



Short Report

Relation between neighborhood socio-economic characteristics and social cohesion, social control, and collective efficacy: Findings from the Boston Neighborhood Study

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ARTICLE INFO

Keywords:

Social determinants
Collective efficacy
Social cohesion
Social control
Neighborhoods

ABSTRACT

Little is known about the determinants of collective efficacy, a neighborhood social process comprised of social cohesion and social control, which has shown to be beneficially associated with health. Our goal was to identify determinants of collective efficacy, social cohesion and social control. We used data collected from the Boston Neighborhood Survey, a cross-sectional survey conducted in 38 Boston neighborhoods in 2010 ($n = 1710$). We used multi-level logistic regression analyses to identify the relationship between the neighborhood-level characteristics and collective efficacy, social cohesion, and social control. High social fragmentation was associated with a decreased likelihood of reporting high collective efficacy (OR = 0.71, 95% CI = 0.54, 0.95). and high social cohesion (OR = 0.63, 95% CI = 0.46, 0.86). High social fragmentation (OR = 0.80, 95% CI = 0.64, 0.99), and moderate economic deprivation (OR = 0.64, 95% CI = 0.47, 0.88) were associated with a decreased likelihood of reporting high social control, while high trust in police was associated with an increased likelihood in reporting high social control (OR = 1.86, 95% CI = 1.16, 3.00). Further research should be undertaken to better understand the direction of effect of these associations and how interventions to promote social processes can utilize these findings to improve health.

1. Introduction

According to the World Health Organization, the social determinants of health are the conditions in which people are born, grow, work, live, and age. These economic and social conditions influence individual and population health (World Health Organization, 2010). Social conditions within residential areas, such as collective efficacy, social cohesion, and social control are such examples. Collective efficacy is interpreted as people's perception of closeness or connection with their neighbors (social cohesion and trust) and the capacity of neighbors to intervene on behalf of their community to reach common goals (informal social control) (Sampson, Raudenbush, & Earls, 1997). Collective efficacy is comprised of two separate processes: social cohesion and social control. Social cohesion is defined as the willingness of members of a society to cooperate with each other in order to survive and prosper (Stanley,

2003). It encompasses the connectedness and solidarity among groups in society. Social control is a concept that refers to the ways in which people's thoughts, feelings, appearance, and behavior are regulated in social systems (Sampson et al., 1997). Researchers often look at collective efficacy in its entirety or its separate component processes. Furthermore, these concepts have been studied as determinants of health outcomes.

Collective efficacy has a number of improved health determinants for both communities as well as individuals within communities. Having higher levels of collective efficacy in a community is associated with lower rates of victimization and violent crime (Molnar et al., 2004, 2008; Sampson et al., 1997), lower rates of obesity (Browning & Cagney, 2002), decreased likelihood in being overweight and reduced BMI (Cohen et al., 2006, 2008), higher rates of life satisfaction among community residents (Adams & Serpe, 2000), as well as better overall

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<https://doi.org/10.1016/j.ssmph.2020.100552>

Received 27 October 2019; Received in revised form 30 January 2020; Accepted 3 February 2020

Available online 5 February 2020

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health (Browning & Cagney, 2002). In one study, women who perceived lower levels of collective efficacy had higher mean body mass index (BMI) and also tended to have a higher prevalence of obesity (Burdette, Wadden, & Whitaker, 2006). Collective efficacy has also been associated with lower all-cause mortality (Skrebski, Kopp, & Kawachi, 2003) and less frequent dating violence (Jain, Buka, Subramanian, & Molnar, 2010) (Rothman et al., 2011). Both collective efficacy and social cohesion are related to better mental health (Fone et al., 2007; Xue, Leventhal, Brooks-Gunn, & Earls, 2005). Another study found that low collective efficacy, informal social control, and social cohesion, increased the prevalence of depressive symptoms among women, older participants and widows (Quatrin, Galli, Moriguchi, Gastal, & Pattussi, 2014); similarly, one study found lower neighborhood collective efficacy was associated with a higher prevalence of depression among older adults (Ahern & Galea, 2011).

Social cohesion, one of the components of collective efficacy, has also been identified as a correlate of a number of health outcomes. Social cohesion has been linked to increased physical activity (Pabayo, Janosz, Bisset, & Kawachi, 2014) as well as better mental health (Fone et al., 2007). Social cohesion can also influence individual health by mitigating the effects of poverty, disparity, and social exclusion (Chuang, Chuang, & Yang, 2013; Phillips & Berman, 2003). Less is known about social control, the other component of collective efficacy, though there has been some research showing an association between social control and improved health outcomes. Social control can alleviate stress by reducing or constraining health-damaging behaviors (Lewis & Rook, 1999), as well as promoting self-care behaviors. People who have responsibilities or obligations to others lead more orderly, regular, and less risky lives (Umberson, 1987). Additionally, social control can directly affect an individual by discouraging risky or deviant behavior (Sampson et al., 1997).

Although collective efficacy, social cohesion, and social control have shown to be significant determinants of health outcomes, less is known about predictors of these social processes, an important aspect if one wants to promote them as a way to improve health behaviors and outcomes. Previous research has identified some individual-level determinants. Age is also a significant factor with respect to collective efficacy; older populations perceive more collective efficacy and social cohesion compared to their younger counterparts (Uchida, Swatt, Solomon, & Varano, 2013). Home ownership has a significant relationship with perceptions of social cohesion, where homeowners generally perceive higher levels of social cohesion (Browning & Cagney, 2002; Uchida et al., 2013). Individuals who use available resources in their neighborhood report higher levels of social cohesion (Uchida et al., 2013). Primary determinants of social control include the feeling of responsibility to exert it; the perceived legitimacy of social control in the situation; and the extent to which bystanders felt hostile emotions (Chaurand & Brauer, 2008). Others argue that the mechanisms involved with social control include components such as collective feelings of shame, coercion, force, restraint, and persuasion, which all enforce a standard of behavior for members of a society (Carmichael, 2012). Neighborhood attachment and satisfaction with police contributed significantly to neighborhood levels of informal social control (Silver & Miller, 2004). Finally, formation of social ties has been shown to take time. For example, financial investment provides homeowners with a vested interest in supporting the commonwealth of neighborhood life; this can lead to longer residential tenure and homeownership and increased collective efficacy to maintain social control (Sampson et al., 1997, 1999).

In addition to individual-level factors, characteristics of where individuals reside are also associated with social processes. While less is known about area-level predictors of social cohesion, social control, and collective efficacy, some environmental correlates of these social processes have been identified. For example, availability of parks has been found to be positively associated with collective efficacy while alcohol outlets have been found to be negatively associated with collective

efficacy (Cohen et al., 2008). In Chicago, density of personal ties, was associated with collective efficacy (Sampson et al., 1997, 1999). Furthermore, the presence of local organizations and voluntary associations helps sustain a capacity for social action that explains the promoting effects of personal ties on collective efficacy (Sampson et al., 1997, 1999). These researchers contend that these organizations foster collective efficacy through strategic networking or by creating needed tasks that demand collective efficacy responses (Sampson et al., 1997, 1999).

More research is needed to identify additional neighborhood-level predictors of these social processes. One potential important social contextual factor that might be associated with collective efficacy and/or its component parts is social fragmentation. Social fragmentation is linked to the concept of anomie, which sociologist Emile Durkheim defined as a state of normlessness (Congdon, 2011), or the breakdown of social bonds between individuals and their communities, with fragmentation of social identity and rejection of self-regulatory values (Congdon, 2011). A previous study conducted in New York City used the percentage of people living alone, not unmarried or separated, rented accommodation, and who moved in the previous year as indicators of social fragmentation (Curtis et al., 2006). Social fragmentation can be seen as a proxy for resident turnover, and the higher the social fragmentation, the higher the rate of resident turnover. Social fragmentation has been linked with lower physical activity and poor mental health outcomes, such as depression and risk for suicide (Collings, Ivory, Blakely, & Atkinson, 2009; Fagg et al., 2008; Ivory, Collings, Blakely, & Dew, 2011). It is conceivable that social fragmentation could act upon these health outcomes through an erosion of collective efficacy, social control and social cohesion.

Research has focused on collective efficacy, social cohesion, and social control as determinants of health outcomes. Yet, these have been less often been examined as outcomes themselves. Individual-level characteristics have largely been assessed in the studies that have examined these social processes as outcomes. There is limited evidence looking at neighborhood-level determinants; this paper addresses that gap by assessing neighborhood-level determinants of social cohesion, social control, and collective efficacy with the goal of informing prevention planning. We hypothesize that these area-level characteristics are associated with collective efficacy, social cohesion, and social control.

2. Methods

Data for this investigation come from the 2010 Boston Neighborhood Survey (BNS), Boston Police Department crime data and 2010 U.S. Census data. The BNS is a random-digit telephone cross-sectional survey conducted by the opinion research firm Fact Finders, Inc. (<http://www.factfinders.com/>) on behalf of the Harvard Injury Control Research Center. Data collection procedures have been described elsewhere (Azrael et al., 2009). Briefly, potential respondents were stratified by each of Boston's 16 larger neighborhoods, with sampling proportional to neighborhood population size (Azrael et al., 2009). Trained interviewers administered the questionnaire in English and Spanish. Verbal informed consent was obtained prior to administering the survey. These data included self-reported sex, age, nativity (US-born, foreign born arrived ≤ 4 years and arrived >4 years) and race/ethnicity (white, black, Asian, Hispanic and other).

2.1. Measures

Outcome Variables: A survey was administered to respondents to measure collective efficacy, social cohesion, and social control and were assessed using a 10-item scale with acceptable reliability and validity in adults (Sampson et al., 1997, 1999). Collective efficacy score was computed as the mean of the 10 items that composed the social cohesion and social control scales, while social cohesion and social control were

computed as the mean of each subset of items. For social cohesion, respondents were asked the following five questions, “*In my neighborhood people: can be trusted; are willing to help their neighbors; know and like each other; get along with each other; people share the same beliefs about what is right and wrong.*” Response options for each included: 1: *strongly agree*; 2: *agree*; 3: *disagree*; 4: *strongly disagree*; 5: *no opinion/don’t know*. Items were reverse coded so that a higher social cohesion score is indicative of more social cohesion. The Cronbach’s alpha for these items was 0.85. For social control, respondents were asked the following five questions, “*In your neighborhood, how likely is that your neighbors would organize together to keep a fire station open that was going to close because of budget cuts; do something about neighborhood children skipping school and hanging out on a street corner; do something about a child showing disrespect to an adult; do something about a child spray-painting graffiti on a local building; do something if there was a fight in your neighborhood and someone was being beaten or threatened.*” Response options were 1: *very likely*; 2: *likely*; 3: *unlikely*; 4: *very unlikely*; 5: *no opinion/don’t know* and were reverse coded so that a higher score is indicative of more social control. The Cronbach’s alpha for these items was 0.82. Collective efficacy is comprised of the social cohesion and social control items added together. The Cronbach’s alpha was 0.93, and items loaded on a single factor that explained 96% of the variance. The range for each of the social processes ranged 1–5. A score of at least a 4 indicated that they agreed on average on each of the indicators. Therefore, participants with a score of 4 and higher were categorized as having high social control, social cohesion and collective efficacy.

Neighborhood-Level Characteristics: We used 2010 US Census data to characterize economic deprivation, social fragmentation, and the proportion of African-American residents; crime data from the Boston Police Department to characterize danger as indicated by neighborhood crime rates, and information from the BNS to characterize neighborhood disorder and trust in police.

Principal Components Analysis (PCA) was used to develop neighborhood-level indices for three independent variables: Economic Deprivation, Residential Instability and Danger. For each characteristic, tertiles of the derived scores were used to categorize the constructs into low, moderate, and high categories.

Economic deprivation was composed of the following indicators: proportion of residents below poverty level, proportion of households on public assistance, proportion of households with 2009 income of <\$25,000 USD, proportion of households with 2009 income of >\$100,000 USD (reverse coded) and proportion of residents with a college degree (reverse coded). Principal Components Analysis indicated that the variables loaded on the same factor (Cronbach’s alpha = 0.87). Economic Deprivation scores ranged from -1.79 to 2.42, and the average score was 0 (SD = 1.0). A higher score reflects greater economic deprivation of the residential neighborhood.

Residential instability, a marker for social fragmentation, within the neighborhood, was composed of the following indicators taken from the 2010 US Census: proportion of residents who have lived in the same house less than 5 years and proportion of owner-occupied housing (reverse coded). Indicators such as percent single households were not included because they were not correlated with the other social fragmentation indicators. Residential instability scores ranged from -2.58 to 2.25 (also standardized to mean = 0; SD = 1.0; Cronbach α = 0.87). A higher score reflects greater residential instability of the neighborhood.

Neighborhood danger was assessed using the number of counts of robbery, aggravated assault, burglary, larceny theft, vehicle theft and arson, obtained from the Boston Police Department, geocoded to US Census tracts.

A scale for neighborhood disorder, comprised of five social items (people drinking alcohol in public, like outside on the street corner; people using or being addicted to drugs; people selling drugs; families not having enough money for basic needs; groups of people hanging around the neighborhood and causing trouble) and three physical items (litter, broken glass, or trash on the sidewalks; graffiti on buildings and

walls; vacant lots or deserted houses or storefronts) was also included. The individual scores were aggregated by neighborhood, resulting in an average neighborhood disorder score. Higher average scores reflect more disorder.

Neighborhood definition: Although the City of Boston is comprised of 16 large neighborhoods, which vary in population size from approximately 25,000 to over 90,000, these area-units could be too large to understand the relationships of social processes such as social cohesion, social control, and collective efficacy. These constructs are likely more meaningful within smaller and more proximal neighborhoods to the individual. Therefore, BNS investigators worked with key informants in sub-neighborhoods of the city who inspected maps and used their local knowledge to define 38 socially relevant “neighborhood clusters” comprised of multiple contiguous census blocks. More detailed information on how neighborhood clusters were formed is described elsewhere (Azrael et al., 2009).

2.2. Statistical analysis

Because respondents were nested within neighborhoods, we used multilevel logistic modeling to determine which neighborhood-level characteristics were significantly associated with the likelihood of reporting they live in a neighborhood that has high social cohesion, high social control, and high collective efficacy. Multilevel models are a generalization of the linear model used in traditional regression analyses (Diez-Roux, 2000). Multilevel logistic regression was used to analyze the relationship between the individual and neighborhood characteristics and collective efficacy, social cohesion, and social control. Analyses were conducted using HLM v7.03.

To investigate the potential effects of neighborhood economic deprivation, danger, disorder, residential instability, proportion African-American, and trust in police on social cohesion, social control, and collective efficacy, we adopted a step-up approach and ran different sets of analytical models (Diez-Roux, 2000). A first set of analyses involved estimating the null model. The null model is used to calculate the 95% plausible value range, which is an indication of the degree of variability of the likelihood of reporting high social cohesion, high social control, and high collective efficacy. The 95% plausible value range is similar to the IntraClass Correlation (ICC), however, the value range is more appropriate for binary outcomes (Raudenbush & Bryk, 2002). Next, a set of analyses including only neighborhood characteristics was performed. Then, only individual-level characteristics were included. Finally, both individual and neighborhood level characteristics were included. Sex and race-area level-cross-level interaction terms were tested due to heterogeneous relationships between gender and race, and social processes. Since these interactions were not significant, results are not presented. A p-value alpha of 0.05 was established to assess statistical significance.

3. Results

Characteristics of the 1710 adults participating in the BNS are presented in Table 1. Overall, a majority of the sample was female (58.0%), 50 years and older (59.5%), White (63.5%), and US born (79.2%). Results from the PCA are presented in Table 2. The 95% plausible value range, estimated from the null models, indicated that there was variability across the neighborhoods of the proportion of respondents who reported high social cohesion (27.2%–63.8%), high social control (44.7%–70.3%), and high collective efficacy (26.4%–64.5%).

When individual-level characteristics, without neighborhood-level characteristics, were included, older residents, in comparison to young adults, those with higher household income, in comparison to the lowest household income, and in comparison, to those who were not born in the US, those who are US born were more likely to report high social cohesion and high collective efficacy (see Tables 3 and 4). Conversely, respondents who were black and Asian, in comparison to those who

Table 1
Characteristics of participants in the Boston Neighborhood Study (n = 1710).

Individual Level Characteristics	Baseline	
	n	Percentage
Sex		
Male	719	42.0
Female	991	58.0
Age, years		
18-29	145	8.5
30-39	246	14.3
40-49	302	17.7
50-64	560	32.7
over 64	458	26.8
Racial Background		
White	1086	63.5
Black	340	19.9
Asian	47	2.7
Latin	150	8.8
Other	87	5.1
Household Income		
under \$20,000	264	15.4
\$20,000 to 40,000	360	21.1
\$40,000 to 80,000	495	28.9
\$80,000 to 100,000	204	11.9
Over \$100,000	387	22.6
Education		
uneducated	133	7.8
High School	342	20.0
Some College	398	23.3
Bachelor's degree	339	19.8
Graduate degree	498	29.1
Number of Adults in Household		
Single	599	35.0
Two adults	696	40.7
3 or more	415	24.3
Nativity		
Foreign-born	355	20.8
US Born	1355	79.2
Neighborhood Level Characteristics (n = 38)	mean (SD)	Range
Social Cohesion	3.65(0.21)	3.23-4.01
Social Control	3.77(0.29)	2.95-4.23
Collective Efficacy	3.71(0.24)	3.20-4.11
Economic Deprivation	0(1)	-1.79-2.42
Danger	0(1)	-2.60-6.87
Disorder	2.87(0.49)	2.06-3.98
Residential instability	0(1)	-2.58-2.25
Proportion black	37.28(27.88)	1.77-92.54
Trust in police	2.14(0.23)	1.75-2.77

Table 2
Neighborhood factors derived from Principal Components Analysis.

Item	Residential Instability	Danger	Economic Deprivation
% of residents who have lived in the same house less than 5 years	0.5680		
% of owner-occupied housing	-0.6075		
Robbery count		0.9032	
Aggravated assault count		0.8160	
Burglary count		0.8819	
Larceny theft count		0.8073	
Vehicle theft count		0.9292	
Arson count		0.5967	
% Living below poverty line			0.8521
% Households on public assistance			0.8343
% Households with <\$25,000 USD			0.9322
% Households with >\$100,000 USD			-0.7993
% Households with a college degree			-0.7527

were white, were significantly less likely to report high collective efficacy; this was likely driven by lower social cohesion, since there was no difference for social control.

When neighborhood-level characteristics were added, residents living in neighborhoods with high residential instability, in comparison to those living in neighborhoods with low residential instability, were significantly less likely to report high collective efficacy (OR = 0.64, 95% CI = 0.46,0.90), high social cohesion (OR = 0.58, 95% CI = 0.43,0.79), and high social control (OR = 0.72, 95% CI = 0.55,0.94). Residents living in neighborhoods with high economic deprivation, in comparison to those living in neighborhoods with low economic deprivation, were less likely to report high social cohesion (OR = 0.65, 95% CI = 0.42, 0.99), social control (OR = 0.57, 95% CI = 0.36,0.90), and collective efficacy (OR = 0.51, 95% CI = 0.31,0.85). Those living in neighborhoods with high disorder, in comparison to those in neighborhoods with low disorder, were significantly less likely to report high social control (OR = 0.61, 95% CI = 0.40, 0.95).

The fully adjusted analyses that included both individual-level and neighborhood-level characteristics indicated that respondents living in neighborhoods with high residential instability, in comparison to those from neighborhoods with low residential instability, were significantly less likely to report living in neighborhoods with high collective efficacy (OR = 0.71, 95% CI = 0.54, 0.95) high social cohesion (OR = 0.63, 95% CI = 0.46, 0.86), and high social control (OR = 0.80, 95% CI = 0.64, 0.99). Respondents living in neighborhoods classified as high in their trust in police (OR = 1.86, 95% CI = 1.16, 3.00), in comparison to those living in neighborhoods with low trust in police, and those from neighborhoods with a moderate proportion of black residents (OR = 1.34, 95% CI = 1.10, 1.63), in comparison to those living in neighborhoods categorized as low in their proportion of black residents, were significantly more likely to report living in a neighborhood with high social control. In comparison to low neighborhood danger, those living in moderately dangerous ones were more likely to report high collective efficacy (OR = 1.30, 95% CI = 0.99, 1.71), however this finding was not significant. When we tested the relationship between danger and social cohesion, in comparison to those living in low dangerous neighborhoods, those rated as highly dangerous were more likely to report high social cohesion (OR = 1.20, 95% CI = 0.97, 1.49), but again this was not significant. Finally, those living in neighborhoods with high disorder, in comparison to those in low disorder were less likely to report high social control (OR = 0.66, 95% CI = 0.43, 1.01), but was not significant.

4. Discussion

Research has demonstrated that there is a range of beneficial outcomes associated with greater social resources in a neighborhood, as described above. In this cross-sectional study among adults living in Boston, Massachusetts, we sought to identify neighborhood-level characteristics that might be useful in building up the social resource of collective efficacy and its component parts, social cohesion and informal social control, in neighborhoods.

The characteristic that stood out as the strongest and most consistent predictor of collective efficacy in a neighborhood was the level of residential instability, where a high level in a neighborhood was associated with decreased collective efficacy among a representative sample of adults. Residential instability can be seen as an indicator of social fragmentation (Congdon, 2011). This is consistent with previous work that identified residents' strong connection with their residential neighborhoods as related with higher collective efficacy. For example, in Chicago, higher density of personal ties was a correlate of higher collective efficacy (Sampson et al., 1997, 1999). Also, home ownership, which is an indication of low population turnover, and therefore social fragmentation, is associated with social cohesion (Browning & Cagney, 2002; Uchida et al., 2013). When looked at separately, both social cohesion and social control were affected by neighborhood residential instability. Social fragmentation, a social contextual factor, has been

Table 3

Models describing the relationship between neighborhood-level characteristics, individual-level characteristics, and both neighborhood- and individual level characteristics and social cohesion, and social control among participants in the Boston Neighborhood Study (n = 1710).

	Social Cohesion						Social Control					
	Neighborhood Characteristics		Demographics		Fully Adjusted		Neighborhood Characteristics		Demographics		Fully Adjusted	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Neighborhood Characteristics												
Economic Deprivation (ref: Low)	1.00				1.00		1.00				1.00	
Moderate	0.82	(0.62,1.09)			1.04	(0.81,1.35)	0.59	(0.43,0.81)			0.64	(0.47,0.88)
High	0.65	(0.42,0.99)			0.87	(0.60,1.25)	0.57	(0.36,0.90)			0.63	(0.39,1.04)
Danger (ref: Low)	1.00				1.00		1.00				1.00	
Moderate	1.13	(0.89,1.44)			1.09	(0.84,1.42)	1.15	(0.88,1.51)			1.11	(0.82,1.49)
High	1.29	(1.00,1.67)			1.20	(0.97,1.49)	0.99	(0.73,1.34)			0.95	(0.70,1.29)
Disorder (ref: Low)	1.00				1.00		1.00				1.00	
Moderate	1.30	(0.97,1.74)			1.49	(1.12,2.00)	1.00	(0.68,1.45)			1.05	(0.72,1.53)
High	1.12	(0.86,1.46)			1.27	(0.98,1.67)	0.61	(0.40,0.95)			0.66	(0.43,1.01)
Residential Instability	1.00				1.00		1.00				1.00	
Moderate	0.85	(0.60,1.22)			0.80	(0.58,1.12)	0.83	(0.60,1.17)			0.85	(0.63,1.17)
High	0.58	(0.43,0.79)			0.63	(0.46,0.86)	0.72	(0.55,0.94)			0.80	(0.64,0.99)
Proportion Black (ref: Low)	1.00				1.00		1.00				1.00	
Moderate	0.88	(0.72,1.08)			0.98	(0.79,1.22)	1.25	(1.00,1.55)			1.34	(1.10,1.63)
High	0.69	(0.50,0.96)			0.86	(0.60,1.24)	1.09	(0.83,1.42)			1.17	(0.84,1.62)
Trust in Police (ref: Low)	1.00				1.00		1.00				1.00	
Moderate	1.21	(0.83,1.89)			1.20	(0.76,1.89)	1.45	(0.97,2.16)			1.50	(0.96,2.36)
High	1.25	(0.83,1.89)			1.12	(0.73,1.75)	1.92	(1.27,2.91)			1.86	(1.16,3.00)
Individual Characteristics												
Sex (ref: male)			1.00		1.00				1.00		1.00	
Female			1.02	(0.84,1.24)	1.04	(0.85,1.26)			1.13	(0.90,1.42)	1.13	(0.89,1.43)
Age, years (18–29)			1.00		1.00			1.00			1.00	
30–39			1.34	(0.93,1.92)	1.35	(0.93,1.96)			1.83	(1.31,2.56)	1.82	(1.30,2.56)
40–49			2.20	(1.46,3.32)	2.25	(1.50,3.40)			2.76	(1.92,3.96)	2.78	(1.96,3.96)
50–64			2.32	(1.82,2.96)	2.38	(1.84,3.08)			3.25	(2.37,4.46)	3.32	(2.39,4.60)
over 64			3.11	(2.15,4.52)	3.20	(2.20,4.66)			4.09	(2.56,6.54)	4.15	(2.58,6.67)
Household Income (ref: under \$20,000)			1.00		1.00			1.00			1.00	
\$20,000 to 40,000			0.89	(0.64,1.25)	0.87	(0.62,1.24)			0.98	(0.71,1.35)	0.97	(0.71,1.34)
\$40,000 to 80,000			1.22	(0.86,1.75)	1.18	(0.82,1.70)			1.23	(0.92,1.65)	1.21	(0.90,1.62)
\$80,000 to 100,000			1.61	(1.10,2.35)	1.53	(1.03,2.28)			1.32	(0.95,1.82)	1.28	(0.93,1.75)
Over \$100,000			1.99	(1.25,3.16)	1.86	(1.16,2.99)			1.84	(1.34,2.52)	1.78	(1.30,2.42)
Race (ref: white)			1.00		1.00			1.00			1.00	
Black			0.62	(0.48,0.80)	0.77	(0.57,1.05)			0.82	(0.63,1.05)	1.00	(0.75,1.33)
Asian			0.33	(0.15,0.70)	0.34	(0.16,0.75)			0.60	(0.33,1.10)	0.64	(0.34,1.21)
Latin			1.04	(0.72,1.49)	1.12	(0.77,1.61)			1.21	(0.83,1.77)	1.31	(0.88,1.96)
Other			0.60	(0.34,1.05)	0.67	(0.36,1.23)			0.75	(0.47,1.18)	0.83	(0.50,1.38)
Education (ref: uneducated)			1.00		1.00			1.00			1.00	
High School			1.07	(0.69,1.68)	1.07	(0.67,1.63)			1.27	(0.93,1.72)	1.29	(0.94,1.78)
Some College			1.01	(0.66,1.54)	0.98	(0.65,1.49)			1.26	(0.94,1.70)	1.25	(0.94,1.68)
Bachelor's degree			1.20	(0.79,1.83)	1.20	(0.79,1.82)			1.29	(0.82,2.03)	1.32	(0.83,2.08)
Graduate degree			1.18	(0.73,1.90)	1.17	(0.73,1.89)			1.00	(0.70,1.42)	1.02	(0.72,1.46)
Nativity (ref: foreign-born)			1.00		1.00			1.00			1.00	
US Born			1.55	(1.20,2.00)	1.56	(1.21,2.01)			1.24	(0.92,1.67)	1.23	(0.91,1.67)
Number of Adults in Household (ref: single)			1.00		1.00			1.00			1.00	
Two adults			1.21	(0.97,1.51)	1.22	(0.99,1.52)			1.39	(1.09,1.77)	1.38	(1.08,1.78)
3 or more			1.24	(0.91,1.68)	1.28	(0.95,1.72)			1.49	(1.13,1.96)	1.49	(1.15,1.95)

defined as the breakdown of social bonds between individuals and their communities. These communities are characterized by fragmentation of residents' social identity, and by rejection of self-regulatory values (Congdon, 2011). Participants who lived in neighborhoods with high social fragmentation, or high residential turnover, were less likely to report high social cohesion social control and collective efficacy. These residents may find it difficult to establish interpersonal ties or social bonds, develop trust, and to form connections with their neighbors, leading to low perceptions of these social processes.

Although previous research has found that indicators of danger, such as violent crime rates in a residential area are associated with lower collective efficacy (Molnar et al., 2004, 2008; Sampson et al., 1997), we did not observe such an association. Instead, patterning of the variation in collective efficacy across neighborhoods was irrespective of the

indicators of danger. Possible reasons for this finding include that there was no association between violent crime and collective efficacy among the population in Boston at the time of the survey, i.e., collective efficacy was thriving or missing irrespective of the crime that exists; or there were confounders not accounted for in these models, or there was not sufficient power to detect a relationship between neighborhood danger and collective efficacy.

Limitations of this study require interpretation of the findings with caution. We used cross-sectional data, and therefore cannot infer causality since the timing of the exposure and outcome was not established. However, the hypotheses and directionality have intuitive appeal. Another limitation is that the response rate was low, though within expectations for surveys conducted by telephone in this research climate (Galea & Tracy, 2007). This low participation rate might have the

Table 4

Models describing the relationship between neighborhood-level, individual-level, and both neighborhood and individual-level characteristics and collective efficacy among participants in the Boston Neighborhood Study (n = 1710).

	Collective Efficacy					
	Neighborhood Characteristics	Demographics		Fully Adjusted		
			OR	95%CI	OR	95%CI
Neighborhood Characteristics						
Economic Deprivation (ref: Low)	1.00			1.00		
Moderate	0.68	(0.49,0.95)		0.81	(0.62,1.07)	
High	0.51	(0.31,0.85)		0.64	(0.39,1.05)	
Danger (ref: Low)	1.00			1.00		
Moderate	1.39	(1.06,1.82)		1.30	(0.99,1.71)	
High	1.32	(0.94,1.86)		1.24	(0.92,1.69)	
Disorder (ref: Low)	1.00			1.00		
Moderate	1.02	(0.70,1.48)		1.11	(0.75,1.64)	
High	0.83	(0.57,1.21)		0.92	(0.64,1.30)	
Residential Instability	1.00			1.00		
Moderate	1.02	(0.71,1.48)		1.02	(0.73,1.43)	
High	0.64	(0.46,0.90)		0.71	(0.54,0.95)	
Proportion Black (ref: Low)	1.00			1.00		
Moderate	1.23	(0.96,1.59)		1.39	(1.06,1.81)	
High	0.87	(0.60,1.27)		1.02	(0.69, 1.52)	
Trust in Police (ref: Low)	1.00			1.00		
Moderate	1.14	(0.67,1.93)		1.14	(0.68,1.92)	
High	1.59	(0.93,2.70)		1.49	(0.86,2.57)	
Individual Characteristics						
Sex (ref: male)			1.00			
Female			1.17	(0.98,1.39)	1.17	(0.98,1.41)
Age, years (18–29)			1.00		1.00	
30-39			1.67	(1.11,2.53)	1.67	(1.09,2.58)
40-49			2.91	(1.89,4.48)	2.95	(1.92,4.54)
50-64			3.32	(2.34,4.72)	3.38	(2.36,4.85)
over 64			4.40	(2.89,6.73)	4.48	(2.93,6.86)
Household Income (ref: under \$20,000)			1.00		1.00	
\$20,000 to 40,000			0.97	(0.77,1.23)	0.97	(0.76,1.24)
\$40,000 to 80,000			1.39	(1.08,1.79)	1.36	(1.04,1.77)
\$80,000 to 100,000			1.67	(1.26,2.22)	1.61	(1.20,2.16)
Over \$100,000			2.07	(1.48,2.88)	1.97	(1.40,2.76)
Race (ref: white)			1.00		1.00	
Black			0.68	(0.51,0.91)	0.86	(0.63,1.16)
Asian			0.39	(0.19,0.80)	0.42	(0.20,0.89)
Latin			1.08	(0.78,1.50)	1.19	(0.84,1.67)
Other			0.55	(0.34,0.87)	0.61	(0.38,0.99)
Education (ref: uneducated)			1.00		1.00	
High School			1.37	(0.91,2.07)	1.39	(0.91,2.13)
Some College			1.35	(0.94,1.94)	1.33	(0.92,1.92)
Bachelor's degree			1.45	(0.95,2.23)	1.46	(0.94,2.27)
Graduate degree			1.10	(0.76,1.58)	1.11	(0.76,1.61)
Nativity (ref: foreign-born)			1.00		1.00	
US Born			1.63	(1.23,2.16)	1.63	(1.22,2.18)
Number of Adults in Household (ref: single)			1.00		1.00	
Two adults			1.33	(1.10,1.61)	1.34	(1.11,1.62)
3 or more			1.51	(1.19,1.91)	1.54	(1.23,1.94)

*Bolded results indicate a significant estimate $p < 0.05$.

potential to bias our findings and may limit our ability to generalize the findings to the general population of Boston. Therefore, we evaluated the generalizability of the BNS sample to the city of Boston by comparing the demographics of the BNS to those of respondents in Boston from the 2005–2009 American Community Survey (ACS), which is a population-based representative study conducted by the US Census Bureau. We then adjusted for all covariates in our sample that exhibited significantly different distributions from ACS estimates of the Boston population distributions. Therefore, we can generalize our findings to Boston conditional on these covariates provided that these covariates account for generalizability differences between the BNS and ACS. While this study included a comprehensive list of individual and area level confounders, residual confounding might be an issue due to this study being observational and the dearth of studies in this field. For example, we could not control for number of years residing in the neighborhood, which could act as a confounder between area-level characteristics and social processes.

One possible public health intervention to increase collective efficacy would be to decrease population turnover, as this is an indication of social fragmentation which was associated with decreased collective efficacy in the study. Affordable housing and rent control might be ways in which population turnover is decreased. Also, by determining the level of social fragmentation within neighborhoods, public health professionals can identify neighborhoods at risk for low collective efficacy. Therefore, interventions can be developed to help lessen the negative impacts of social fragmentation.

We also observed strong collective feelings of trust in police within neighborhoods associated with social control, the perception that participants have about whether their neighbors are doing something proactive to improve their community. This provides evidence that finding ways to increase collective feelings of trust in the police could potentially be beneficial to a community through increased perceptions of social control (Gill, Weisburd, Telep, Vitter, & Bennett, 2014). A policing approach referred to as community-oriented policing focuses on

community involvement in crime prevention through the development of partnerships between police officers and neighborhood residents and organizations in neighborhoods in an effort to address issues proactively rather than reactively (Gill et al., 2014). This very specific form of policing fits well with the public health approach by involving residents in the process of crime prevention. Thus, perhaps a shift towards community-oriented policing could improve residents' feelings of trust, thereby improving social control among residents. In the United States, race and ethnicity is associated with an increased likelihood of being killed by police (Barber et al., 2016), thus improving collective trust in police may prove more challenging than simply implementing a community-policing model, especially within certain communities. Nonetheless, police can build trust by being transparent. Communities should be made aware of the policies and procedures and police departments should hold their officers accountable when policies and procedures are not followed, which can increase trust residents have towards the police (Kristina, 2009). Also, if police can engage with the community in non-enforcement activities, this may show they are part of the community, also bolstering trust by the residents (Gill et al., 2014). Overall, it is important to note that public interventions that target these area-level social processes will benefit everyone in a community including individuals without a strong sense of social cohesion, social control, and collective efficacy. In other words, everyone can benefit from living in communities with higher levels of these social processes.

Future research should build on this work. While this first investigation used cross-sectional data in order to establish a relationship between the predictors and the outcomes, future research could include changes in economic deprivation, social fragmentation, collective efficacy, social control, and social cohesion over time so that causal associations may be investigated. And, while these data are somewhat older, they are the most recent data available that can be linked to area-level determinants. Future research should focus on collecting more data on these topics that is not only more recent but also nationally representative in an effort to be more generalizable. Future research should also examine these concepts using respondents within differing spatial units, such as Census tracts and counties, in an effort to assess the manner in which these variables cross neighborhood borders. This will allow us to gain a better understanding of how these neighborhood factors could potentially influence social processes.

This investigation makes an original contribution in this field of research as it identifies neighborhood-level characteristics as correlates of social processes, in particular social cohesion, social control, and collective efficacy. Overall, when residents living within neighborhoods do not have the opportunity to develop stability, the ability of that society to intervene on behalf of their community to reach common goals might be affected. This can have a number of implications on the public health of members of the community and the community itself. Opportunities to reduce social fragmentation and improve trust in police are needed in an effort to improve the social fabric and health of neighborhoods and their residents.

Financial disclosure

The authors have no financial relationships relevant to this article to disclose.

Funding source

Centers for Disease Control and Prevention, USA (U49-CE00740). This research was undertaken, in part, thanks to funding from the Canada Research Chairs program.

Ethics approval

The Institutional Review Boards at Harvard TH Chan determined that the analysis of this data was exempt.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article to disclose.

CRediT authorship contribution statement

Roman Pabayo: Conceptualization, Formal analysis, Writing - original draft. **Erin Grinshteyn:** Writing - review & editing. **Olivia Avila:** Writing - review & editing. **Deborah Azrael:** Project administration, Writing - review & editing. **Beth E. Molnar:** Conceptualization, Writing - review & editing, Formal analysis.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2020.100552>.

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