



Published in final edited form as:

*Curr Diab Rep.* 2016 August ; 16(8): 72. doi:10.1007/s11892-016-0760-4.

## Social Disorder in Adults with Type 2 Diabetes: Building on Race, Place, and Poverty

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### Abstract

The recent resurgence of social and civic disquiet in the USA has contributed to increasing recognition that social conditions are meaningfully connected to disease and death. As a “lifestyle disease,” control of diabetes requires modifications to daily activities, including healthy dietary practices, regular physical activity, and adherence to treatment regimens. One’s ability to develop the healthy practices necessary to prevent or control type 2 diabetes may be influenced by a context of social disorder, the disruptive social and economic conditions that influence daily activity and, consequently, health status. In this paper, we report on our narrative review of the literature that explores the associations between social disorder and diabetes-related health outcomes within vulnerable communities. We also propose a multilevel ecosocial model for conceptualizing social disorder, specifically focusing on its role in racial disparities and its pathways to mediating diabetes outcomes.

### Keywords

Diabetes; Disparities; Racial disparities; Race; Social disorder; Social determinants; Socioeconomic determinants; Poverty; Social environment; Neighborhood environment

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#### Compliance with Ethical Standards

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

**Conflict of Interest** Shantell L. Steve, Elizabeth L. Tung, John J. Schlichtman, and Monica E. Peek declare that they have no conflict of interest.

## Introduction

Type 2 diabetes (T2D) is one of the leading causes of death and disability in the USA [1]. Low-income racial and ethnic minorities are disproportionately affected by T2D, experiencing higher incidence, prevalence, comorbidity (e.g., hypertension, dyslipidemia), and complications (e.g., blindness, end-stage renal disease, limb amputation) compared to non-Hispanic whites [1–3]. According to the 2014 National Diabetes Statistics Report, racial and ethnic minorities are almost twice as likely to be affected by diabetes, with even greater disparities among racial and ethnic minorities living in poverty [1, 4•].

These disparities have been largely attributed to patient-level lifestyle factors (e.g., poor diet, physical inactivity [5, 6]) and health system factors (e.g., disparities in healthcare access and medical care [7]). Subsequently, efforts to prevent and control T2D within these populations have targeted access to clinical services and/or behavioral risk factors in clinical settings. However, clinical interventions have often demonstrated mixed findings and improvements have been difficult to sustain over time [8].

Others have cited environmental conditions as a primary driver of health disparities and have targeted features of the built environment [9, 10]. The built environment refers to the human-made or modified structures used in daily life, as compared to naturally occurring aspects of the environment [11•]. Numerous studies have demonstrated relationships between the built environment and health [9, 10]. For example, a “walkable” neighborhood is positively associated with increased physical activity and reduced prevalence of obesity [12, 13]. Access to healthy food within the built environment has been associated with reduced diabetes distress and improved diabetes self-care [14]. Signs of physical disorder within the built environment (e.g., dilapidated housing, few recreational spaces, broken glass on the ground) have been associated with unhealthy behaviors (e.g., physical inactivity, poor dietary habits) and poor health outcomes (e.g., poor diabetes control, hypertension) [11•, 15•].

## The Role of Social Disorder

Although physical disorder and features of the built environment are critical to understanding environmental effects on T2D, social disorder may play an equally important role among low-income racial and ethnic minorities [11•, 15•, 16•]. Social disorder, the disruptive social conditions that influence health, may take the form of crime, noise, loitering, public drinking, drug use, conflicts, and panhandling—any of which may create a sense of unrest or danger [17•].

There are two likely mechanisms through which social disorder may impact diabetes-related outcomes. First, perceptions of social disorder may discourage residents from engaging in healthy behaviors (e.g., safety concerns may limit outdoor physical activity, perceived discrimination may influence assessments of which grocers are welcoming), thus increasing the risk of diabetes onset and poor diabetes control. Second, perceived fear and chronic stress can lead to allostatic load—the overactivity or underactivity of allostatic systems (e.g., hypothalamic-pituitary adrenal axis, immune system), with resultant inflammation and stress

hormone patterns that can increase the risk of obesity and diabetes [17•, 18•]. We note, however, that impressions of social disorder may be subjective and variable. For instance, seeing a group of people conversing outside might motivate one person to take a walk (e.g., engage in neighborly socialization, thus mitigating stress response mechanisms) and a different person to stay inside (e.g., avoid perceived dangerous loitering, thus triggering stress response mechanisms).

Social disorder is usually conceptualized within the social environment, defined as the immediate social setting in which people live, including interpersonal behaviors, cultures, and attitudes [19]. However, we believe that the current understanding of social disorder—limited to the immediate social setting—does not fully capture the many dimensions of disorder experienced among low-income racial and ethnic minority communities.

In this paper, we propose a multilevel ecosocial model (Fig. 1) to describe potential mechanisms through which social disorder may contribute to diabetes disparities in low-income racial and ethnic minority communities. We also discuss the results of a narrative literature review, conducted to identify evidence supporting or refuting the proposed associations between social disorder (broadly defined) and diabetes-related health outcomes within vulnerable communities. We conclude by providing recommendations for future directions in research and interventions. This paper provides a theory-driven summary of some of the most important literature in the field and describes how major themes inform our multilevel conceptual model on social disorder and diabetes-related health outcomes.

## Methods

We searched PubMed, PsychInfo, Scopus, and SocIndex databases using a combination of MeSH terms and keywords: type 2 diabetes mellitus, obesity, cardiovascular disease, disparities, community, social environment, built environment, neighborhood disorder, social disorder, physical disorder, prejudice, discrimination, racism, policing, crime, violence, residential segregation, social cohesion, social capital, and collective efficacy. We primarily included papers published from 2010 to 2015 to highlight the most current research.

We did not include studies evaluating social network theory or network analysis, as these studies were outside the scope of this review. It is worthwhile to note that, given the focus on social disorder, we excluded studies describing positive social aspects (e.g., social support) and health. We also make a distinction between social disorder and general definitions of social determinants. Social determinants refer to the place-related conditions that influence health, both positive and negative [20, 21••]. Social disorder, as defined in this paper, refers to the disruptive social conditions on all levels, including place, which may influence health.

## Conceptual Model

Figure 1 summarizes several plausible mechanisms through which social disorder may contribute to diabetes disparities. First, structural and neighborhood-level influences, such as economic systems, macrosocial inequalities, and residential segregation, mutually reinforce each other. Economic deprivation can result in spatial inequalities in the built and social environment (Fig. 1, left), which can, in turn, reinforce residential segregation and

concentrated poverty. Second, neighborhood-level influences can impact individual behaviors and processes. The built environment (e.g., a lack of healthy food options) can impede healthy dietary intake (Fig. 1, top), or the social environment (e.g., perceived safety concerns) can impede physical activity (e.g., by decreasing outdoor exercise within the community) (Fig. 1, bottom): both paths strengthen the pathways to obesity and comorbid disease. Alternatively, noise in the environment and stressors related to perceived threats of violence or perceived interpersonal discrimination (e.g., in interactions with police) could disturb sleep, thereby activating allostatic systems (Fig. 1, right) and facilitating obesity risk. Finally, personal and social health beliefs/behaviors operating at the individual and interpersonal level are related to health (Fig. 1, right). For example, interpersonal racial discrimination and social comparison can produce stress, which can subsequently result in the adoption of unhealthy eating behaviors and physical inactivity; both stress and maladaptive behaviors can lead directly to poor health.

## Structural Features of Social Disorder

Fitzpatrick and LaGory suggest that obesity and related outcomes are a consequence of larger social structures, as evidenced by the highest rates of obesity within US states that have the lowest income, least education, and highest percentages of racial/ethnic minorities [21••]. Indeed, racial and ethnic minorities often live in communities affected by interrelated macrosocial and economic inequalities (Fig. 1, far left) with downstream consequences on health.

### Macrosocial Inequalities

Low-income minority communities are more likely than white communities to have been shaped by large-scale biased policies and practices of governments (i.e., federal, state, municipal), institutions (e.g., banks), and associations (e.g., in real estate). For example, the 1968 National Advisory Commission on Civil Rights was created to understand the underlying causes of the 1967 race riots in major US cities. The report identified white racism and failed policies in housing, education, and social services at the state and federal level as the main causes of urban violence [22]. The tools that furthered racial segregation included racially restrictive covenants on housing, mortgage redlining, and urban renewal—a policy practice from 1949 to 1974 that displaced hundreds of thousands of households, the majority of which were nonwhite and poor [23]. During the 1990s and 2000s, in an environment of urban gentrification, some areas where mortgage capital had been withheld in earlier periods actually became flooded by high-risk variable rate mortgages and predatory lending schemes [24••, 25]. This influx of risky contracts facilitated a wave of foreclosures [24••], thus furthering the existence of social and physical disorder within low-income minority communities. Currently, the presence of race-based retail redlining (i.e., stores and/or businesses choosing not to serve certain communities based on racial/ethnic composition) may contribute to limited healthy food options in a given neighborhood [26].

### Economic Inequalities

Beginning before and persisting beyond the Civil Rights era, large-scale economic and social forces have contributed to social disorder in urban neighborhoods [27]. For instance,

over the past half-century, the USA lost hundreds of thousands of manufacturing jobs, leaving a landscape of economic and social devastation in many urban communities [28, 29]. The homes of unemployed workers sat deteriorating or abandoned. The bars, religious congregations, and meeting halls that had served as social networking sites eventually collapsed, socially and sometimes physically. For many residents, it felt like work “disappeared” [30]. For others, jobs that paid a living wage in manufacturing were replaced by service-sector jobs with wages that could not sustain a household. Such economic transformation was formative in the current status of many communities with high proportions of unskilled workers who would have previously been employed in the manufacturing economy—quite often communities of racial/ethnic minorities.

## Neighborhood Organizational Features of Social Disorder

Consequently, these communities can be characterized by economic deprivation and residential segregation (Fig. 1, center left). Place of residence is strongly associated with social position, socioeconomic status, and race/ethnicity. As such, the organizational features of place and its characteristics may be an important mediator between race/ethnicity and health disparities, particularly in chronic diseases such as diabetes.

### Residential Segregation

Residential segregation is a neighborhood characteristic that can perpetuate health disparities [30]. It can be a consequence of micro-level discrimination (e.g., real estate steering practices) or broader systematic practices and structural policies (e.g., mortgage redlining, public housing policy). Racial segregation, even after adjustment for individual and family-related factors, has been associated with myriad health conditions, including obesity and T2D [31•, 32•, 33, 34••]. One observational study evaluated a racially integrated, economically homogenous community in Baltimore and found that disparities in the prevalence of diabetes dissipated (10.4 % blacks, 10.1 % whites) compared to national estimates (10.5 % blacks, 6.6 % whites) [35•].

Other research has challenged the notion that racial segregation is related to health. For example, Piccolo et al. examined potential associations between neighborhood racial composition and diabetes prevalence in Boston and found a large variation in the prevalence of T2D between Boston neighborhoods that could not be reasonably explained by racial/ethnic composition or specific neighborhood attributes, such as socioeconomic, safety, or neighborhood disorder [15•]. Mixed findings in the literature about the relationship between residential segregation and health outcomes may indicate that a racially homogenous neighborhood by itself, regardless of which racial group is being evaluated, is not inherently an adverse feature [36]. Rather, health risks may develop when patterns of residential segregation are associated with poverty and neighborhood deprivation.

### Neighborhood Deprivation

Neighborhood deprivation refers to neighborhood organizational features such as economic disadvantage, unemployment, poor education options, and substandard housing conditions [37, 38•, 39]. Thus, neighborhood deprivation reflects both social disorder (the focus of this

paper) as well as physical disorder (as part of the built environment). Neighborhood deprivation (e.g., concentrated poverty, residential instability) has been associated with negative health outcomes, such as obesity, diabetes, and cardiovascular disease, as well as intermediate measures such as medication treatment adherence [31•, 34••, 40, 41]. One observational study examined the role of neighborhood poverty on racial disparities in diabetes prevalence (blacks vs. whites), using data from the US Census and the National Health and Nutrition Examination Survey (NHANES). Findings indicated that although neighborhood-level racial composition itself did not increase the odds of having diabetes, concentrated neighborhood poverty was associated with increased odds of diabetes prevalence for blacks (both poor and non-poor) as well as poor whites [34••]. An experimental study, part of the Moving to Opportunity (MTO) housing intervention, examined obesity and diabetes outcomes when households were given the opportunity to move from a high-poverty neighborhood to a low-poverty neighborhood [32•]. Individuals with the opportunity to move to a low-poverty neighborhood were less likely to become obese or develop T2D over the 14-year cohort study.

Neighborhood deprivation is often reflected in a built and social environment that offers few healthy resources (Fig. 1), thus increasing individual risk for unhealthy behaviors [38•, 42–45]. Such neighborhoods, for example, may be less likely to have grocery stores and recreational facilities (components of the built environment) and might also be less likely to have community cooking classes or walking groups (products of social environmental factors such as social cohesion).

## Neighborhood Social Environment Features of Social Disorder

The literature suggests that the neighborhood social environment (Fig. 1, center right) may affect health and contribute to disparities within low-income and minority communities [40]. Disorder in the neighborhood social environment includes factors such as poor social cohesion and collective efficacy, neighborhood crime and safety concerns, and policing and incarceration practices, which can promote unhealthy behaviors and induce physiological distress mechanisms that negatively impact health (Fig. 1, far right).

### Lack of Social Cohesion and Collective Efficacy

Social cohesion is the “degree of connectedness and solidarity that exists among people living in a defined geographic area” [24••, 46•]. Collective efficacy is “social cohesion combined with shared expectations for social control,” a willingness of community members to trust, look out for each other, and intervene for the common good [24••]. The interpretation of collective efficacy has varied over time and between cultural groups. For example, what were perceived as “slums” full of social disorder (e.g., people sitting out on the porch) in the 1940s have been reinterpreted by some as brimming with collective efficacy; what some analysts interpreted as loitering, Jane Jacobs termed “eyes on the street” that foster community safety [47].

Recent literature suggests that low collective efficacy is associated with a variety of health outcomes that cluster at the neighborhood level, including T2D and cardiovascular disease [21••, 48•]. Halbert and colleagues examined the relationship between collective efficacy,

diet, and physical activity within a community-based sample of black adults [48•]. They found significant associations between low collective efficacy and unhealthy behaviors (poor nutritional intake or physical inactivity) that increase the risk of obesity and T2D [48•].

Collective efficacy may reinforce positive attributes of a community, as well as counteract some of the negative factors. It may, for instance, serve as a buffer between large-scale detriments (e.g., racism, economic flux, poverty) and the community, and consequently reduce individual stress and protect health (Fig. 1, far right). A study of working class Italian Americans in Roseto, Pennsylvania, suggested that the common ground of cultural homogeneity fostered an “unconditional interpersonal support” that was associated with reduced stress and positive health outcomes [36, 49]. Neighborhoods with high collective efficacy tend to have a higher degree of connectedness and interpersonal trust, which allows residents to advocate for themselves and reinforces health-promoting behaviors, such as walking and exercise [21••]. There is also evidence that collective efficacy might encourage healthy behaviors even in the presence of physical disorder (e.g., litter, loitering) or the existence of impediments (e.g., access to health foods). Using 10-year data from a population-based cohort study, Christine et al. found that higher levels of social cohesion in low-income neighborhoods was associated with a lower incidence of diabetes [50•]. Alternatively, in some neighborhoods with poor collective efficacy, the addition of businesses (e.g., grocers that offer healthy food options, fitness centers) or other amenities may not be understood as accessible for long term residents (e.g., due to price, brand selection) and can even lead to the displacement low-income groups by higher income groups (i.e., gentrification) [51], thereby perpetuating poor health outcomes among low-income residents.

### **Crime and Resident Safety Concerns**

Racial/ethnic minorities are more likely to live in neighborhoods associated with higher rates of crime and social instability [42]. Although we found no studies directly examining associations between neighborhood crime and diabetes, several studies indicate that perceptions about safety may influence or mediate obesity or obesity-related disease (Fig. 1, right). First, perceptions of crime may increase a resident’s level of stress; chronic stress has been shown to increase allostatic load and stress hormones (e.g., cortisol) that increases the risk of developing T2D [17•, 52•]. Second, in high-crime neighborhoods, residents may be less likely to participate in physical activity (e.g., walking) [53], thus increasing an individual’s risk for obesity and T2D. Third, perceived safety concerns may reduce a resident’s willingness to leave their neighborhood to access amenities that promote health (e.g., parks, grocery stores, medical care) [54•]. For example, one study using California Health Interview Survey (CHIS) data found that people who reported living in an unsafe neighborhood were more likely to report delays in filling prescription medications [54•]. Fourth, the daily activities of residents who live in neighborhoods with high rates of crime can be tied to policing practices. For instance, controversial policing strategies, such as “stop and frisk,” may deter a sense of community identity and have downstream adverse consequences for collective efficacy and social order [55•, 56–59]. The idea, that the very practices thought to address social disorder (e.g., policing to counteract crime) may actually

cause stress in particular contexts, underscores that various factors in our model may have counteracting effects (Fig. 1).

## Individual and Interpersonal Features of Social Disorder

At the individual and interpersonal level, racial/ethnic minorities—especially in low-income communities—can experience social disorder through both externalized and internalized racism (Fig. 1, right). Externalized racial discrimination can take on overt forms, such as harassment, violence, and mistreatment—or it can take on more subtle forms, such as limited employment opportunities, poor quality medical care, or unconscious bias [60•, 61]. Internalized racism can take on the form of poor self-esteem, self-stereotyping, and social comparison (i.e., evaluating self-worth by comparing and contrasting personal attributes) [61, 62]. Both reflect an important type of psychosocial stressor that can adversely affect health status [60•, 61].

### Interpersonal Racial Discrimination

Racial/ethnic minorities who report interpersonal racial discrimination are at increased risk for a variety of stress-related health outcomes and chronic diseases [61, 63•, 64]. Exposure to racial discrimination can lead to increased allostatic load, which has been linked to increased risk of obesity, hypertension, insulin resistance/diabetes, neuronal damage, immune disorders, and mental health disorders [18•, 52•, 61]. Moreover, individuals who report racial discrimination may be more likely to engage in negative coping strategies, such as unhealthy eating and cigarette use, thus increasing their risk for diabetes and diabetes-related complications [52•, 64]. One study using Behavioral Risk Factor Surveillance System (BRFSS) data reported that, in unadjusted models, self-reported racial/ethnic discrimination in healthcare was associated with diabetes quality of care (e.g., HbA1c testing, foot examinations) and complications (e.g., diabetes-related foot disorders, retinopathy) [60•].

### Social Comparison

Recently, social comparison, a process of evaluating social worth based on comparing and contrasting personal attributes, has been described as a potential form of internalized racism [62]. Prior studies suggest that the activation of negative stereotypes among minority or stigmatized groups can create expectations, anxieties, and reactions that can adversely affect health [61]. One study of low-income Brazilians explored the relationship between social comparison and diabetes self-care, showing that social comparison among adult primary care patients often precipitated a negative social identity (e.g., “being ill,” “being different,” “being embarrassing”), which impacted both personal habits (e.g., medication adherence, nutritional intake) and experiences with diabetes (e.g., “being diabetic is leading a difficult life”) [62]. Thus, among marginalized populations (e.g., low-income racial/ethnic minorities) who are at increased risk for negative social comparisons, the addition of chronic diseases such as diabetes may enhance perceptions of stigma and worsen social comparisons, with subsequent adverse health consequences.



## Discussion

Racial and ethnic disparities in diabetes remain a serious public health issue. Although prior studies have investigated behavioral and environmental mechanisms that contribute to such disparities, we sought to collect and organize studies as part of a broader conceptual model describing the role of social disorder in diabetes-related health outcomes. We present evidence from the literature that social disorder can contribute to the disproportionate risk, prevalence, and outcomes of diabetes in low-income racial/ethnic minority communities.

The notion that “place matters” —that where people live can determine their health status— is not new. Over the last decade, research has begun to show that place can be either protective or detrimental for health behavior and outcomes [11•, 21•, 35•, 38•, 40]. However, place may be particularly meaningful for low-income racial/ethnic minority communities. For some, place represents an accumulation of social-structural factors, neighborhood features, and interpersonal interactions that produce social disorder. Racial and ethnic minorities disproportionately live in places with significant social disorder, which may meaningfully impede pathways to positive health outcomes. Thus, our expansion of the social disorder construct can serve as a guide to better inform points of intervention.

Recently, there has been renewed interest in clinical interventions that address the social determinants of health. Health Leads is a non-profit organization that matches patients’ unaddressed social needs to appropriate resources (e.g., housing, employment, support groups, food programs) [65]. CommunityRx employs local high school youth to conduct an annual inventory of businesses and organizations on Chicago’s South Side [66, 67•, 68•]. The CommunityRx database integrates with electronic medical records to generate personalized, condition-specific referrals (HealtheRx) to resources near the patient’s home [67•, 68•].

In 2015, CMS announced a 5-year, \$157 million program to test a model called Accountable Health Communities (AHC) [68•]. This model combines screening for social needs with community service navigation and capacity-building to ensure that patients are not only connected to appropriate services, but community-based service partners are aligned and have adequate capacity to meet community needs [68•]. Health sectors are also participating in cross-sector collaboration to enhance health system-community linkages, and play a role in community development strategies to promote health. A recent report for the Robert Wood Johnson Foundation Commission to Build a Healthier America described emerging strategies to support cross-sector partnerships [69•], including the promotion of a “culture of health” as the new subjective norm.

New policies enacted by the Affordable Care Act encourage health systems to consider not only individual-level patient outcomes, but also the population health of their communities. Health policy changes have bolstered preventive, non-clinical interventions that target the social and economic barriers to population-based health. Low-income racial and ethnic minorities will particularly benefit from interventions that target neighborhoods shaping individual risk [41, 70, 71]. One study of HOPE VI, a new generation of public housing, demonstrated an increase in neighborhood-based physical activity among housing residents

[41]. However, the mass relocations and destruction of existing communities facilitated by HOPE VI may have countervailing effects on social cohesion and collective efficacy [72]. This illustrates the need for models, like the one we present here, to understand the complex interrelationships between social disorder and health, and the potential for unintended health consequences from health policies and interventions.

Finally, the increased availability of individual-level technology (e.g., mobile phones, dashboard cameras) has increased documentation and public awareness of racially unjust policing and incarceration practices, especially in low-income minority neighborhoods [56–59]. Although few studies have directly examined the impact of neighborhood policing on health outcomes, resources are being developed to establish data sources in this field that may better inform law enforcement policies related to health. In 2015, President Obama launched the Task Force of 21st Century Policing to better understand issues surrounding neighborhood law enforcement, including its impact on mental and physical health [73•]. The Task Force also started a Police Data Initiative to increase data collection, improve transparency, and foster community trust [73•].

As we develop evidence-based strategies to address the health of at-risk communities, it will be increasingly important to address the impact of social disorder on activities that shape prevention and control of diabetes and other chronic diseases. It will also be important to systematically test interventions at multiple levels (i.e., structural, neighborhood, interpersonal, individual) where social disorder functions. Only then can we begin to align multilevel strategies—building on race, place, and poverty—to improve what matters most to minority patients in poor communities: daily life.

## Acknowledgments

This research was supported by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) (Grant No. R18DK083946), the Chicago Center for Diabetes Translation Research (Grant No. P30 DK092949-01), and the Merck Foundation. Elizabeth L. Tung, MD was also supported by the Ruth L. Kirschstein National Research Service Award (Grant No. T32 HS000078-17).

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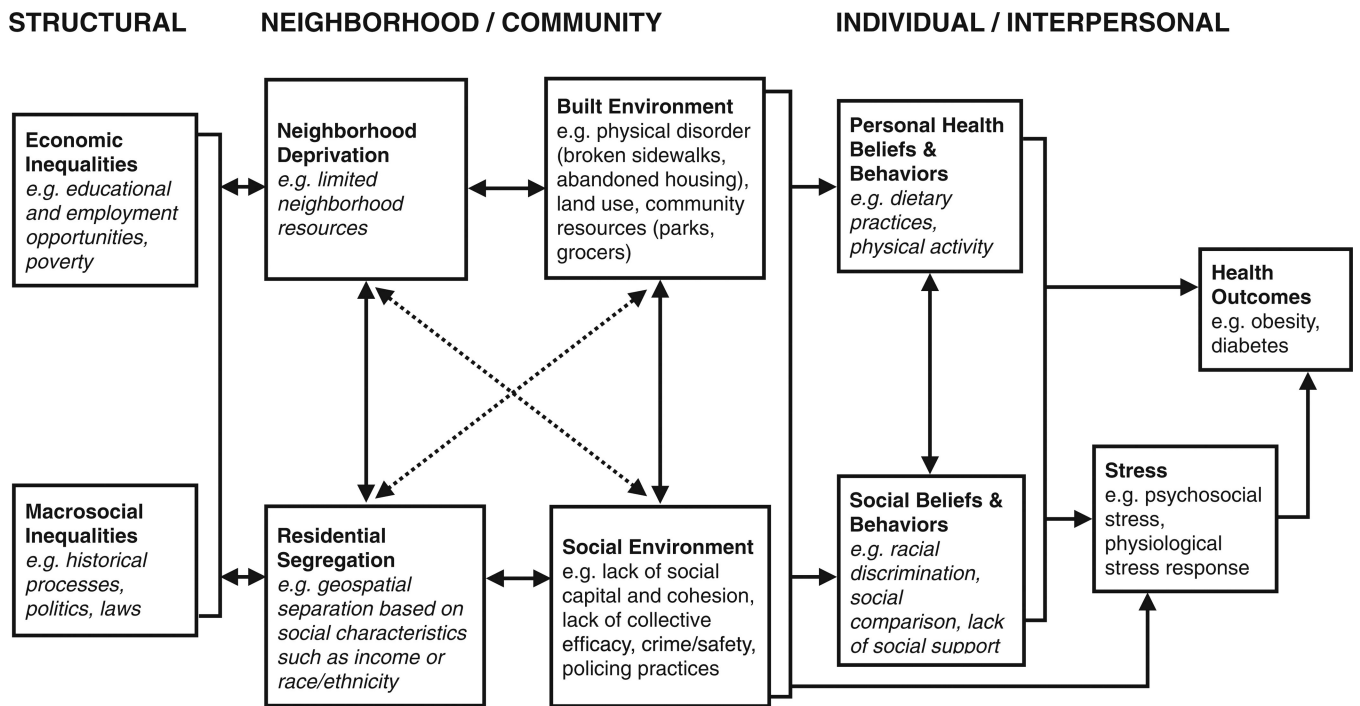
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**Fig. 1.** Social disorder and type 2 diabetes mellitus [11••, 17•, 24••]