Short Communication

# Neighborhood crime and access to health-enabling resources in Chicago

Elizabeth L. Tung[a,d,*], Kelly Boyd[b], Stacy Tessler Lindau[b,c,e], Monica E. Peek[a,d,e]

[a] Department of Medicine, Section of General Internal Medicine, University of Chicago, 5841 South Maryland Avenue, Chicago, IL 60637, USA
[b] Department of Obstetrics and Gynecology, University of Chicago, 5841 South Maryland Avenue, Chicago, IL 60637, USA
[c] Department of Medicine-Geriatrics, University of Chicago, 5841 South Maryland Avenue, Chicago, IL 60637, USA
[d] Chicago Center for Diabetes Translation Research, University of Chicago, 5841 South Maryland Avenue, Chicago, IL 60637, USA
[e] MacLean Center on Clinical Medical Ethics, University of Chicago, 5841 South Maryland Avenue, Chicago, IL 60637, USA

ABSTRACT

Neighborhood crime may be an important social determinant of health in many high-poverty, urban communities, yet little is known about its relationship with access to health-enabling resources. We recruited an address-based probability sample of 267 participants (ages ≥ 35 years) on Chicago's South Side between 2012 and 2013. Participants were queried about their perceptions of neighborhood safety and prior experiences of neighborhood crime. Survey data were paired to a comprehensive, directly-observed census of the built environment on the South Side of Chicago. Multivariable logistic regression models were used to examine access to health-enabling resources (potential and realized access) as a function of neighborhood crime (self-reported neighborhood safety and prior experience of theft or property crime), adjusting for sociodemographic characteristics and self-reported health status. Low potential access was defined as a resident having nearest resources > 1 mile from home; poor realized access was defined as bypassing nearby potential resources to use resources > 1 mile from home. Poor neighborhood safety was associated with low potential access to large grocery stores (AOR = 1.73, 95% CI = 1.04, 2.87), pharmacies (AOR = 2.24, 95% CI = 1.33, 3.77), and fitness resources (AOR = 1.93, 95% CI = 1.15, 3.24), but not small grocery stores. Any prior experience of neighborhood crime was associated with higher adjusted odds of bypassing nearby pharmacies (AOR = 3.78, 95% CI = 1.11, 12.87). Neighborhood crime may be associated with important barriers to accessing health-enabling resources in urban communities with high rates of crime.

## 1. Introduction

Neighborhood crime can confer deleterious health effects that lead to or exacerbate chronic conditions, such as obesity and hypertension (Fish et al., 2010; Tamayo et al., 2016). People living in communities with high levels of crime experience frequent and prolonged activation of stress response pathways (Burdette and Hill, 2008; McEwen, 1998). These pathways are postulated to impact health directly through metabolic and autonomic dysregulation (Burdette and Hill, 2008; McEwen, 1998), or indirectly through adverse health behaviors (e.g., stress eating) (Billimek and Sorkin, 2012; Foster and Giles-Corti, 2008; Russell et al., 2016). However, less is known about the relationship between neighborhood crime and access to health-enabling resources, despite growing consensus in clinical practice that these resources are integral to addressing chronic disease (Coleman et al., 2009; Stellefson et al., 2013).

Andersen's enduring Behavioral Model defines access in two ways (Andersen, 1995): *potential access* indicates the availability of resources

in a neighborhood, and *realized access* indicates the actual use of those resources (Andersen, 1995). In a recent study, we found that people often bypassed nearby resources for more distant resources, and bypassing was associated with higher BMI; poor safety was identified as an important reason for bypassing (Tung et al., 2016). Zenk and colleagues, in prior qualitative work, also identified crime-related safety as a barrier to accessing healthy and nutritious foods (Zenk et al., 2011). However, few quantitative studies have explicitly examined the relationship between neighborhood crime and access to health-enabling resources, such as grocery stores, pharmacies, and fitness centers. None to our knowledge have used a directly-observed census of the built environment to measure access.

We used cross-sectional data from an address-based probability sample, collected on Chicago's South Side, to examine relationships between neighborhood crime and access to health-enabling resources. Based on previously published work (Tung et al., 2016; Zenk et al., 2011), we hypothesized that neighborhood crime is inversely associated with both potential and realized access to health-enabling

resources.

## 2. Methods

### 2.1. Study design and participants

The South Side Health and Vitality Population Study was conducted in a densely populated, high-poverty region (55% of residents below 200% FPL), with a predominantly non-Hispanic black (77%) and Hispanic/Latino (13%) population (U.S. Census Bureau, 2012). An address-based probability sample of community-dwelling adults, ages ≥ 35 years, was recruited between November 2012 and July 2013. Community and University leaders worked together to decide which populations and age groups should be included in this study, based on community priorities and budgetary constraints. The target population was ultimately selected based on elevated but modifiable risk for chronic disease. Hour-long in-person interviews were conducted in participants' homes. A detailed methodology of this study has been previously described (Tung et al., 2016).

This study was approved by the University of Chicago Institutional Review Board.

### 2.2. Data and measures

Sociodemographic characteristics were measured using items adapted from national surveys, including age, self-identified race and ethnicity, gender, income, and education (Centers for Disease Control and Prevention, 2011–2012a, b; The University of Michigan, 2002). Prior experience of neighborhood crime ("While living in your neighborhood, have you or anyone who lives in your house had anything stolen or damaged inside or outside your home…?") and self-reported neighborhood safety ("How safe is your neighborhood?") were measured using items adapted from the Los Angeles Family and Neighborhood Survey (LAFANS) (Pebley et al., 2010). Neighborhood safety was analyzed as a dichotomous variable because we observed no significant differences using ordered or categorical data.

We selected a subset of resource types identified by the Robert Wood Johnson Foundation (RWJF) Commission to Build a Healthier America as critical building blocks for sustaining health (Mattessich and Rausch, 2013). Although not the full range of resources identified by the RWJF framework, the resources included in this study were chosen for being common, community-based establishments that support the *daily* activities needed to sustain and enable health, including healthy eating, physical activity, and medication adherence. Access to health-enabling resources was measured in two ways. First, we used data from the 2012 MAPSCorps asset census, a comprehensive, directly-observed census of every open and operating, public-facing business and organization in the region (Lindau et al., 2016) to identify community-based resources near each resident's home. Second, we used survey items to query residents about the community-based resources they most commonly used (Pebley et al., 2010; Tung et al., 2016). Due to practical constraints on survey length, we included the two most common resource types, specifically, grocers and pharmacies. Participants were asked to give the names and locations of the places they most often frequented to: 1) buy groceries, and 2) fill a prescription or buy other medications.

Height, weight, and blood pressure were measured at the time of interview using a previously described protocol (Smith et al., 2009). Obesity status was defined as BMI ≥ 30 kg/m$^2$ (World Health Organization Expert Consultation, 2004); elevated blood pressure was defined as SBP ≥ 140 or DBP ≥ 90 mmHg (Page, 2014).

### 2.3. Analysis

Descriptive statistics were calculated. Unadjusted and multivariable logistic regression models were used to evaluate relationships between: 1) neighborhood safety (independent variable) and potential access to nearby grocers, pharmacies, and fitness resources and 2) prior experience of neighborhood crime (independent variable) and realized access to nearby grocers or pharmacies. Poor potential access was defined as nearest resources > 1 mile from a resident's home. Poor realized access was defined as bypassing resources within 1 mile to use resources > 1 mile from a resident's home. A fuller description of the methodology has been previously published (Tung et al., 2016). As a secondary analysis, we also explored the relationship between prior experience of neighborhood crime (independent variable) and BMI and BP status, hypothesizing positive associations between neighborhood crime and these biological indicators of stress-related chronic disease.

All regression models adjusted for sociodemographic characteristics. Based on prior studies of the relationship between neighborhood crime and health, the following variables were also considered for inclusion: self-reported health status (Ware et al., 1994), routine physical activity (Chastin et al., 2015), and duration of residence (Park et al., 2008). We included covariates that were significant in bivariate analyses (p-value < 0.1). Final models adjusted for age, gender, education, and self-reported health status. All analyses were performed in 2017 using STATA, v13.1 and ArcGIS, v10.1.

## 3. Results

Table 1 summarizes sociodemographic characteristics of the sample population. Overall, 431 eligible residents were invited to participate and 267 (62%) completed the survey. The majority of residents were female (63%) and identified as non-Hispanic black (69%; Table 1).

Many participants had at least one small grocer (84%) within 1 mile from home; fewer had at least one large grocer (57%), pharmacy (45%) or fitness resource (57%) within 1 mile. Poor neighborhood safety was associated with low potential access to large grocery stores (AOR = 1.73, 95% CI = 1.04–2.87), pharmacies (AOR = 2.24, 95% CI = 1.33–3.77), and fitness resources (AOR = 1.93, 95% CI = 1.15–3.24), but not small grocery stores (Table 2).

Among residents who had resources within 1 mile from home, many bypassed grocers (50%) and pharmacies (58%) to use resources farther away; very few used *any* fitness resources (11%). A prior experience of theft or property crime was associated with higher adjusted odds of bypassing nearby pharmacies (AOR = 3.78, 95% CI = 1.11–12.87; Table 2); an association with bypassing grocery stores (AOR = 1.14, 95% CI = 0.67–1.96) was not significant in final adjusted models (Table 2).

A prior experience of theft or property crime was also associated with 74% higher adjusted odds of obesity (95% CI = 1.02–2.95) and 50% higher adjusted odds of hypertension (95% CI = 0.86–2.60); however, hypertension analyses were not significant in final adjusted models.

## 4. Discussion

In this high-poverty, urban community with a predominantly racial and ethnic minority population, we found a consistent relationship between neighborhood crime and poor access to health-enabling resources. People reporting poor neighborhood safety were less likely to have large grocers, pharmacies, and fitness resources within 1 mile from home. Even among those who did have resources within 1 mile from home, a prior experience of neighborhood crime was associated with bypassing pharmacies.

These findings provide evidence to suggest that neighborhood crime may impede access to health-enabling resources in two important ways. First, neighborhood crime may reduce the total number of available resources (i.e., potential access), perhaps because health-enabling businesses avoid locating to high-crime neighborhoods. Second, neighborhood crime may impede utilization of available resources (i.e., realized access). In previous qualitative work, an older woman reported