

Research paper

Neighbourhood structural characteristics and crack cocaine use: Exploring the impact of perceived neighbourhood disorder on use among African Americans



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ABSTRACT

Background: Crack cocaine use and associated negative social and health consequences remain a significant public health problem. Research that expands beyond the individual by considering the environmental context as a determinant of cocaine use is growing. The main objectives of this paper are to examine the effects of perceived neighbourhood disorder as an independent correlate of the frequency of recent crack cocaine use and whether its impact is mediated by use-related practices and social context of use among an African American adult sample in Atlanta (GA).

Methods: Cross-sectional data were collected from 461 respondents who were recruited through active and passive community outreach from 70 disadvantaged urban neighbourhoods across Atlanta. Multi-variable negative binomial regression was performed to assess the independent association of perceived neighbourhood disorder with crack cocaine use frequency and to explore potential mediation by use-related practices and social context of use.

Results: Perceived neighbourhood disorder did not remain statistically significant after accounting for use-related practices and social context of use. Involvement in drug distribution and having traded sex were associated with increases in frequency of drug use, while using in safer places and using alone were associated with decreases in frequency of use.

Conclusion: The results show that perceived neighbourhood disorder is associated with frequency of crack cocaine use independently of socio-demographics. However, its significance was eliminated when controlling for use-related practices and the social context of use. Such practices and the social context of use may mediate the relationship between neighbourhood disorder and crack cocaine use. Future research is needed to more fully elucidate the links between individual and neighbourhood characteristics that are related to crack cocaine use and strategies to reduce use must consider the salience of use-related practices and the social context of use.

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Introduction

Crack cocaine use and its health and social consequences remain significant public health problems since their initial introduction in the mid-1980s in the United States. For example, cocaine was the most commonly reported illicit drug for emergency department visits in 2011 (Substance Abuse and Mental Health Services Administration, 2013) and for arrests in 2009 (Motivans, 2011). Health consequences associated with crack cocaine use include a range of psychiatric, neurological, and cardiovascular problems (Cornish & O'Brien, 1996; Falck, Wang, & Carlson, 2008) as well as the increased risk for sexually transmitted infections, most notably HIV/AIDS (DeBeck et al., 2009; Harzke, Williams, & Bowen, 2009;

Latkin, Curry, Hua, & Davey, 2007; Logan, Cole, & Leukefeld, 2003; Sterk-Elifson & Elifson, 1993). Drug-related violence has also been related to high mortality and morbidity rates (Brewer et al., 2006; Siegal, Falck, Wang, & Carlson, 2000). Negative personal and social consequences include social degradation and economic marginalization (Bourgeois, 1995; Cross, Johnson, Davis, & Liberty, 2001; Sterk, 1999a), chaotic residential circumstances (Substance Abuse and Mental Health Services Administration, 2010; Wechsberg et al., 2003), unhealthy personal relationships (Golub, Dunlap, & Benoit, 2010), decreased personal safety (Falck, Wang, Carlson, & Siegal, 2001; Ribeiro, Sanchez, & Nappo, 2010) and increased criminal justice involvement (Sterk, Theall, & Elifson, 2005).

Crack cocaine use from an ecological perspective: neighbourhood disorder

Crack cocaine largely has been marketed in resource-poor neighbourhoods characterized by social disorder and populated

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by residents, often racial/ethnic minorities, with limited options for upward social mobility (Lipton & Johnson, 1998), providing a historical context for the link between place and crack use intensity. Studies examining the effects of neighbourhood characteristics on drug use are increasing (Boardman, Finch, Ellison, Williams, & Jackson, 2001; Crum, Lillie-Blanton, & Anthony, 1996; Galea, Rudenstine, & Vlahov, 2005), including those that focus on the neighbourhood socio-economic status (Duncan, Duncan, & Strycker, 2002; Fuller et al., 2005; Karriker-Jaffe, 2011; Wilson, Syme, Boyce, Battistich, & Selvin, 2005). Neighbourhood disadvantage has been associated with drug-related behaviors (Boardman et al., 2001). Research has also shown that social exclusion, relative deprivation and lack of economic resources more generally create environmental risk for illicit drug use (Fothergill, Ensminger, Green, Robertson, & Hee Soon, 2009; Karriker-Jaffe, 2011).

The lack of sufficient economic and social resources results in a weakening of social controls, thereby creating a place characterized by physical disorder (e.g., vacant buildings, graffiti, vandalism) as well as social disorder (e.g., crime, drug use and drug sales) (Lambert, Brown, Phillips, & Ialongo, 2004; Ziersch, Baum, MacDougall, & Putland, 2005). Neighbourhood disorder may act through other individual or social processes in influencing health or drug use behavior (Galea, Ahern, & Vlahov, 2003). For example, research shows that the association between neighbourhood disadvantage and health might be mediated when perceived neighbourhood social disorder and associated fear were included (Ross & Mirowsky, 2001).

Perceived neighbourhood disorder, the meso-system and crack cocaine use

Perceived neighbourhood disorder has been associated with illicit drug use, controlling for individual factors and other neighbourhood characteristics (Sunder, Grady, & Wu, 2007). Perceived neighbourhood condition may also be antecedent of drug use as part of a system. Bronfenbrenner's (1979) ecological model differentiates between the exo-, meso- and micro-systems. Place may be considered a facet of the exo-system and the meso- and micro-system are then processes embedded within it. In this study, place is conceptualized as neighbourhood disorder. The process of micro-system features such as family, friends, and acquaintances relating to one another is the meso-system, which in this study includes crack cocaine use-related practices and the social context of use. Neighbourhood disorder may increase crack cocaine use through norms that are supportive of use, while marginalizing those who disapprove of local drug scenes (Sterk, Elifson, & Theall, 2007). Moreover, neighbourhood disorder may allow for use in public places, public distribution and sales, and activities to support one's drug habit, ranging from pan-handling to trading sex (Latkin et al., 2007; Schönnesson et al., 2008; Sterk, 1999b; Sterk, Elifson, & German, 2000; Werb et al., 2010).

In neighbourhoods with high levels of disorder, places likely will emerge that facilitate use (Sterk-Elifson & Elifson, 1993). These range from private settings (e.g., crack houses and private residential settings), to semi-public (e.g., abandoned house or car) and public places (e.g., park or street corner). Use patterns vary by place of use. For example, in private settings, users are more likely to share the drug, maybe even buy their supply together or cook rocks from powdered cocaine, and have forms of informal social control that curtail the frequency of use. Conversely, in public settings, use and sales tend to occur at the same time, group cohesion is limited, and norms are largely undefined (Hamid, 1992;

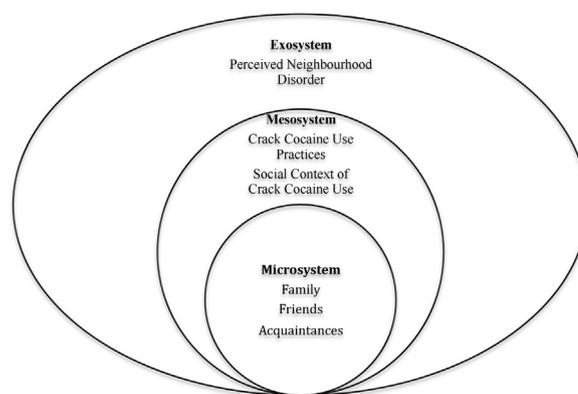


Fig. 1. Conceptual model.

Mieczkowski, 1990; Ribeiro et al., 2010; Sterk-Elifson & Elifson, 1993).

The place or setting of use and the network of people with whom one uses and other associates tend to be linked. However, some studies that have included neighbourhood disadvantage in multivariate models predicting drug use still found a significant effect for neighbourhood when controlling for social resources (Boardman et al., 2001), opinions about friends' use (Gibbons et al., 2004) or friend's acceptance of use (Sunder et al., 2007), suggesting that place influences drug use regardless of social network characteristics. For example, one study found that seeing the drug and other people using (Ehrman, Robbins, Childress, & O'Brien, 1992; Epstein et al., 2009) may lead one to use or use more often or that being at a place where the person has used or been exposed to use triggers the desire to get high (Bradizza & Stasiewicz, 2003; Crum et al., 1996). Although some researchers found that users may prefer to use alone as a means to have more control, a number also reported isolated use to reduce the negative aspects of getting high, such as paranoia (Inciardi, 1995; Ribeiro et al., 2010; Sterk-Elifson & Elifson, 1993).

At the micro-level, socio-demographic characteristics influence the social context of crack cocaine use. For example, those who are older and those who initiated use at an older age tend to be more marginalized and face more challenges in acquiring the drug and supporting their habit than those who are younger and who became socialized into the drug world at a younger age (Johnson & Sterk, 2003; Sterk, 1999a).

The present study

The resource poor environment that characterizes many areas of high crack cocaine use may exacerbate frequency of use patterns. In Atlanta, GA, where this study took place, crack cocaine users are primarily African Americans living in resource poor neighbourhoods (DePadilla & Wolfe, 2012). The objectives of this paper are (1) to determine if the exo-system characteristic of perceived neighbourhood disorder and the meso-system characteristics of crack cocaine use-related practices and social context of crack cocaine use are independently associated with frequency of use and (2) to examine whether the impact of the exo-system characteristic of neighbourhood disorder on frequency of use is mediated by the meso-system characteristics of crack cocaine use-related practices and social context of use. Given the paucity of literature about the practices and social context among non-treatment populations (Malchy, Bungay, & Johnson, 2008; Ribeiro et al., 2010), we seek to understand how these meso-system characteristics impact frequency of use from an ecological perspective that incorporates the concept of place among African American adults (Fig. 1).

Methods

Data

The data for this paper were collected for *People and Places*, a large-scale community-based cross-sectional study. The study was designed to achieve a better understanding of multiple levels of influences on health and health-related behaviors. In the present study, because the focus is on recent crack cocaine use, only those who reported having used crack at least once in the 90 days prior to the interview were included. Data were collected from 461 currently using respondents recruited through active (e.g., community outreach or street intercept methods where people are approached in their neighbourhoods and informed about the study) and passive (e.g., posting flyers) methods between May 2009 and March 2012. The study area includes 70 neighbourhoods (census block groups).

Eligibility criteria included self-identification as African American, black, or African, being 18 years or older, and having lived in the same census block group within the study area for at least 12 months prior to the interview. The added eligibility criteria for recent crack cocaine use required respondents to have used the drug at least once in the last 90 days. Non-probability quota sampling was employed to ensure sufficient variation in gender and age among the respondents by census block group with the goal of having the ability to make comparisons rather than to provide a representative sample. The Institutional Review Board at Emory University approved informed consent procedures. Interviews were conducted in a private room at a centrally located research site in one of the study neighbourhoods by trained interviewers using computer-assisted technology. The survey included domains such as demographic characteristics, psychosocial measures, health history, alcohol and drug use history, criminal justice involvement, and neighbourhood perceptions. At the completion of the interview, each respondent was paid \$30 for participating in the study as well as offered referrals to local health/social service agencies.

Dependent variable

Frequency of crack cocaine use was operationalized as the number of days a respondent used the drug during the 90 days preceding the interview.

Micro-system

Socio-demographic characteristics

Age at first use and *Age* were measured in years. *Gender* was coded as male (0) and female (1). *Education* ranged from “no schooling” (0) to “doctorate or equivalent degree” (23). *Income* was measured in dollars per month. This variable was skewed and a square root transformation was applied prior to analysis in order to have it conform to a more normal distribution. *Relationship status* was measured as not having a partner (0) versus being partnered (1). *Stability of housing situation* was categorized as unstable housing (e.g., homeless, temporary housing, or staying in someone else’s house) (0) versus stable housing (e.g., renting or owning) (1). *Neighbourhood 5+ years* reflected if a respondent had been living in the neighbourhood less than five years (0) or for five or more years (1).

Exo-system

Perceived neighbourhood disorder

Perceived neighbourhood disorder was measured using 8 items from the [Ross and Mirowsky \(1999\)](#) neighbourhood disorder scale. Items were summed such that higher scores corresponded to greater perception of neighbourhood disorder and ranged from 2 to

32. Internal consistency as measured by Cronbach’s alpha reflected good reliability at 0.81.

Meso-system

Crack cocaine use-related practices

Involvement in drug distribution was measured with the question “During the past year, did you sell, distribute, or help to make illegal drugs?” and was coded as no (0) or (1) yes. *Having traded sex* was measured with the question “During the past year, did you trade sex for food, drugs, or money?” and was coded as no (0) or yes (1).

Social context of crack cocaine use

Setting of use was assessed with the question “During the past 90 days, at what places have you used crack?” Responses were used to generate the measure as any (semi-)public places (including in a crack house, in a shooting gallery/get off house, in an abandoned building, in a car, outdoors and elsewhere) (0) and private residence (including only at home, the home of relatives and the home of friends) (1).

People with who use occurred was assessed with the question “During the past 90 days, with what other people have you used crack?” Responses were used to generate the measure as alone only (0), ever with individuals with who the respondent has personal connections (including a sex partner, one or more relatives or one or more friends) and alone but not with acquaintances (1) and ever with acquaintances (including acquaintances, co-workers, neighbors, a drug dealer or strangers) (2).

Analyses

Descriptive statistics were computed for the independent and dependent variables. For all inferential statistics, adjustments were made to parameters and standard errors to account for clustering using generalized estimating equations (GEE) in IBM SPSS Statistics 20. GEE is used to adjust standard errors to account for the clustered nature of data collected by census block group. Associations between each independent variable and the outcome were tested with regression models using a negative binomial distribution and a log link. Negative binomial regression was used to account for the over dispersion of the dependent variable ([Hilbe, 2008](#)). These regressions model the log of the expected number of days of crack cocaine use in the last 90 days. An exponentiation of the coefficients yields an incident rate ratio (IRR) ([Hilbe, 2008](#)), or an estimate of the percentage change (IRR – 1) in the outcome for a one-unit change in each independent variable ([Long, 1997](#)).

The multivariable regression models of the effect of perceived neighbourhood disorder adjusted for socio-demographics (Model 1) and the full model of perceived neighbourhood disorder, crack cocaine use-related practices and the social context of crack cocaine use (Model 2) also employed a negative binomial distribution and log link and included all predictors that were significant at the level of $p < .05$ in bivariate regressions. Regressions were used to test for the mediation of perceived neighbourhood disorder by crack cocaine use-related practices and the social context of crack cocaine use using the criteria outlined by [Baron and Kenny \(1986\)](#). Evidence of mediation was determined if perceived neighbourhood disorder was associated with the indicator of crack cocaine use-related practices and the social context of crack use in analyses controlling for socio-demographics, perceived neighbourhood disorder was associated with frequency of crack use controlling for socio-demographics and if the effect of neighbourhood disorder was reduced to non-significance when the indicator of crack cocaine use-related practices and the social context of crack use was included in the model. Regressions with dichotomous outcomes employed a binomial distribution with a logit link and the regression predicting people with who use occurred employed a

multinomial distribution with a cumlogit link. The coefficients for perceived neighbourhood disorder were multiplied by its standard deviation prior to exponentiation in order to interpret associations with a meaningful increase in this variable. Missing data was minimal (<1%) and case wise deletion was applied.

Results

Sample

Descriptive statistics are displayed in [Table 1](#). On average, respondents used crack cocaine 48.75 (sd = 32.17) days out of the past 90 days. The mean age of first use was 27.48 (sd = 8.01), meaning that most respondents began using in the early 1990s, the time period when crack cocaine began to dominate the local drug market. The average age of the respondent was 46.75 (sd = 8.39), and 43% of the sample was female. Respondents, on average, had completed at least 12 years of school, and the mean monthly income was \$687.70 (sd = 813.48, median = 500). Nearly one half (49%) reported having a partner. Forty-seven percent of the sample reported having stable housing and less than one half (45%) had been in the neighbourhood for at least five years.

Involvement in drug distribution was reported by 21% of the respondents. Approximately one-third (32%) indicated having traded sex in the last year. More than half (55%) of the sample reported using crack cocaine only in their own home, the home of friends, or the home of relatives in the past 90 days. In terms of people with whom they used crack cocaine, use with people with whom they held social or biological ties was most common (47%). Least common was using alone (14%).

Crude associations

An older age of initiation of crack cocaine use (IRR: 0.99, $p < .01$) and being older (IRR: 0.99, $p < .01$) were associated with fewer days of crack cocaine use (see [Table 1](#)). Conversely, higher income (IRR: 1.01, $p < .01$) was associated with an increase in the number of days of use.

An increase of a standard deviation (5.60) of perceived neighbourhood disorder was associated with an 8% increase in the number of days of use (IRR: 1.08, $p < .01$). Crack cocaine use-related practices were associated with increases in the number of days of crack cocaine use with involvement in drug distribution showing the stronger association (IRR: 1.49, $p < .001$) compared to having traded sex for drugs or money (IRR: 1.38, $p < .001$).

Using crack cocaine only at home, the home of relatives or the home of friends was associated with an decrease in number of days of use (IRR: 0.70, $p < .001$) compared to ever using in a (semi-)public place. Using only alone (IRR: 0.55, $p < .001$) or alone and with personal connections only (IRR: 0.76, $p < .001$) were associated with decrease in number of days of use compared to ever using with acquaintances.

Multivariable analysis results

The results of the multivariable analysis are displayed in [Table 2](#). Model 1 shows that perceived neighbourhood disorder (IRR: 1.06, $p < .05$) was a significant predictor of number of days of crack cocaine use controlling for the significant effects of age at first use (IRR: 0.99, $p < .05$) and income (IRR: 1.01, $p < .01$). Model 2 included the variables describing crack cocaine use-related practices and the social context of crack use. Involvement in drug distribution (IRR: 1.26, $p < .01$) and having traded sex (IRR: 1.16, $p < .05$) were both associated with increases in days of use. Using only at home, the home of a relative, or the home of friends was associated with a decrease in days of use (IRR: 0.82, $p < .01$) compared to ever using

in (semi-)public places. Using alone only was associated with a decrease in days of use (IRR: 0.74, $p < .05$) compared to ever using with acquaintances. Using alone and with personal connections only did not differ significantly in days of using compared to ever using with acquaintances. Perceived neighbourhood disorder was no longer associated with frequency of crack cocaine use after controlling for the meso-system variables.

Mediation results

The initial regressions necessary to test for mediation assessed the associations between perceived neighbourhood disorder and the crack cocaine use-related practices as well as the associations between perceived neighbourhood disorder and the social context of crack cocaine use. Among the practices of involvement in drug distribution and having traded sex, only having traded sex was significantly predicted by perceived neighbourhood disorder, controlling for socio-demographics (OR: 1.05, $p < .05$). Among the variables describing social context of use, setting and people with who use occurred, only the latter was significantly predicted by perceived neighbourhood disorder, controlling for socio-demographics (OR: 0.96, $p < .01$). When having traded sex was included with perceived neighbourhood disorder in a model predicting frequency of crack use, perceived neighbourhood disorder was no longer significantly associated with the outcome while having traded sex was strongly and positively associated (IRR: 1.32, $p < .001$). When people with who use occurred was included with perceived neighbourhood disorder, perceived neighbourhood disorder was no longer significantly associated with the outcome while using only alone was associated with a decrease in frequency of crack use (IRR: 0.59, $p < .001$) compared to ever using with acquaintances and using alone and with personal connections only was also associated with a decrease in frequency of crack use (IRR: 0.80, $p < .01$) compared to ever using with acquaintances ([Table 3](#)).

Discussion

Homogenizing crack cocaine users masks the heterogeneity of their use experiences ([Daniulaityte, Carlson, & Siegal, 2007](#)). Understanding how the neighbourhood environment or place and the specific context of the use experience relate to frequency of use can enhance knowledge of domains that can be addressed in efforts to reduce the role that crack cocaine might play in the lives of individuals situated in particular places and contexts. Perceived neighbourhood disorder was associated with an increase in frequency of use when accounting for socio-demographic characteristics, providing support for research that has found a direct link between neighbourhood disorder and illicit drug use ([Boardman et al., 2001](#); [Gibbons et al., 2004](#); [Sunder et al., 2007](#)). However, including crack cocaine use-related practices and the social context of crack cocaine use reduced the effect of perceived neighbourhood disorder to non-significance with having exchanged sex and people with who use occurred emerging as mediators of the effect of perceived neighbourhood disorder on frequency of crack cocaine use.

Consistent with previous literature, greater perceived neighbourhood disorder was positively associated with having traded sex ([Latkin et al., 2007](#)). In contrast, greater perceived neighbourhood disorder was negatively associated with using only alone or using with personal connections versus using with people who were not as close to the respondent, indicating that place may inhibit people from trying to mitigate the harmful associated consequences of crack cocaine use that may occur in such neighbourhoods when using with others, such as violence ([Ribeiro et al., 2010](#); [Sterk-Elifson & Elifson, 1993](#)). The inclusion of these

Table 1
Study variable descriptive statistics and associations that are frequency of crack cocaine use ($n = 461$).

Variable	Mean (SD)/%	Crude IRR
Days crack use, past 90	48.75 (32.17)	
<i>Socio-demographic characteristics</i>		
Age at first use	27.48 (8.01)	0.99 (0.98, 1.00)**
Age	46.75 (8.39)	0.99 (0.98, 1.00)**
Female	43%	1.11 (0.99, 1.24)*
Education	12.25 (2.45)	0.99 (0.97, 1.02)
Income ^a	23.09 (12.45)	1.01 (1.00, 1.01)**
Partner	49%	0.96 (0.86, 1.08)
Stable home	47%	0.90 (0.80, 1.02)*
Neighbourhood 5+ years	45%	0.99 (0.88, 1.12)
Perceived neighbourhood disorder ^b	19.10 (5.60)	1.08 (1.03, 1.14)**
<i>Crack cocaine use-related practices</i>		
Involvement in drug distribution	21%	1.49 (1.33, 1.66)***
Having traded sex	32%	1.38 (1.24, 1.53)***
<i>Social context of crack cocaine use</i>		
Setting: only at home, home of relatives and home of friends ^c	55%	0.70 (0.61, 0.81)***
People use with: alone only ^d	14%	0.55 (0.44, 0.69)***
People use with: alone or personal connections only ^d	47%	0.76 (0.65, 0.88)***

^a Square root transformed.

^b IRR is for a one standard deviation change in neighbourhood disorder (5.60).

^c Reference group is any (semi-)public places (45%).

^d Reference group is ever with acquaintances (39%).

* $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

predictors in a multivariable model indicated that perceived neighbourhood disorder, a characteristic of place, may act through trading sex and people with whom one uses in its effect on frequency of days used. These potential mechanisms provide insight as to how, in the absence of improving the larger environment, researchers may address behaviors that increase use.

In this study, selling drugs was also a significant correlate of an increase in the frequency of use in the multivariable model. Previous research has shown that economic stressors have been positively associated with illicit drug use, even after accounting for protective factors such as employment and kinship solidarity (Hatch, 2007). It may be that users are compelled to sell in order to support a habit of frequent crack cocaine use and the subsequent increased proximity to the drug may enter the user into a cycle of increasing use (Hamid, 1992). Similarly, trading sex for drugs or money also remained significant in the full multivariable model.

Setting of use was also significantly associated with frequency of use. Using in safer places such as at home or the home of friends

or relatives compared to using in (semi-)public places was associated with a decrease in frequency of use. Using in safer places has been described by crack cocaine users as a means to avoid violence (Mieczkowski, 1990; Ribeiro et al., 2010; Sterk-Elifson & Elifson, 1993) and the link between using in safer places and decreased frequency may reflect a lower dependence on the drug and perhaps a person less affected by the corresponding limited resources associated with frequent crack cocaine use (Cross et al., 2001) that may drive one to use in public places (German & Sterk, 2002). Although setting was not statistically found to be a mediator of the effect of perceived neighbourhood disorder, it is important to note that it is linked to who one uses with as we found that 70% of people who had ever used with acquaintances had also used in unsafe places compared to people who used only alone (22%) or only alone and with personal connections (33%). Therefore, the link between the place where one lives and the setting of use may be better explained by the people with who one uses.

Table 2
Multivariable models of frequency of crack cocaine use ($n = 459$).

Variable	Model 1 (adjusted IRRs)	Model 2 (adjusted IRRs)
<i>Socio-demographic characteristics</i>		
Age at first use	0.99 (0.98, 1.00)*	0.99 (0.98, 1.00)*
Age	0.99 (0.99, 1.00)	1.00 (0.99, 1.01)
Income ^a	1.01 (1.00, 1.01)**	1.00 (1.00, 1.01)*
Perceived neighbourhood disorder ^b	1.06 (1.01, 1.12)*	1.03 (0.97, 1.10)
<i>Crack cocaine use-related practices</i>		
Involvement in drug distribution		1.26 (1.09, 1.45)**
Having traded sex		1.16 (1.04, 1.30)*
<i>Social context of crack cocaine use</i>		
Setting: only at home, home of relatives and home of friends ^c		0.82 (0.70, 0.95)**
People use with: alone only ^d		0.74 (0.59, 0.94)*
People use with: alone or personal connections only ^d		0.92 (0.78, 1.09)

^a Square root transformed.

^b IRR is for a one standard deviation change in neighbourhood disorder (5.60).

^c Reference group is any (semi-)public places.

^d Reference group is ever with acquaintances.

* $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3
Mediation analyses.

Variable	Paths from neighbourhood disorder to mediators	Paths from neighbourhood disorder and mediators to frequency of use
Perceived neighbourhood disorder ^{a,b}		1.07 (1.02, 1.12) [*]
Crack cocaine use-related practices		
Involvement in drug distribution ^c	1.04 (0.99, 1.10)	
Having traded sex ^a	1.05 (1.01, 1.10) [*]	1.32 (1.19, 1.47) ^{***}
Perceived neighbourhood disorder ^{a,b}		1.05 (1.00, 1.11) [*]
Perceived neighbourhood disorder ^{b,c}		1.06 (1.01, 1.12) [*]
Social context of crack use		
Setting: only at home, home of relatives and home of friends ^{a,d}	0.97 (0.94, 1.00) [*]	
People use with ^{c,e}	0.96 (0.93, 0.99) ^{**}	
People use with: alone only ^{c,f}		0.59 (0.48, 0.74) ^{***}
People use with: alone or personal connections only ^{c,f}		0.80 (0.69, 0.92) ^{**}
Perceived neighbourhood disorder ^{b,c}		1.05 (0.99, 1.11)

^a Controlling for age and age at first use.

^b IRR is for a one standard deviation change in neighbourhood disorder (5.60).

^c Controlling for age, age at first use and income.

^d Reference group is any (semi-)public places.

^e Sorted descending from ever with acquaintances to alone only.

^f Reference group is ever with acquaintances.

⁺ $p < .10$.

^{*} $p < .05$.

^{**} $p < .01$.

^{***} $p < .001$.

Jang and Johnson (2001) in their examination of neighbourhood disorder discuss the difference between objective measures of disadvantage and the perception of neighbourhood disorder, describing the former as the presence of the phenomena and the latter as an interpretation of it. Their study found an association between perceived disorder and illicit drug use but other studies that used census data to create indices of neighbourhood disadvantage, largely grounded in different indicators of socioeconomic status, have also found associations between these objective measures and illicit drug use (Boardman et al., 2001; Karriker-Jaffe, 2011). However, this finding is not consistent across studies (Karriker-Jaffe, 2011). Additionally, a study of low-income women that used both an objective census measure and a measure of perceived disorder found that the objective measure indicated less disorder was associated with more drug use when comparing only the least disadvantaged neighbourhoods while perceived disorder was associated with drug use in the anticipated direction (Sunder et al., 2007). It could be that when people are experiencing similar levels of disadvantage based on income, it is the interpretation or experience of the surrounding disorder that makes them more vulnerable to drug use. In this study, we applied perception of disorder as our measure of place in order to examine the effect of peoples' experience of where they live on frequency of crack cocaine use. It makes sense, therefore, that the inclusion of measures of use that are more proximal to the experience of drug use such as setting may be more salient or may mediate the impact of neighbourhood disorder.

Strengths and limitations

This study is subject to a number of limitations. The data are cross-sectional and preclude any causal inferences. The sample is non-probability and therefore may not be representative of crack cocaine users in the area under study. As participants were asked about neighbourhood disorder where they reside, it's possible that if they work or purchase drugs elsewhere, the conditions of those environments may have additive or differential impact on crack cocaine use. Respondents self-reported sensitive information about drug use and illegal activities and their responses may have been subject to social desirability bias. However, the interviewers were trained to be sensitive to potential bias and we have no reason

believe that there would be misreporting for reasons other than recall bias. Using a brief time period of 90 days was intended to mitigate this issue. The sample is relatively small and purposive and generalizability is limited to resource poor urban neighbourhoods. A strength of the study is that the population is not limited to those seeking treatment, thus providing understanding of a hard-to-reach group of users. Additionally, this study elaborates on the on the meso-system and links it to the exo-system as it applies to crack cocaine users, thereby enhancing a specific application of the ecological model.

Conclusion

The foci of this study address crack cocaine use among African Americans at two ecological levels: the exo-system and the meso-system by examining perceived neighbourhood disorder, crack cocaine use-related practices and the social context of crack cocaine use. Given that a higher percentage of African Americans report the use of illicit drugs nationally than other races/ethnicities (Substance Abuse and Mental Health Services Administration, 2012) and a higher percentage of public drug treatment admissions for crack cocaine specifically in Atlanta, GA (DePadilla & Wolfe, 2012), an understanding of the effect of place on crack cocaine use in this population is important. The findings show that although perceived neighbourhood disorder as a characteristic of place is independently associated with frequency of use when controlling for socio-demographics, the practices related to use and the specific circumstances of use defined by setting and people, may be more salient correlates. People engaging in practices that are embedded within the drug economy may need different resources than those who are not. It may be that some users are already attempting to mitigate the negative consequences of crack cocaine use (Ribeiro et al., 2010) and those who cannot may indicate disparities in access to safer settings among crack cocaine users (German & Sterk, 2002) that highlight other needs, such as stable housing or social support from people who are not users (Sterk, 1999a). Assistance such as this, however, will be more complicated to provide in places that foster sex trading or using drugs in groups through physical and social disorder. In turn, interventions that aim to address the impact of disorder on drug use may well benefit from understanding heterogeneity in the use-related practices and the social context

of individual users in order to aid those most impacted by crack cocaine.

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