PubMed: 21513673]
- Furr-Holden CDM, Milam AJ, Young KC, MacPherson L, Lejuez CW. Exposure to hazardous neighborhood environments in late childhood and anxiety. *J. Community Psychol.* 2011b; 39:876–883. [PubMed: 21876608]
- Furr-Holden CDM, Smart MJ, Pokorni JL, Ialongo NS, Leaf PJ, Holder HD, Anthony JC. The NifETy method for environmental assessment of neighborhood-level indicators of violence, alcohol, and other drug exposure. *Prev. Sci.* 2008; 9:245–255. [PubMed: 18931911]
- Gilpin EA, White VM, Pierce JP. What fraction of young adults are at risk for future smoking, and who are they? . *Nicotine Tob. Res.* 2005; 7:747–759. [PubMed: 16191746]
- Henriksen L, Schleicher NC, Dauphinee AL, Fortmann SP. Targeted advertising, promotion, and price for menthol cigarettes in California high school neighborhoods. *Nicotine Tob. Res.* 2012; 14:116–121. [PubMed: 21705460]
- Hu L, Bentler PM. Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. *Psychol. Methods.* 1998; 3:424–453.

- Ialongo NS, Werthamer L, Kellam SG, Brown CH, Wang S, Lin Y. Proximal impact of two first-grade prevention interventions on the early risk behaviors for later substance abuse, depression, and anti-social behavior. *Am. J. Community Psychol.* 1999; 27:599–641. [PubMed: 10676542]
- Kelly CM, Schootman M, Baker EA, Barnige EK, Lemes A. The association of sidewalk walkability and physical disorder with area-level race and poverty. *J. Epidemiol. Community Health.* 2007; 61:979–983.
- Kendzor DE, Reitzel LR, Mazas CA, Cofta-Woerpel LM, Cao Y, Ji L, Costello TJ, Vidrine JL, Businelle MS, Li Y, Castro Y, Ahluwalia JS, Cinciripini PM, Wetter DW. Individual- and area-level unemployment influence smoking cessation among African Americans participating in a randomized clinical trial. *Soc. Sci. Med.* 2012; 74:1394–1401. [PubMed: 22405506]
- Lambert SF, Brown TL, Phillips CM, Ialongo NS. The relationship between perceptions of neighborhood characteristics and substance use among urban African American adolescents. *Am. J. Community Psychol.* 2004; 34:205–218. [PubMed: 15663207]
- Latkin CA, German D, Hua W, Curry AD. Individual-level influences on perceptions of neighborhood disorder: a multilevel analysis. *J. Community Psychol.* 2009; 37:122–133. [PubMed: 20027234]
- Leatherdale ST, Hammond DG, Kaiserman M, Ahmed R. Marijuana and tobacco use among young adults in Canada: are they smoking what we think they are smoking? *Cancer Causes Control.* 2007; 18:391–397. [PubMed: 17235494]
- Matheson FI, LaFreniere MC, White HL, Moineddin R, Dunn JR, Glazier RH. Influence of neighborhood deprivation, gender and ethno-racial origin on smoking behavior of Canadian youth. *Prev. Med.* 2011; 52:376–380. [PubMed: 21371497]
- Milam AJ, Furr-Holden CDM, Cooley-Strickland MC, Bradshaw CP, Leaf PJ. Risk for exposure to alcohol, tobacco, and other drugs on the route to and from school: the role of alcohol outlets. *Prev. Sci.* 2013 Epub ahead of print.
- Miles R. Neighborhood disorder and smoking: findings of a European urban survey. *Soc. Sci. Med.* 2006; 63:2464–2475. [PubMed: 16904800]
- Nebbitt VE, Lombe M, Yu M, Vaughn MG, Stokes C. Ecological correlates of substance use in African American adolescents living in public housing communities: assessing the moderating effects of social cohesion. *Child Youth Serv. Rev.* 2012; 34:338–347.
- Patterson JM, Eberly LE, Ding Y, Hargreaves M. Associations of smoking prevalence with individual and area level social cohesion. *J. Epidemiol. Community Health.* 2004; 58:692–697. [PubMed: 15252073]
- Patterson F, Seravalli L, Hanlon A, Nelson DB. Neighborhood safety as a correlate of tobacco use in a sample of urban, pregnant women. *Addict. Behav.* 2012; 37:1132–1137. [PubMed: 22688344]
- Patton GC, Coffey C, Carlin JB, Sawyer SM, Lynskey M. Reverse gateway? Frequent cannabis use as a predictor of tobacco initiation and nicotine dependence. *J. Addict.* 2005; 100:1518–1525.
- Peterson NA, Yu D, Morton CM, Reid RJ, Sheffer MA, Schneider JE. Tobacco outlet density and demographics at the tract level of analysis in New Jersey: a statewide analysis. *Drugs (Abingdon, Engl).* 2011; 18:47–52.
- Proctor C, Barnett JA, Muilenburg J. Investigating race, gender, and access to cigarettes in an adolescent population. *Am. J. Health Behav.* 2012; 36:513–521. [PubMed: 22488401]
- Richter KP, Kaur H, Resnicow K, Nazir N, Mosier MC, Ahluwalia JS. Cigarette smoking among marijuana users in the United States. *Subst. Abuse.* 2004; 25:35–43.
- Robinson LA, Klesges RC, Zbikowski SM. Gender and ethnic differences in young adolescents' sources of cigarettes. *Tob. Control.* 1998; 7:353–359. [PubMed: 10093167]
- Rodriguez D, Carlos HA, Adachi-Mejia AM, Berke EM, Sargent JD. Predictors of tobacco outlet density nationwide: a geographic analysis. *Tob. Control.* 2012 Epub ahead of print.
- Schneider JE, Reid RJ, Peterson NA, Lowe JB, Hughey J. Tobacco outlet density and demographics at the tract level of analysis in Iowa: implications for environmentally based prevention initiatives. *Prev. Sci.* 2005; 6:319–325. [PubMed: 16163568]
- StataCorp. College Station, TX: StataCorp LP; 2011. Stata Statistical Software: Release 12.
- Substance Abuse and Mental Health Services Administration. Results from the 2010 National Survey on Drug Use and Health: Summary of National Findings, NSDUH Series H-41, HHS Publication No. (SMA). Rockville, MD: 2011. p. 11-4658.

- Timberlake DS, Haberstick BC, Hopfer CJ, Bricker J, Sakai JT, Lessem JM, Hewitt JK. Progression from marijuana use to daily smoking and nicotine dependence in a national sample of U.S. adolescents. *Drug Alcohol Depend.* 2007; 88:272–281. [PubMed: 17174040]
- U.S. Census Bureau. Baltimore City, Maryland: State and County quickfacts; <http://quickfacts.census.gov/qfd/states/24/24510.html> [accessed 20.07.13]
- U.S. Department of Health and Human Services. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
- Vidrine IJ, Reitzel LR, Wetter DW. The role of tobacco in cancer health disparities. *Curr. Oncol. Rep.* 2009; 11:475–481. [PubMed: 19840525]
- Widome R, Brock B, Noble P, Forster JL. The relationship of neighborhood demographic characteristics to point-of-sale tobacco advertising and marketing. *Ethn. Health.* 2012; 18:135–151.
- Yu D, Peterson NA, Sheffer MA, Reid RJ, Schnieder JE. Tobacco outlet density and demographics: analysing the relationships with a spatial regression approach. *Public Health.* 2010; 124:412–416. [PubMed: 20541232]
- Zeger SL, Liang KY. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics.* 1986; 42:121–130. [PubMed: 3719049]

Table 1

Sample characteristics by past month tobacco use

Tobacco use within the past month				
	Yes (n=59)	No (n=300)	p-value	Total n (%)
Race – No. (%)			p<0.001	
African American	50 (14.75)	289 (85.25)		339 (100)
White	9 (45.00)	11 (55.00)		20 (100)
Age – years			p=0.06*	359 (100.0)
Mean (SE)	19.1 (0.04)	19.0 (0.02)		[Mean=19.0; SE=0.02]
Sex – No. (%)			p<0.05	
Males	37 (20.33)	145 (79.67)		182 (100)
Females	22 (12.43)	155 (87.57)		177 (100)
Income			p<0.01	
Enough to meet needs	21 (11.35)	164 (88.65)		185 (100)
< Enough to meet needs	38 (21.84)	136 (78.16)		174 (100)
Past month alcohol use– No. (%)			p<0.001	
Yes	26 (36.62)	45 (63.38)		71 (100)
No	33 (11.46)	255 (88.54)		288 (100)
Past month marijuana use – No. (%)			p<0.001	
Yes	26 (63.41)	15 (36.59)		41 (100)
No	33 (10.38)	285 (89.62)		318 (100)
Perceived neighborhood drug involvement - Mean (SE)			p<0.001*	
	7.5 (0.36)	6.1 (0.16)		359 (100) [Mean=6.3; SE=0.15]
Perceived neighborhood social cohesion - Mean (SE)			p=0.25*	
	8.5 (0.31)	8.8 (0.13)		359 (100) [Mean=8.8; SE=0.12]
Objective neighborhood disorder– Mean (SE)			p=0.31*	
	2.3 (0.23)	2.0 (0.11)		359(100) [Mean=2.1; SE=0.10]

Asterisk indicates that p-value was obtained from a t test as compared to chi-squared test

Table 2

Crude and adjusted odds ratios relating past month tobacco use to perceived and objective neighborhood disorder and Spearman correlations between perceived and objective neighborhood disorder

	Crude OR (95% CI)	aOR (95%CI)	Correlation with objective neighborhood disorder
Perceived neighborhood drug involvement			
females:	1.40 (1.16–1.68)***	1.49 (1.19–1.88)***	rho = 0.25 (p = 0.001)
males:	1.07 (0.92–1.24)	0.98 (0.85–1.13)	rho = -0.03 (p > 0.05)
Perceived neighborhood social cohesion	0.93 (0.83–1.05)	0.97 (0.83–1.13)	females: rho = -0.17 (p = 0.02) males: rho = 0.03 (p > 0.05)
Objective neighborhood disorder	1.08 (0.93–1.26)	1.17 (0.98–1.38)	---

- Each neighborhood disorder model was adjusted for race, age, sex, income, past month alcohol use, and past month marijuana use

- The interaction term between sex and perceived neighborhood drug involvement was significant (aOR: 1.47; 95% CI: 1.15–1.89), thus models for perceived neighborhood drug involvement were stratified by sex.

- Perceived and objective neighborhood disorder were only correlated among females, thus correlation results are stratified by sex.

- aOR: Adjusted odds ratio

- CI: Confidence Interval

p 0.001