

## **Prospective effect of community distress and subcultural orientation on mortality following life-threatening diseases in later life**

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**Abstract** We conducted a prospective and contextual study to examine the effects of community social-economic-physical distress and subcultural orientation on mortality following onset of 13 life-threatening diseases in later life. We also examined the inter-relationship between the effects of community social, economic and physical distress (*i.e.* poverty, physical disorder and low collective efficacy) and subcultural orientation (*i.e.* anomie and tolerance of risk behaviour) on the survival chances of seriously ill older patients. Three data sources were combined to construct the working sample: 1990 Census data, the 1994-95 PHDCN-CS, and the COSI data. Fifty-one ZIP code areas in Chicago and 12,672 elderly patients were studied. Community distress (HR = 1.04; 95% CI = (1.01, 1.07)) and anomie (HR = 1.26; 95% CI = (1.02, 1.54)) are found to be significantly and positively associated with a higher hazard of death. Moreover, community anomie contributes to the effect of community distress on post-hospitalisation mortality. The social, economic, physical and cultural environment in which people live appears to exert a significant impact on whether older people facing life-threatening illness live or die.

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**Keywords:** community/neighbourhood, anomie, tolerance for risk behaviour, ageing, Medicare, mortality

### **Introduction**

Recent interest in how characteristics of place of residence affect the health of individuals living in the community has generated an abundant literature

that has provided strong evidence for the link between place and health over and above individual demographic and socioeconomic traits (Blafour and Kaplan 2002, Browning *et al.* 2003, Haan *et al.* 1987, Kawachi and Berkman 2003a, Latkin and Curry 2003, LeClere *et al.* 1997, 1998, Robert 1998, Ross 2000). This body of literature has confirmed that both individual and contextual attributes are important dimensions of social determinants of health, thereby suggesting a research agenda that simultaneously considers factors located at different layers of social structure insofar as they influence health.

The bulk of this work has focused on community socioeconomic status (SES) which is typically measured by the average level of poverty, affluence, family income, wealth and education of local residents. The major conclusion from these studies is that community SES is a significant contextual determinant of individual mental and physical health, although the effect of size is relatively smaller than that of individual-level SES (Kawachi and Berkman 2003b, Pickett and Pearl 2001, Robert 1998, 1999). To a lesser extent, community social and physical environments have also been examined as contextual determinants of health in their own right and as pathways linking community SES to health. Following the hot debate about whether social capital<sup>1</sup> is relevant to individual health outcomes (Chang and Christakis 2005, Kawachi *et al.* 1997, 1999, Lomas 1998, Lynch 2000, Muntaner and Lynch 2002), recent empirical investigations that focus on social capital/social cohesion and health have provided evidence supporting the claim that social capital, both at the community level and at the state level, has a significant and positive effect on individual health (Browning and Cagney 2003, Kawachi and Berkman 2000, Kawachi *et al.* 1999, Lochner *et al.* 2003, Veenstra 2002). Moreover, it has been reported that social resources such as collective efficacy<sup>2</sup> and reciprocity, that are present at the neighborhood level, play a mediating role on the link between contextual economic resources (*e.g.* affluence) and health (Wen *et al.* 2003). Previous work has also found that poor neighborhoods tend to have more problems of broken glass or trash on streets and graffiti on buildings, and that these physical signs of disorder are negatively associated with health (Barr *et al.* 2001, Ross and Mirowsky 2001, Wen *et al.* 2003).

The literature on contextual effects on health has more or less revolved around these structural, social and physical dimensions of community environment, whereas other important aspects of community life have been much less studied. As Macintyre and her colleagues (2003) recently argued, research on the link between place and health need not be constrained by socioeconomic and psychosocial factors as studied by social cohesion/social-capital theorists, but could also incorporate other aspects, including cultural, religious, political and historical characteristics of residential communities. Indeed, studying these other aspects of community environment may not only reveal important yet previously unknown patterns of social ecological influences on health, but also help to identify mechanisms that can explain the effects of community SES and social and physical disorders on individual health.

The current investigation is intended to focus on the prospective impact of community *subcultural orientation* on mortality in a particularly vulnerable population – older people afflicted with life-threatening diseases. We will explore the linkages among economic forces, social resources, physical disorder and cultural factors at the community level and their impacts on the odds of mortality in later life. Of particular interest is our endpoint that measures the survival time between the incidence or diagnosis of disease and death. This outcome affords an excellent opportunity to assess the impact of contextual factors at a very vulnerable stage of life – being old and seriously ill – and also serves the useful purpose of conditioning the effect on a given health state. By focusing on this special population of older patients, we attempt to test whether previous evidence on contextual effects can be expanded into a secondary-prevention population with known life-threatening diseases. We will also specifically examine whether tolerance of risk behaviours and prevailing values and beliefs as measures of community subcultural orientation exert prospective and contextual effects on mortality, and whether these subcultural patterns help explain the effects of community economic, social and physical environments on health.

### **Theoretical and empirical background**

#### *Poverty, low collective efficacy and physical disorder*

Poverty is the key source of many social problems. The early work of the Chicago school urban sociologists suggested that economic problems were often spatially clustered with other social problems involving crime, delinquency, mental disorders and physical illness (Faris and Dunham 1960, Shaw and McKay 1969). Arguably, a place seriously deficient in economic resources may have a problem of sustaining good physical conditions, adequate health services, efficient social institutions (*e.g.* family, church, sports clubs and other voluntary associations) and adequate local employment opportunities. Thus, individuals who reside in poor areas are likely to suffer from daily stress and ill health.

A sophisticated literature has consistently described the deleterious effect of community poverty on health even after controlling for individual characteristics (Barr *et al.* 2001, Haan *et al.* 1987, Yen and Kaplan 1999). In other words, this work finds that community poverty contextually and sometimes prospectively increases one's risks for poor health or death, and this relationship is not completely confounded or mediated by individual SES and other socio-demographic factors.

The protective effect of social resources at the community level has also been documented. For example, a recent study finds multilevel evidence that individuals residing in Chicago neighbourhoods with higher levels of collective efficacy report better overall health (Browning and Cagney 2002). Another Chicago-based study also shows that community social capital – as

measured by reciprocity, trust and civic participation – was associated with lower community death rates, after adjustment for community material deprivation (Lochner *et al.* 2003). Beyond the social capital/collective-efficacy perspective, institutional theories emphasise the role that schools, businesses, political organisations and social services play in the community (Crane 1991).

Not surprisingly, poverty and social and physical environments at the community level are linked. Ross and Mirowsky (2001) conducted a study examining whether living in a disadvantaged Census tract damaged health, and whether community social and physical disorder mediated the association. They constructed an index of objective community disadvantage that measured physical signs of disorder such as graffiti and abandoned buildings, as well as negative social signs such as crime and people drinking or using drugs. They found that residents of disadvantaged communities had worse self-reported health and physical functioning and more chronic conditions than residents of more advantaged neighbourhoods. Furthermore, the association was mediated entirely by perceived community physical and social disorder and the resulting fear.

The link between poverty and a low stock of social resources in the community has been illuminated long ago in Shaw and McKay's social disorganisation theory (Shaw and McKay 1969). A central premise of this model is that structural barriers such as poverty impede development of the formal and informal ties that promote the ability to solve common problems (Sampson and Groves 1989). Although later evidence shows that poor urban areas can be tightly integrated with extensive patterns of social interaction (Glass and Balfour 2003, Stack 1974, Wen *et al.* 2005), it is possible that the capacity to achieve common goals among persons living in impoverished neighbourhoods (*i.e.* collective efficacy) is low, given that they may have limited means to support each other.

Community distress signalled by poverty, physical disorder and low collective efficacy may affect health via multiple mechanisms. It is plausible that, as an integral component of our social contexts, community milieu affects individual psychosocial experiences involving stress processes and behavioural patterns that directly affect health. Meanwhile, the social and economic disorganisation may nurture a lost sense of community, negative community identification and aberrant behaviours (Wilson 1987). The ensuing departure from mainstream patterns amounts to a set of norms, values, orientations and aspirations that are likely to be negative and health-compromising.

#### *Culture-of-poverty model and the epidemic theory*

Here Oscar Lewis's culture-of-poverty arguments on the ghetto underclass may shed light on how community social and structural distress may affect its cultural characteristics which have direct bearings on individual health lifestyles that inevitably affect health (Lewis 1968). Lewis defined the culture of poverty as 'both an adaptation and a reaction of the poor to their marginal

position in a class-stratified, highly individuated, capitalistic society' (Lewis 1968: 188). He argued that the culture of poverty 'tends to perpetuate itself from generation to generation because of its effect on the children. By the time slum children are age six or seven, they have usually absorbed the basic values and attitudes of their subculture and are not psychologically geared to take full advantage of changing conditions or increased opportunities which may occur in their life-time' (1968: 188). Here it is important to note that Lewis also realised and explicated that culture of poverty is *structurally* rooted and structural changes in society (*e.g.* redistributing wealth) can lead to modifications of the basic characteristics of the culture of poverty.

In other words, the culture-of-poverty perspective postulates that the poor who reside in areas plagued by poverty and social problems, by virtue of their exclusion from mainstream society and their social isolation from positive role models, develop a lifestyle that is by nature different from that of the middleclass societies in which they live and that assumes a 'life of its own', that is passed across generations through cultural transmission (Steinberg 1989, Wilson 1991, 1996). This model is essentially consistent with the contagion or epidemic theory suggesting that people's behaviours are influenced by the norms, values, orientations and aspirations of those around them, and spread through peer influence (Crane 1991, Robert 1999). Living in distressed communities and being neighboured by other disadvantaged people, therefore, enhance ones exposure to health-compromising *attitudes* and *behaviours*. And, at least in part, it is through the spread of negative attitudes and risky behaviours that poverty and social dislocations are transferred to poor health in the community.

In this theoretical stream, the emphasis on anomic attitudes and deviant behaviour echoes and expands earlier intellectual traditions on the concept of *anomie* (Orrù 1987). Durkheim was perhaps the first to introduce the anomie concept into sociology and used the concept to explain deviant behaviour (Durkheim 1933, 1951). Durkheim's concept of anomie was developed in the *The Division of Labor* (1933) and further elaborated in *Suicide* (1951). He was concerned with the inadequacy of socially generated goals and values in industrial societies and the consequent destructive individual behaviours due to the lack of normative guidance (Orrù 1989). He used the concept of anomie to describe the erosion of standards and values characteristic of cultural or normative disorder that results from the lack of societal regulation (for whatever reasons). One consequence of this normative disorder or anomie in a society or community is what Durkheim labelled as 'anomic suicide'. Building on Durkheim's work, Merton later modified the anomie concept and described the consequences of an instrumental imbalance between cultural values and social norms and the ensuing condition where norms lost their regulatory power for the individual (Merton 1938, Orrù 1989). He thus incorporated the disjunction between cultural goals and socially structured opportunity into the anomie framework (Cloward 1959). The conception of anomie was further broadened by Leo Srole who not only

explicitly specified five dimensions of the anomie concept but also conceived his anomie scale and tested the scale in his own study (Srole 1956). While Srole admitted that his operational formulation of the anomie concept was preliminary and rather simplistic, the Srole anomie scale has proved to be useful in applied research related to the anomie concept (Bullough 1967, Wilson 1971). Although these theorists emphasised different aspects and conditions of anomie, all shared the view that the core component of anomie is normlessness or a departure from the dominant mainstream culture. They also have all argued or implied that the ensuing feelings of alienation in an anomic society or community are likely to foster maladaptive, antisocial and high-risk behaviour that inevitably compromises health in the long run.

Another version of this view that emphasises the link between anomic attitudes and deviant behaviour is epitomised in the subcultural transmission model. This model suggests that subcultures display distinctive health lifestyles, with specific beliefs, knowledge and attitudes conditioning risk-taking behaviour and health (Fitzpatrick and Lagory 2000). In some insulated and deprived places, therefore, where long-term poverty, low labour force participation, out-of-wedlock childbearing, school drop-out, welfare dependency and other social problems prevail, deviant role models emerge and encourage health-destructive behaviours such as use of illegal drugs and violence (Wilson 1987, 1991, 1996). Similarly, attitudinal problems may also result from racial and economic segregation, limited opportunities and little hope for upward mobility. For example, feelings of alienation, powerlessness, fatalism and cynicism are likely to result from previous experiences of denial and exploitation that are potentially hazardous to health, as they may be correlated with recognised pre-disease pathways in individuals such as stress (Thoits 1995) and social isolation (Cacioppo *et al.* 2002).

In all, a common theme that emanates from these differently labelled theories (*i.e.* culture-of-poverty perspective, contagion or epidemic model and subcultural transmission model) is that community economic deprivation is complexly intertwined with social disorganisations and physical disorders; and, the combined social-structural distress nurtures deviant cultural characteristics that inevitably expose the inhabitants to health-detrimental psychosocial hazards which tend to precipitate the ageing process and to cause morbidity and premature mortality.

#### *Health lifestyles and ecological 'habitus'*

Health lifestyles are important psychosocial factors that have been theorised and corroborated as important pathways linking social contexts with health (Williams 1990). Health lifestyles have been defined as collective modes of health-related consumption involving choices in diet, leisure, activity, health-care use and other forms of behaviour, and are based on options available to people according to their life chances reflected in variables such as age, gender, race, ethnicity, social networks and SES (Cockerham and Ritchey 1997). It has long been recognised that one's life chances, largely determined

by one's structural position in the social hierarchy, shape the choices that people can make (Weber 1978). The relationship between social class and health lifestyles in France has been thoroughly studied by the French sociologist Pierre Bourdieu (1984). According to Bourdieu, *habitus*, or a class-based set of durable dispositions to act in particular ways, results from upstream social structure and shapes an individual's cultural tastes and styles so as to correspond to his or her social position. In the US, given the fact that poverty and affluence have been more and more concentrated spatially in large cities over the last three decades (Massey 1996), place of residence can be viewed as an extended marker of one's structural position in society. Indeed, it can be argued that health lifestyles are spatially patterned and inextricably entangled with the spatial distribution of structural resources.

Although research that empirically examines the link between the health subculture of a residential community and the health of individual residents is extremely rare, some evidence shows that community collective features are important to individual health behaviours. For example, Yen and Kaplan (1998) found that area characteristics such as lighting, amount of criminal activity and access to recreational facilities could influence physical activity levels. In addition to Yen and Kaplan's (1999) finding that local poverty prospectively predicted decline in physical activity, a recent study (Craig *et al.* 2002) using Canadian data found that a composite score of community environment, based on 18 community characteristics (*e.g.* variety of destinations, visual aesthetics and traffic), was positively associated with walking to work, both with and without adjustment for degree of urbanisation. Another study, drawing on ecological theory, examined the association among participation in regular vigorous exercise, social status and aspects of prominent life settings, including contextual factors at the community level (Grzywacz and Marks 2001). These analyses indicated that respondents who perceived their neighbourhoods as safer participated in more regular and vigorous exercise than individuals in less safe communities. Other health behaviours have also been examined in their relation to residential environment. Lee and Cubbin (2002) examined whether community characteristics were associated with cardiovascular health behaviours independently of individual characteristics. The results showed that low SES and high community social disorganisation were independently associated with poorer dietary habits, while high community Hispanic concentration and urbanicity were associated with healthier dietary habits. While this study did not show significant associations between community characteristics and physical activity or smoking, two other studies have found prominent effects of community SES on smoking behaviours. One study found that deprivation of the area of residence remained a significant predictor of smoking status even after the socioeconomic group of the individual had been taken into account (Kleinschmidt *et al.* 1995). The other study found that the age- and gender-adjusted prevalence of smoking was higher in deprived urban areas and that the SES of residents could only partially explain this effect (Reijneveld 1998).

Evidence also shows that community deprivation, perhaps partially through exerting environmental stress, increases one's likelihood of drug use even after controlling for individual socio-demographic characteristics (Boardman *et al.* 2001).

These empirical studies demonstrate that individual health lifestyles are surely affected by community social and structural characteristics, which make it a plausible hypothesis that community subcultural orientation corresponds to social, economic and physical aspects of community environments, and influences individual choices of health promoting or compromising consumption that eventually affect health. Even if we may suspect that healthy or risky behaviours have a larger impact on the onset of disease than on the outcome, it is reasonable to expect that lifestyles as manifest in diet, exercise, smoking, alcohol use and utilisation of preventive healthcare are still important factors that would affect disease progression to death among seriously ill older adults.

**Conceptual framework**

Based on these theoretical considerations and empirical findings, Figure 1 shows a conceptual model that guides our empirical analyses. We focus on concentrated poverty as a socioeconomic marker, collective efficacy as an indicator of health-promoting social resources and physical disorder as a measure of local physical environment. We examine two aspects of subcultural orientation – anomic attitudes and tolerance for risk behaviours – in terms of their impact on health and role in the pathway from community distress to health. Health is objectively indexed by mortality after the onset of serious illness in older life. Acknowledging additional individual-level

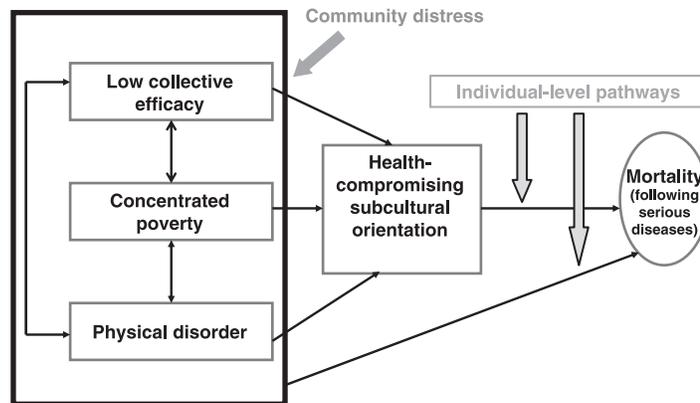


Figure 1 *Conceptual model*

pathways linking place with health, this model postulates that concentrated poverty, low collective efficacy and physical disorder are bundled together constituting community *distress* that fosters a sense of *anomie* and raises the level of *tolerance for risky behaviour* in the community which exacerbates already existing medical conditions among seniors, accelerates the health deteriorating process and increases mortality.

## Methods

### *Data*

Three data sources were used to construct the working sample in this study: the 1990 Census data, the 1994–95 Project on Human Development in Chicago Neighborhoods-Community Survey (PHDCN-CS), and the Care after the Onset of Serious Illness (COSI) dataset.

ZIP code level poverty rate was obtained from the 1990 Census and was used as a structural marker of community conditions. The benefit of using a single variable versus a composite index to indicate community economic condition is that it is conceptually clear and methodologically simple.

Measures of community physical environment (physical disorder), social resources (*collective efficacy*) and cultural characteristics (*tolerance for risk behaviour, anomie*) were constructed from the PHDCN-CS (Sampson *et al.* 1997). The PHDCN-CS is a probability sample of 8,782 residents of Chicago focusing on respondent assessments of the communities in which they live. Each record in the PHDCN-CS data was identified by a Census tract in Chicago. Using geographic centroids of Census tracts, we linked each Census tract with its corresponding ZIP code area. On average, there were 293 PHDCN-CS respondents per ZIP code.

The core data of COSI are rooted in the 1993 inpatient hospitalisation records from the Health Care Financing Administration's Medicare program (Christakis and Iwashyna 2003, Christakis *et al.* 2002, Iwashyna *et al.* 2002). The COSI data set consists of a cohort of patients *newly* diagnosed in 1993 with one of 13 serious illnesses and followed for up to six years. The 13 diseases were selected because they met several COSI conceptual criteria including accuracy of ascertainment and high prevalence. Prior detailed empirical work provided guidance to capture incident cases of disease based on incident hospitalisations. Detailed descriptions of how COSI data were constructed have been published elsewhere (Christakis *et al.* 2002).

ZIP codes were available for subjects in the COSI data and were used to define neighbourhoods and to link the three data sources into one merged file. Although ZIP code boundaries do not perfectly circumscribe neighbourhoods, they do represent local residential areas and they are frequently used in studies of neighbourhoods (Finch *et al.* 1999, Lipton and Gruenewald 2002, Merkin *et al.* 2002, Zwanziger *et al.* 2002). We studied 12,672 patients from COSI residing in 51 ZIP code areas in Chicago.

Geo-coding to smaller levels of aggregation (e.g. Census tracts) was not possible because of data limitations.

#### *Dependent variable*

Our health outcome was the relative hazard of death for COSI cohort members. The survival time was defined as the number of days from the date of the index hospitalisation for the onset of his/her disease to death or to the end of the study (*i.e.* 30 June 1999). People who were still alive on 30 June 1999 were right censored.

#### *Independent variables*

*At the individual level:* Individual demographic and baseline health measures (used as controls in the analyses) include age, gender, race (non-white or white), three continuous comorbidity scores based on healthcare use in the three years prior to the index hospitalisation<sup>3</sup>, and a dichotomous indicator of Medicaid recipient at any point in 1993 as a proxy measure of individual income status (poverty). Table 1 illustrates characteristics of COSI patients in Chicago. The average age of this cohort is about 79 with 13 per cent of them receiving Medicaid in 1993. The majority are white and 32 per cent are non-white, most of whom are African Americans and Latinos. For the COSI cohort, stroke (23%) and congestive heart failure (24%) are the most common conditions among the diseases studied.

*At the community level:* Following Browning and Cagney (2003), health-related subcultural orientations were captured with two scales, a measure of tolerance for youthful deviance and problem behaviours and a measure of detachment from conventional norms (anomie). *Tolerance for risk behaviour* was measured by four items. Respondents were asked their opinions regarding how wrong it was for teenagers around 19 years old to smoke cigarettes, use marijuana, drink alcohol and get into fistfights. *Anomie* was tapped by a five-point Likert scale asking respondents' agreement with the following statements: 1) 'Laws were made to be broken', 2) 'It's okay to do anything you want as long as you don't hurt anyone', 3) 'To make money, there are no right and wrong ways any more, only easy ways and hard ways', and 4) 'Fighting between friends or within families is nobody else's business'. Corresponding to Durkheim's original conception of the concept of anomie (Durkheim 1933, 1951), this scale is intended to capture detachment from conventional norms and fatalistic orientations that may increase the likelihood of health-risk behaviour (Browning and Cagney 2003, Sampson and Bartusch 1998).

Following the operationalisation of Sampson *et al.* (1997), the collective efficacy scale was constructed through combining items of social cohesion and informal social control. Social cohesion items from the PHDCN-CS assessed the respondent's level of agreement (on a five-point scale) with the following statements: 1) 'People around here are willing to help their neighbors', 2) 'This is a close-knit neighborhood', 3) 'People in this community can be trusted', 4) 'People in this community generally don't get along with each

Table 1 *Characteristics of COSI patients in Chicago*

<i>Variables</i>	<i>Mean/per cent</i>	<i>St dev.</i>
<i>Demographic</i>		
Age	78.598	7.204
Male	0.403	0.491
Poverty (Medicaid recipient)	0.130	0.339
Race (white)	0.676	0.468
<i>Baseline health status (in 1993)*</i>		
Charlson score for year 1	1.356	1.198
Charlson score for year 2	1.238	0.977
Charlson score for year 3	1.182	0.873
<i>Baseline diagnosis (in 1993)</i>		
Acute myocardial infarction	0.159	0.365
Congestive heart failure	0.241	0.428
Central Nervous System	0.004	0.063
Colorectal cancer	0.069	0.252
Hip fracture	0.134	0.339
Head/neck cancer	0.010	0.098
Liver/biliary cancer	0.008	0.089
Leukaemia	0.013	0.115
Lung cancer	0.070	0.255
Lymphoma	0.021	0.144
Pancreatic cancer	0.014	0.116
Stroke	0.229	0.421
Urinary cancer	0.029	0.166

N = 12,672

\* Baseline health status was measured by the Charlson scores for the first, the second and the third year of lookback

other', and 5) 'People in this community do not share the same values'. The last two items were reverse coded. Health-related informal social control was tapped through respondents' level of agreement with the following statement: 'You can count on adults in this community to watch out that children are safe and don't get into trouble'. An additional informal control item asked respondents how likely it was that people in their community would intervene if a fight broke out in front of their house. Social cohesion and informal social control were closely correlated across ZIP code areas ( $r = 0.92$ ,  $p < 0.0001$ ). The higher the value in the collective efficacy scale, the more the stock of collective efficacy present in the community.

*Physical disorder* was represented by a three-item Likert-type scale in the PHDCN-CS. Residents were asked about the extent of problems stemming from litter, broken glass or trash on the sidewalks and streets; of graffiti on buildings and walls; of vacant or deserted houses or shopfronts. Responses

to the items were aggregated to the community level as initial measures. The three items were highly correlated across neighbourhoods. They were subsequently combined into a composite measure, with higher scores indicating higher levels of physical disorder.

*Community Poverty* was measured by the percentage of households that were living in poverty (a household annual income of less than US\$13,359 for a household of four in 1990). Community poverty, as a marker of spatially based social position, goes hand in hand with physical disorder ( $r = 0.81$ ;  $p < 0.001$ ) while being negatively correlated with collective efficacy ( $r = -0.68$ ;  $p < 0.001$ ). By contrast, the two cultural variables are not significantly associated with poverty. Relative to anomie, tolerance for risk behaviour is more correlated with poverty although the correlation is not statistically significant at the five per cent level ( $r = 0.21$ ;  $p = 0.15$ ). Meanwhile, it is significantly linked to collective efficacy ( $r = -0.39$ ;  $p < 0.05$ ) and physical disorder ( $p = 0.23$ ;  $p < 0.10$ ). Table 2 shows the correlation matrix of these five measures of community environment.

To better understand the relationships among these community factors, we performed factor analyses to identify the latent structure underlying the five variables at the community level examined in this study. These analyses show that physical disorder, poverty and collective efficacy are tightly clustered around a dominant factor, whereas tolerance for risk behaviour and anomie appear conspicuously distinct. Factor loadings for poverty, collective efficacy and physical disorder are 0.83,  $-0.83$  and 0.93 respectively. We then constructed a single factor score as a composite measure of general community social, economic and physical environment. The community distress scale has a satisfactory internal reliability (the coefficient alpha is 0.76). We label this composite measure as 'community distress', which is positively correlated with high poverty, low collective efficacy and high level of physical disorder in the community.

#### *Analytical strategy*

Following the *ecometric* method assessing ecological settings illustrated in the work of Raudenbush and Sampson (1999), we used HLM-adjusted

Table 2 *Correlation matrix of community-level characteristics*

	<i>Poverty</i>	<i>Collective efficacy</i>	<i>Physical disorder</i>	<i>Anomie</i>	<i>Risk behaviour</i>
Concentrated poverty	1.000				
Collective efficacy	-0.676***	1.000			
Physical disorder	0.814***	-0.813***	1.000		
Anomie	-0.045	-0.088	0.135	1.000	
Tolerance of risk behaviour	0.206	-0.386**	0.234*	0.025	1.000

\*  $p < 0.10$  \*\*  $p < 0.05$  \*\*\*  $p < 0.001$

N = 51 Zip code areas

empirical Bayes' residuals as measures of community *collective efficacy*, *physical disorder*, *tolerance of risky behaviour* and *anomie*. The major advantage of this approach to measuring community characteristics based on survey data is that ecological measures thus constructed are simultaneously adjusted for item-specific factors (e.g. severity), response bias, different sample size within each ecological unit and random errors specific to each community.

After data construction, we fit a series of Cox proportional hazards models to test the effects of community characteristics on individual hazard of death among the elderly patients in the COSI data set. The Huber-White robust method of calculating the variance-covariance matrix is used to account for the possible correlation in survival experiences among patients living within the same ZIP code area (Lin and Wei 1989). The proportionality assumption of Cox models was tested to examine the sensitivity of findings from non-stratified Cox models to the violation of the proportionality assumption. No meaningful violation of the proportionality assumption was detected.

## Results

Table 3 shows the results of six Cox proportional hazards models that examine the effects of community distress, anomie and tolerance for risk behaviours on mortality and the mediating role of subcultural orientation in the link between community distress and the hazards of death among elderly patients. First, we find that community physical, social and economic distress prospectively and contextually increases the mortality risk of individuals after diagnosis (model 3.1). Living in a community with one unit higher level of distress is associated with four per cent higher risk of mortality after onset of serious disease in this elderly patient population, controlling for individual poverty status, age, gender, race, baseline comorbidity and diagnosis. The magnitude of this community effect can be understood more intuitively by comparison with the mortality effect of individual attributes. For example, according to model 1 in Table 3, the difference in the relative hazard of death between two sub-populations which differ by one unit in community distress is approximately equivalent to the difference that would be generated by a 10-month age difference at the individual level.

Second, a measure of *anomie* at the community level significantly predicts higher rate of mortality for older patients with serious diseases in addition to several personal characteristics (model 3.2). Living in a community with one unit higher level of anomie is associated with 26 per cent higher risk of mortality in this elderly patient population regardless of individual risk factors. Tolerance for risk behaviour also exerts a positive effect on mortality but the magnitude of the effect is not statistically significant (model 3.3).

Third, the data also show that community distress can be partially explained by the contextual impact of anomie. After adding anomie to model 3.1, the effect of community distress decreases by about 18 per cent but remains

Table 3 *Coefficients of Cox Proportional Hazards Models*

	(1) <i>Community distress</i>	(2) <i>Anomie</i>	(3) <i>Risk behaviour</i>	(4) <i>Distress &amp; anomie</i>	(5) <i>Distress &amp; behaviour</i>	(6) <i>Distress &amp; subculture</i>
Age	0.049*** (0.002)	0.049*** (0.002)	0.049*** (0.002)	0.049*** (0.002)	0.049*** (0.002)	0.049*** (0.002)
Male	0.272*** (0.022)	0.269*** (0.023)	0.271*** (0.022)	0.270*** (0.023)	0.272*** (0.022)	0.270*** (0.023)
Poverty (Medicaid)	0.085** (0.035)	0.096*** (0.034)	0.098*** (0.035)	0.085** (0.034)	0.085** (0.035)	0.085** (0.034)
Race (non-white)	0.016 (0.033)	0.061* (0.031)	0.042 (0.033)	0.034 (0.031)	0.016 (0.032)	0.034 (0.031)
Comorbidity 1 <sup>^</sup>	0.100*** (0.009)	0.101*** (0.009)	0.101*** (0.009)	0.100*** (0.009)	0.100*** (0.009)	0.100*** (0.009)
Comorbidity 2	0.059*** (0.011)	0.059*** (0.011)	0.059*** (0.011)	0.059*** (0.011)	0.059*** (0.011)	0.059*** (0.011)
Comorbidity 3	0.028** (0.012)	0.028** (0.011)	0.028** (0.011)	0.028** (0.011)	0.028** (0.012)	0.028** (0.011)
CHF	0.105*** (0.039)	0.106*** (0.039)	0.108*** (0.039)	0.104*** (0.039)	0.105*** (0.039)	0.104*** (0.039)
CNS	1.068*** (0.187)	1.069*** (0.188)	1.074*** (0.186)	1.064*** (0.189)	1.068*** (0.188)	1.063*** (0.190)
Colorectal cancer	0.094* (0.055)	0.094* (0.055)	0.093* (0.055)	0.095* (0.055)	0.094* (0.055)	0.095* (0.055)
Hip fracture	-0.207*** (0.048)	-0.205*** (0.048)	-0.207*** (0.048)	-0.206*** (0.048)	-0.207*** (0.048)	-0.206*** (0.048)
Head/neck cancer	0.377*** (0.137)	0.383*** (0.136)	0.379*** (0.135)	0.379*** (0.137)	0.377*** (0.137)	0.379*** (0.137)

Table 3 *Continued*

	(1) <i>Community distress</i>	(2) <i>Anomie</i>	(3) <i>Risk behaviour</i>	(4) <i>Distress &amp; anomie</i>	(5) <i>Distress &amp; behaviour</i>	(6) <i>Distress &amp; subculture</i>
Liver/biliary cancer	1.322*** (0.146)	1.323*** (0.145)	1.326*** (0.147)	1.322*** (0.145)	1.323*** (0.147)	1.322*** (0.146)
Leukaemia	0.661*** (0.110)	0.671*** (0.109)	0.663*** (0.110)	0.669*** (0.110)	0.661*** (0.111)	0.669*** (0.111)
Lung cancer	1.161*** (0.050)	1.164*** (0.051)	1.162*** (0.050)	1.163*** (0.051)	1.161*** (0.050)	1.163*** (0.051)
Lymphoma	0.492*** (0.079)	0.500*** (0.080)	0.497*** (0.080)	0.496*** (0.079)	0.492*** (0.079)	0.496*** (0.080)
Pancreatic cancer	1.361*** (0.079)	1.361*** (0.080)	1.357*** (0.082)	1.364*** (0.079)	1.361*** (0.080)	1.364*** (0.079)
Stroke	0.007 (0.039)	0.009 (0.039)	0.008 (0.039)	0.008 (0.039)	0.007 (0.039)	0.008 (0.039)
Urinary cancer	0.017 (0.059)	0.020 (0.059)	0.018 (0.059)	0.019 (0.059)	0.017 (0.059)	0.019 (0.059)
Community distress	0.039*** (0.015)			0.032** (0.014)	0.038** (0.016)	0.032** (0.015)
Anomie		0.228** (0.106)		0.183* (0.098)		0.183* (0.098)
Tolerance of risk behaviours			0.049 (0.061)		0.007 (0.065)	0.001 (0.063)
Observations	12,672	12,672	12,672	12,672	12,672	12,672

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

^ Charlson comorbidity score in lookup year 1 (see footnote 3)

significant at the five per cent level (model 3.4). Similarly, adding community distress to model 3.2 reduces the anomie effect by nearly 20 per cent which is now only marginally significant at the 10 per cent level (model 3.4).

Fourth, both model 3.5 and model 3.6 show that tolerance of risky behaviours is not an important mechanism underlying the contextual effect of community distress on mortality. The effect of community distress remains virtually unchanged with tolerance of risky behaviours added to the model.

In summary, the key message conveyed by Table 3 is that the overall level of community economic, social and physical distress exercises a strong impact of increasing the odds among older people of dying from medical conditions, and community subcultural orientation manifest in anomic attitudes seems to play a mediating role in this association. It is also noteworthy that the effects of individual risk factors are consistent across all the models. Age, male gender, poverty and co-existing morbidity are all significant risk factors of mortality. The coefficients of diagnosis reveal that relative to acute myocardial infarction (MI; the reference diagnosis), stroke has a comparable effect on the hazard of death, congestive heart failure has a stronger mortality force, most cancers have yet stronger effects on mortality, and hip fracture appears to be the least fatal condition among the 13 diseases examined.

### Summary and discussion

In this prospective and contextual study, we examined four dimensions of community environments, comprising physical disorder, social resources, economic deprivation and subcultural orientation in terms of their contextual effects on mortality risk following diagnosis with various serious conditions in an elderly population in Chicago. We found that a dominant latent factor underlies physical disorder, collective efficacy and poverty. An encompassing composite index was then constructed to measure the level of community distress and was subsequently used to test our conceptual model (see Figure 1). The theoretical framework received broad empirical support.

The conclusion that we can draw is that community distress and the amount of anomie present in the community (a contextual subcultural factor) exert powerful contextual forces affecting the mortality risk among elderly patients, in addition to individual risk factors. By contrast, we found no effect of the level of tolerance for risk behaviours on the mortality of elderly people stricken with debilitating illnesses. When we set off to test the mortality effect of subcultural orientation, we explicitly focused on deviant attitudes in general and views on risk behaviours in particular, as two important dimensions of community subculture. The anomie scale was intended to tap the first dimension and the tolerance for risk behaviour scale was orientated to capturing the latter. Recall of the tolerance for risk behaviour scale was based on respondents' opinions regarding how wrong it was

for *teenagers* to engage in risk behaviours. It is possible that this measure is primarily based on views about teenage risk behaviour and therefore is less relevant for older and diseased adults. Or, perhaps more likely, norms of healthy or risky behaviour *at the community level* have indeed a more preventive function and are less crucial for elderly people who have already been afflicted with serious diseases, even if at the individual level lifestyles may still be relevant for health at this stage of life. On the other hand, the level of anomie, which may reflect a certain degree of cynicism, fatalism and 'present-time-consumption' that spread across the community, appears to have a strong impact on the hazard of death contextually as well as prospectively in this elderly population with serious illnesses.

Following the findings of significant effects of community distress and subculture, we further examined whether the effect of community distress was mediated through subcultural orientation as measured by the level of anomie and the tolerance for risk behaviours in the community. Our data show that the two types of community forces, social-structural distress and subculture, are inter-related yet clearly distinct from each other. Although their effects on mortality can each be understood by the other to some degree, they have unique or independent impacts on mortality which are perhaps channelled through alternative pathways. This finding confirms the hypothesis put forward in the conceptual model (Figure 1), that is, that community social-economic-physical distress affects mortality in part via subcultural orientation. However, additional mechanisms probably exist through other community ecological processes and/or individual pathways that are not examined in this study.

The conclusion that community subcultural orientation plays a significant role in the link between residential community distress and health may be provocative. This evidence essentially lends support to the culture-of-poverty perspective that stresses the unhealthy subcultures in marginalised social groups and poor urban communities in explaining the so-called 'ghetto' problems, as well as individual disadvantage. Critics of the culture-of-poverty thesis argue that it places blame on the victim no matter whether at the individual level or community level and hence clouds the social causes of poverty; believers in this view may therefore erroneously favour social policies that aim to indoctrinate the poor with mainstream values over those more expensive and painful policies that promote structural changes in resource allocation (Steinberg 1989). Clearly, it is not appropriate to assume that cultural patterns spontaneously evolve without being inextricably tied up with the social structure. As Oscar Lewis noted in his original conception of the culture-of-poverty perspective, 'by creating basic structural changes in society, by redistributing wealth, by organizing the poor and giving them a sense of belonging, of power and of leadership, revolutions frequently succeed in abolishing some of the basic characteristics of the culture of poverty even when they do not succeed in curing poverty itself' (Lewis 1966: 9).

On the other hand, as argued long ago by Ulf Hannerz (1969) and reiterated by William Julius Wilson (1991), it is not enough to recognise the importance of macrostructural constraints; it is also imperative to see 'the merits of a more subtle kind of cultural analysis of life in poverty' (Hannerz 1969). Wilson (1991) further argued that simplistic either/or notions of 'culture versus social structure' have impeded the development of a broader theoretical context that can be used to examine questions regarding life in urban deprived neighbourhoods. He also presented a framework that integrates social structural and cultural arguments in an attempt to depict the sources as well as processes of social dislocations in inner-city ghettos. This framework finds some empirical support in the current research, showing that community subcultural orientation (*i.e.* anomie) does play a role in linking poor neighbourhoods with poor health.

It is equally important, however, to recognise that although poor places tend to have health-compromising subcultures and social problems, not all poor places have become 'ghettos' (Wilson 1971), and some communities, despite suffering from economic deficiency, may yet manage well in maintaining the mainstream values or social functioning, and, in doing so, alleviate the deleterious effect of structural disadvantage. These communities are probably uncommon, but their experiences would be particularly informative to policy makers and researchers who are concerned with health disparities across social groups. Further quantitative and qualitative research is needed to elucidate the processes through which some impoverished communities protect their residents against health hazards better than their peers of similar poverty level. Data from in-depth ethnographic field work may provide some answers to questions such as 'What are the circumstances, apart from or in conjunction with affluence, that impel a community to mobilise an efficient apparatus to instill positive cultural values into the residents and successfully maintain social order?'. Such research would potentially narrow the knowledge gap in the relationship between community subcultural orientation and the residents' physical and mental health. Some cultural orientations are not exclusively rooted in the unequal distribution of resources. Future work should extend research by investigating other cultural aspects in the community, such as health values and attitudes toward health services, that may be embedded in the community's ethnic and minority background.

In sum, the general findings from this research are strongly supportive of the perspective that community contextual effects extend to later life. Theory suggests that community effect should be stronger for elderly people because they tend to be less mobile, spend more time in the neighbourhood and be more vulnerable and/or attached to their neighbourhoods than younger people (Diez-Roux 2002, Glass and Balfour 2003). Empirical evidence, however, is at most mixed about this posited age pattern in the neighbourhood-health link, with more studies in fact finding non-significant or less significant community effect (SES) among elderly adults (Anderson *et al.* 1997, Haan *et al.* 1987, Waitzman and Smith 1998). It has been argued that inadequate

measures of community environment may be one reason for the seemingly reduced community effects in older persons (Glass and Balfour 2003). Using multiple measures of the community environment, our study reinforces the idea that the social, economic, physical and cultural environments of residential community are relevant dimensions of social causation of mortality in later life.

Here it is noteworthy that our measures of anomie and tolerance for risk behaviour are aggregated survey-based assessments of individual attitudes and are rather exploratory. To efficiently identify anomie in the community, we focused on the key dimension of the anomie concept – values and attitudes deviant from the dominant culture. In fact, this component of anomie, perhaps most closely approximating Durkheim's original conception of anomie, is also reflected in the item standing for the deflation of internalised social norms and values in the original Srole anomia scale (Srole 1956). While we did not adopt the Srole anomia scale to operationalise the anomie concept, two items in the anomia scale might be incorporated into our anomie scale in the future as a measure of detachment from conventional norms. One item captures the sense of orderlessness, with the agree-disagree statement 'Nowadays a person has to live pretty much for today and let tomorrow take care of itself'. The other item directly taps normlessness and meaninglessness, with the statement 'It's hardly fair to bring children into the world with the way things look for the future'. There are certainly other attitudinal statements that are potentially useful for constructing a differentiating measure of anomie. It is hoped that in future research more effective measurement of anomie will be conceived, constructed and validated through concerted qualitative and quantitative efforts in formulating the applications of the anomie concept. More work also needs to be done to refine the measurement of tolerance for risk behaviours at the community level. Situational measures that are more relevant to our study population – older adults with serious illness – may yield different findings.

Several strengths of this study merit comment. Using different data sources to measure community environment (*i.e.* the 1990 Census data and the PHDCN-CS) and to capture individual risk factors and health event (the COSI) minimises method-induced associations between outcomes and predictors. Our outcome measure, the hazard of death, was objective. The study was prospective and population-based. Moreover, we tested the prospective and contextual effect of an under-researched aspect of community life – *subcultural orientation* – on mortality following serious illnesses in the late stage of the lifecourse, and further revealed the mediating role of cultural characteristics (*i.e.* anomie) in the link between community physical, social and economic disadvantage and the hazard of death among elderly urban patients.

The research would be strengthened by a true longitudinal design, however. Without time-varying information on individual residence (only ZIP code at the origin of the study was available for the COSI cohort) we cannot examine how residential mobility affects our findings. Presumably, some people moved

between their initial diagnosis and their death. Failure to take this issue into account may result in bias due to exposure misspecification. The direction of this bias is not clear, however, because of variation in the possible causes of residential moves. Future investigation equipped with longitudinal data both at the individual level and community level should be able to better explore this issue. Another data limitation concerns the lack of individual-level controls. For example, we did not control for education which is clearly related to one's residence as well as health, and our measure for individual income was crude and only based on a dichotomous indicator of Medicaid recipient. Nevertheless, we controlled for diagnosis in 1993 at the index of hospitalisation and comorbidity status for the three preceding years. It is arguable that these health outcomes are largely reflective of one's social-demographic background and can be viewed as complementary to other individual-level risk factors. Finally, we want to mention that this study is Chicago-based and designed for a vulnerable subgroup of the population – people who are old and ill. It would be interesting to see if the main findings are replicable for other populations in other urban or rural settings. Our knowledge of social determinants of health would be further enhanced by finding specific patterns of community effects for different subgroups on a variety of health outcomes.

In conclusion, this research finds evidence supporting the prospective and contextual effect of the social, economic, physical and cultural environment of local communities on the survival experiences of older people facing life threatening illness. It appears that reducing poverty, regaining community collective efficacy, controlling physical disorder and redirecting subcultural orientation via, say, providing role models and adequate institutional support, may help regenerate disadvantaged neighbourhoods and benefit the health of local residents.

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### **Notes**

- 1 Social capital has diverse definitions according to different theorists of social capital (Bourdieu 1986, Coleman 1988, Putnam *et al.* 1993). Nonetheless, it can

be generalised from these definitions that social capital generally refers to social resources (*e.g.* trust and reciprocity) that are accumulated through social networking (dense or loose), shared among members of some social structures (yet differentially accessible to individuals), and potentially facilitating collective actions to fulfil commonly recognised goals.

- 2 Sampson and his colleagues (1997) have recently developed 'collective efficacy' as a related social ecological concept in their study of neighbourhood effects on crime. Essentially collective efficacy is a subsumed notion of social capital, which has been defined as 'social cohesion among neighbours combined with their willingness to intervene on behalf of the common good' (Sampson *et al.* 1997). This notion emphasises two important dimensions of social capital—social solidarity and informal social control. In physical setting, it emphasises the *willingness* and *ability* of neighbourhoods to act collectively in order to realise the common goals of residents. According to the collective efficacy theory, high collective capacity is achieved not necessarily through the existence of dense local civic networks but mainly through the agreed collectivism manifest in a community's cohesive culture and in the informally controlled normative behaviours of its residents (Morenoff *et al.* 2001, Sampson *et al.* 1997).
- 3 Comorbidity is measured by the Charlson method (Charlson *et al.* 1987), which is extremely popular and has been used extensively in claims data research (Christakis *et al.* 2002, Iwashyna *et al.* 2002). Having examined the effects of alternative data sources and lookback periods on the performance of Charlson scores in the prediction of mortality following hospitalisation, Zhang *et al.* (1999) have found that, compared with a one-year lookback involving solely inpatient claims, statistically and empirically significant improvements in the prediction of mortality were obtained by incorporating alternative sources of data (particularly two years of inpatient data and one year of outpatient and auxiliary claims), but only if they were entered into the regression simultaneously. Although they parameterised the Charlson score as indicator variables, they also tested a linear, continuous specification of the Charlson score and found by and large the same patterns. In our sample, three years of in-patient Charlson scores were available, all of which were parameterised as linear continuous measures and were entered into our regression model distinctly as controls for pre-hospitalisation health status.

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