

Drug use, misuse, and the urban environment

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Abstract

Urbanization is probably the single most important demographic shift world-wide throughout the past and the new century and represents a sentinel change from how most of the world's population has lived for the past several thousand years. As urban living becomes the predominant social context for the majority of the world's population, the very ubiquity of urban living promises to shape health directly and to indirectly affect what we typically consider risk factors or determinants of population health. Although a growing body of research is exploring how characteristics of the urban environment may be associated with health (e.g. depression) and risk behaviours (e.g. exercise patterns), relatively little research has systematically assessed how the urban environment may affect drug use and misuse. In this paper we will propose a conceptual framework for considering how different characteristics of the urban environment (e.g. collective efficacy, the built environment) may be associated with drug use and misuse, summarize the existing empiric literature that substantiates elements of this framework, and identify potential directions for future research. [Galea S, Rudenstine S, Vlahov D. Drug use, misuse and the urban environment. *Drug Alcohol Rev* 2005;24:127–136]

Key words: cities, context, drug abuse, drug use, urban.

Introduction

There is little doubt that who we are, what we do, and to an extent even what we think, is shaped by our environment. Therefore, advancing our understanding of the determinants of behaviour rests, to a large extent, on our understanding of how our environment shapes what we do. Drug use behaviour is no exception. Recognizing that elements of our environment shape health behaviour, it is important to consider those aspects of our environment that are common and that may, as such, affect behaviour of large proportions of the population. It is in this context that understanding how the urban environment shapes risk behaviour becomes important.

Urbanization, probably the single most important demographic shift world-wide over the past and in the new century represents a sentinel change from how most of the world's population has lived for the past several thousand years [1]. Moreover, urban living is rapidly becoming the norm for a majority of the world's population. At the beginning of the 19th

century, only 5% of the world's population was living in urban areas. By 2003, about 48% of the world's population was living in urban areas [2]. Furthermore, come 2007 it is estimated that more than half the world's population will be living in urban areas and by 2030, up to 60% of the world's population will live in cities [2,3]. There are approximately 50 000 urban areas in the world today with close to 400 cities with a population of a million people or more [4]. The first urban area to become a 'mega-city' with more than 10 million inhabitants was the New York City metropolitan area around 1940. Today there are more than 15 mega-cities world-wide [4,5], and the proportion of people world-wide living in mega-cities is expected to rise from 4.3% in 2000 to 5.2% in 2015 of the global population [4]. Therefore, as more and more of us come to live in urban areas, the urban environment becomes increasingly important as a potential determinant of health and of health behaviour.

Historically, drug use has been conceptualized as an urban problem [6–9]. This was perhaps captured most

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succinctly by Pierce Bailey who suggested, in 1916, that ‘The heroin habit is essentially a matter of city life...’. Over the past two centuries images of opium dens, shooting galleries and jazz musicians using drugs in cities have been promulgated in the popular press, often in contrast to images of bucolic and healthful rural life-styles. However, a review of the empiric literature quickly shows that the evidence about urban-rural differences in drug use are not as clear as these images might suggest. For example, an analysis using Monitoring the Future data gathered from 250 000 high-school students between 1976 and 1992 showed that urban-rural drug use prevalences changed over time. During some time periods the prevalences of drug use were higher in urban than in rural areas, while there were no substantial differences between the urban and rural drug use during other periods. In this analysis, rural youth participated significantly more in alcohol drinking and binge drinking than their urban counterparts [10]. Data from the 2000 US National Household Survey on Drug Abuse (now the National Survey on Drug Use and Health) showed that those living in metropolitan areas were more likely to have used illicit drugs during the previous year than those who were not living in metropolitan areas. However, people in non-metropolitan areas were more likely to report that marijuana was easy to obtain and rates of heroin use were comparable between metropolitan and non-metropolitan areas [11].

How may we consider the urban environment and the potential role it plays in shaping health and health behaviour? Much of the early literature on the role of the urban environment has been concerned with comparisons between urban and rural areas or with comparisons between urban areas [12–14]. However, while urban-rural comparisons are useful in order to draw attention to particular health conditions that are associated with urban living, and which merit investigation, these studies are limited in their ability to shed light on what the characteristics of urban living are that affect health of the residents within them. That different urban-rural comparisons have provided conflicting evidence about the relative burden of disease in urban and non-urban areas is not surprising, particularly in the context of drug use behaviour, which probably has multi-factorial aetiology. Yet, the changing conditions within cities over time and differences in living conditions between cities suggest that at best these studies provide a crude snapshot of how the mass of urban living conditions at one point in time may be affecting population health and behaviour.

Similarly, although urban-urban comparisons [15] may suggest practices at the city level that are amenable to intervention, these studies implicitly assume that

aggregate behaviours or characteristics at the city level are equally important for all residents of those cities. This limits consideration of how cities may affect the health of urban residents to an analysis of city-wide characteristics that may, or may not, affect all urban residents equally.

Therefore, a growing number of authors concerned with urban health have called for more studies that consider intra-urban variability and its association with health and behaviour [16]. Such studies focus on spatial groupings of individuals (typically conceived as ‘neighbourhoods’, although several studies assess the contribution of administrative groupings that are not necessarily meaningful to residents as neighbourhoods) and typically consider the role of one’s community of residence within an urban area on individual health [17]. These studies, effectively intra-urban comparisons, then have the potential to identify which characteristics of the urban context are associated with health and behaviour and to assess why these characteristics are associated with health and behaviour [18,19]. In this essay we present a heuristic that focuses on how characteristics of the urban environment may affect drug use and misuse and contributes to explaining intra-urban variability in drug-related behaviour. We build on data that has been based primarily on studies in the United States. As a result, some of the observations drawn in this essay may not be applicable to other countries with that are systematically different than the United States, including, for example, countries that have a more broadly available health and social service infrastructure than what currently exists within in the United States. Further extensions of our work might consider how the heuristic presented here might differ in other national contexts.

Characteristics of the urban environment that may influence drug use and misuse

There are multiple features of urban neighbourhoods that may be associated with health and drug use. We propose here a framework that summarizes the key characteristics of urban areas that may be associated with drug use and misuse. This framework builds on our previous work [20] and draws from the broader literature on contextual determinants and their effects on health and behaviour [21].

Figure 1 presents a heuristic that synthesizes the different characteristics of the urban environment that may be associated with drug use and misuse. The framework has three components. First, we suggest that urban characteristics are macro-level characteristics which shape behaviour. Within this component we distinguish between primary and secondary urban characteristics. Primary determinants are fundamental

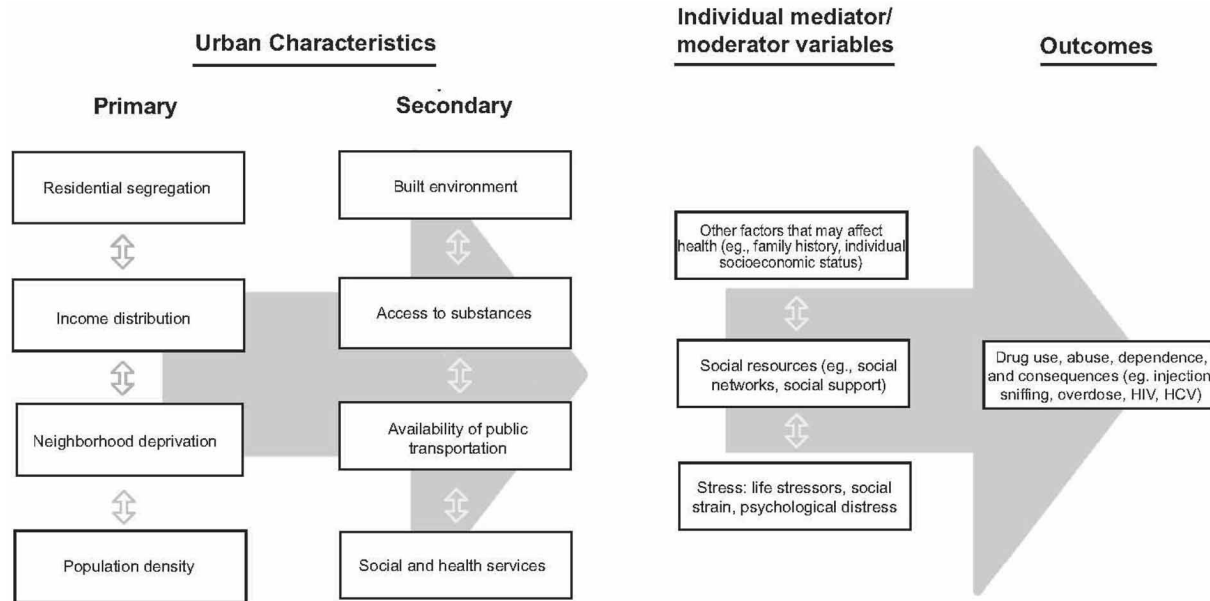


Figure 1. Conceptual framework summarizing how characteristics of the urban environment may influence drug use and drug use risk behaviour.

determinants of the infrastructure, employment, educational and salutary resources of the urban communities. Secondary determinants are potential consequences of the fundamental conditions and may mediate the relation between the primary neighbourhood factors and population drug use and misuse. Secondly, we show individual-level factors that may be influenced by the urban environment and may play a mediating or moderating role (e.g. social networks and psychosocial stressors) in the associations between characteristics of the urban environment and drug use. Although a summary of the full range of individual characteristics that may affect substance use and misuse is beyond the scope of this paper [22], we note in Figure 1 that there is ample evidence for the importance of factors such as social networks and social supports as determinants of drug use and misuse [22–25]. Thirdly, we show drug use, misuse and its potential consequences as being a product not only of individual, but also of area-level characteristics. We note that this framework, of necessity, is a simplification of a far more complex truth. There are undoubtedly several interrelationships between the factors within levels (i.e. between characteristics of the urban environment itself) and across levels (e.g., between characteristics of the urban environment and individual-level factors) all of which contribute to shaping population drug use and misuse. In addition, determinants of the use of different drugs, and of different drug use behaviour may vary in different contexts. It is the purpose of the heuristic simply to present the role of urban characteristics as

part of a multivariate and multilevel causal framework of drug use and its consequences. We discuss briefly here the evidence for the potential role of each of these urban characteristics in shaping drug use and misuse and subsequently suggest potential mechanisms that may explain the associations between these features of the urban environment and drug use and misuse.

We note that there is relatively little research that has explicitly assessed the relations between characteristics of the urban environment and drug use and misuse; this essay aims to synthesize what we do know about the area, generate hypotheses and stimulate such research. Here we draw extensively on extant research on the role of urban characteristics in shaping health and behaviour that has primarily focused on outcomes such as physical health, homicide, and violence. This work provides a theoretical basis for us to explore the urban characteristics that may also be associated with substance use and misuse.

Area-level disadvantage (also referred to as area-level deprivation or area-level socio-economic status) has been shown to be a determinant of several health-related outcomes including health related behaviours, mental health, birth outcomes, adult physical health, coronary heart disease and mortality even after accounting for individual-level factors [26–34]. Area-level disadvantage also may be associated with differential access to medical care and social services. This may be associated with attendant differences in salutary resources [35,36] and with the establishment of social hierarchies (based on characteristics such as socio-

conomic status) that may affect social supports [37] and increase psychological vulnerability to substance misuse [38].

An aspect of area-level disadvantage that has been studied widely and merits particular consideration is income distribution. Ecological evidence has long suggested that countries with more egalitarian income distributions have lower mortality rates [39]. Furthermore, recent evidence, although controversial, suggests that inequalities in income distribution may contribute to health differentials net of the effects of material deprivation [40,41]. We accept that this association between income distribution and population health does not fully recognize the range of determinants that shape population health and does not begin to consider, for example, the complex interaction of history, culture and politics in shaping population health. However, the relationship between income distribution and population health may explain health differentials between states and cities and may be an important determinant of substance use and its consequences [40,42–45]. Several explanations have been proposed to explain these relations. Psychosocial stress associated with living in urban areas with high income disparity may be associated with greater inter-individual tension and likelihood of inter-personal violence; both may be associated with increased substance use and misuse through stress processes [46–48]. Also, perceived and actual inequality, caused by discrepancies in income distribution, erodes social trust and social capital that shape societal well-being [49] and may be associated with disinvestment in material resources in communities [40]. This may further predispose urban residents to unhealthy behaviours such as use and misuse of substances.

Collective efficacy and its relation with homicide and violence has been the focus of a number of groundbreaking studies. Collective efficacy is usually conceived of as a group's capacity to realize collective rather than forced goals, hence it is different to formal regulation or forced conformity by institutions [50]. Collective efficacy is believed to reduce violence and homicide because of residents' informal capacity to control group level processes and visible signs of social disorder [51]. Related work in the United States has shown that states with higher levels of social capital have lower levels of firearm homicide and violence [49,52]. Therefore, urban areas with lower social capital and collective efficacy may be less likely to control deviant behaviours, potentially including the use and misuse of substances.

The quality of the built environment may also affect health and behaviour. Research documents a higher prevalence of several health-related threats, such as proximity to environmental threats that may

increase people's chances of contracting illness, in low-income areas [53]. Living in areas with high levels of noise, litter, crime, vandalism, graffiti and abandoned buildings may result in people being less likely to engage in physical activity out of fear of exercising in the area [54]. Studies examining the relation between area-level conditions and health also has shown that chronic exposure to threatening conditions faced by individuals in disadvantaged areas leads to psychological responses that may impair mental and physical health and lead to increased substance use and misuse [55–59].

Residential segregation may restrict socio-economic attainment by determining access to educational and employment opportunities and to health-related resources [48,60]. People who live in segregated communities may have disproportionate exposure, susceptibility and response to economic and social deprivation, toxic substances and hazardous conditions [61]. Racial segregation also may affect health through its influence on individual health behaviours (via enforcing social network ties), access to health resources and access to health-care services. For example, low socio-economic status, concentrated in areas of residential segregation, is associated with higher smoking rates [62]. Racially segregated areas are also frequently targeted with tobacco and alcohol advertising [61].

Population density may be a particularly important feature of the urban environment that may affect health and behaviour. Theories of collective socialization emphasize the influence of the group on the individual [63,64]. These theories suggest that people who are importantly in positions of authority or influence in specific areas can affect norms and behaviour of others in direct and indirect ways. One of the concepts that is linked to social learning that may have substantial implications for public health is 'contagiousness'. Models of biological contagion, particularly in the context of infectious disease, are well established. For example, in recent years, group practices and social norms have been considered particularly important in the transmission of sexually transmitted diseases and the transmission of HIV [65–67]. Importantly, newer theories include the possibility of contagiousness of ideas and social examples and these concepts are particularly important in dense urban areas. In epidemiology it is understood that all things being equal, urban populations, characterized by high population density, are at higher risk of transmission of biological organisms. Also, because concentrated urban populations share common resources the practices of one group can importantly affect the health of others. For example, it has been shown that more densely populated urban neighbourhoods are more likely to

have illicit sales of substances [68]. These observations may be extended to behaviour and to health.

Social norms and attitudes may reinforce healthy (or unhealthy) behaviours and contribute to better (or worse) physical and mental health in a community (seminal work by Durkheim; for more recent examples see Holmes *et al.* [69]). For example, healthy social norms about alcohol drinking have been used as effective interventions to decrease high-risk drinking among college students [70]. Moreover, social norms vary both between and within cities [71] and changing social norms about smoking have contributed to a general deterrence of smoking and a lowering of the prevalence of smoking in North America during the past 30 years [72]. However, social norms may also support substance misuse.

Transportation, public and non-public, is essential both to facilitate population mobility in densely populated urban areas and for the delivery of emergency medical services. For example, it has been shown that people living in more densely populated cities have worse survival from acute events, perhaps due to the longer response times of emergency medical and fire services [73,74]. This may have implications for survival from drug overdose [45]. In addition, a few studies in the United States have suggested that infectious disease patterns are more comparable in areas where there is a spatial relationship between the prevalence of infectious disease cases and public transportation routes [75]. This suggests that disease transmission, possibly facilitated by injection drug use, may be affected by transportation routes and availability. This may be particularly important in the context of a densely populated urban area where public transportation is the primary means of mobility for most people within the city.

Physical availability of health and social services is associated with health [76]. Even the poorest urban neighbourhood often has dozens of social agencies, each with a distinct mission and service package. Many of the health successes in urban areas in the last two decades, including reductions in HIV transmission and tuberculosis control have depended in part on the efforts of health and social services [77]. In the context of drug use and misuse, availability of regular, good quality, medical care may contribute to lower prevalences of drug use in urban areas. In addition, because in many urban areas, specific social and health services serve as referrals for other areas, there can be differential availability of health and social services both within and between urban areas [78].

Ultimately, intra-urban differences in access to substances, i.e. the availability of licit or illicit drugs may be one of the key determinants of use of drugs in urban areas [79,80].

Mechanisms that may explain the associations between the urban environment, drug use and misuse

Having suggested that characteristics of the urban environment may affect drug use and misuse and briefly suggesting how each of these characteristics may be associated with drug use and misuse, we now turn our attention to the mechanisms that may explain the association between these characteristics of the urban environment and drug use and misuse. A full discussion of all mechanisms that may integrate the relations among characteristics of the urban environment and between group-level and individual-level characteristics is beyond the scope of any one paper. Therefore, here we discuss a few of the key mechanisms, which may explain the relations between the characteristics of the urban environment, outlined in the first part of this essay and drug use and misuse within the urban population.

Area-level disadvantage and residential segregation may be associated with increased drug use and misuse due to an increased exposure to life stressors and social strain [46,81]. Perception of stressful life experiences results in exaggerated psychological and physiological stress responses that are influenced by personal characteristics, socio-demographic factors, psychological and behavioural factors, and coping responses. Within this framework, the stress reduction hypothesis suggests that drugs are used to relieve stress and that stress-related drug use may contribute to abuse and dependence [82,83]. Therefore, drug use in disadvantaged and segregated urban neighbourhoods may be a coping mechanism in response to a number of stressful life experiences [84]. Prior research [46] has found that neighbourhood economic disadvantage had a modest relation to drug use although this has not been tested systematically. A similar mechanism has been proposed for residential segregation in terms of blocked striving due to limited economic and educational opportunities in highly segregated black communities [85].

Access to health and social services may moderate the relation between residential segregation, area-level disadvantage, and drug use and misuse. Family and friends of residents of deprived neighbourhoods may be exposed to substantial stressors themselves [48,86], thus diminishing the extent to which traditional arenas of support (i.e. social resources such as social support) can be tapped into during times of stress [87]. This then suggests that more formal social or health services may play an important role in the relation between urban neighbourhood stressors and risk behaviour and that the relation between neighbourhood disadvantage and risk behaviour may be more pronounced in the absence of formal social/health services. This is

particularly important in the context of residential segregation which has been shown to be linked to disinvestment in local resources [81].

Income inequality at the area-level may be associated with the consequences of drug use due to limited health and social resources in unequal urban areas that mediate the relation between income inequality and health [88]. It has been argued that the relation between income inequality and health also is mediated through psychosocial stress or through a disinvestment in material resources [89]. It has been shown that urban areas with high income inequality are associated with a higher risk of drug overdose [45], due possibly to both these aforementioned mechanisms.

The relations between population density and drug use risk behaviour may be mediated by the presence of social networks that encourage drug use and misuse. Furthermore, income inequality may moderate the relation between population density and risk behaviour. If one's close network endorses and participates in drug misuse, this may increase the likelihood of risk behaviour in the individual affected by this network [25,90,91]. Numerous studies have shown an association between the risk behaviour of social network members and the individuals embedded in these networks, which is not surprising given that drug use is inherently a social activity [92,93]. For example, participation in drug using social networks has been shown to be a determinant of drug use behaviour [25]. Importantly, people living in areas characterized by high income inequality may be more mistrustful of each other and have fewer network supports [49]. It is then plausible that in highly unequal urban areas there may be fewer social network ties and the relation between population density and risk behaviour may be less marked.

A deteriorating built environment may be related independently to drug use risk behaviour and may increase individual exposure to life stressors and psychological distress [94–97]. In this case, fear and psychological stress may mediate the relation between the built environment and risk behaviour [31,98]. Moreover, the hypothesized relation between the built environment and risk behaviour in particular is consistent with thinking about drug use as a means of coping with psychological distress [46,99]. Given the known co-morbidity between mental health problems and use of substances, it is plausible that higher levels of psychological distress mediate the relation between a deteriorating built environment and drug misuse.

Ultimately, the differential ability of communities to extract resources and respond to cuts in public services (such as police patrols, fire stations, garbage collection, and housing code enforcement) looms large when we consider the link between deteriorating built environ-

ments (such as vacant housing, burned-out buildings, vandalism, and litter) and drug misuse [95,100,101]. Therefore, social and health services may moderate the relation between the built environment and drug misuse. In addition, in urban areas, with more available social and health services, the relation between a deteriorating built environment and drug misuse and their consequences may be attenuated [20]. As a corollary, public transportation may facilitate the exchange between urban neighbourhoods and may also moderate the relation between the built environment and drug misuse [102]. Therefore, drug use in specific groups may be more comparable among people living in urban neighbourhoods connected by public transportation routes than among people living in unconnected neighbourhoods.

Research directions

The relation between characteristics of the urban environment, individual-level determinants and drug use, misuse, and its consequences is complex. However, it is becoming increasingly clear that we need to better understand the role played by our environment (and for a growing proportion of the world's population, the urban environment) in shaping drug use and misuse. Although extensive work has been conducted that has assessed the relation between individual characteristics and drug use and misuse, the empiric work evaluating the role of the urban environment is limited. In the absence of a better understanding of how the urban environment directly shapes drug use and misuse or influences relations between individual-level characteristics and drug use, these latter relations are likely to remain unsatisfactory explanations for population distribution of drug use behaviour. For example, although several studies have shown that there are racial/ethnic differences in drug use and misuse, [103,104], the relation between race/ethnicity, social service use, characteristics of area of residence, and other factors that may be importantly associated with drug use and misuse remains unclear. Therefore, racial/ethnic differences in use of drugs may not translate into comparable differences in the consequences of drug misuse, contributing to well-documented racial/ethnic disparities in the consequences of drug misuse, particularly HIV [105–107]. Moreover, understanding racial/ethnic differences in the consequences of drug use will require not only an appreciation of the diverse racial/ethnic patterns of drug use itself, but also of the context that may affect the relation between race/ethnicity and drug use and misuse.

In this paper we have argued that characteristics of the urban environment shape drug use and misuse patterns. In addition, we hypothesize mechanisms

that may explain these relations. However, empiric evaluations of these hypotheses are necessary to move the field forward both to an improved understanding of these associations and to potentially guide public health intervention. In that regard we suggest that there are three primary directions where future research in the area can be fruitful.

First, throughout this paper we refer to drug use and drug misuse as a whole, using the term to reflect a broad range of behaviours including abuse, dependence and risky drug use behaviour (e.g. injection). However, considering drug use and misuse as a whole is undoubtedly a simplification of far more complex relations between the urban characteristics discussed here and the use and misuse of different drugs. For example, empiric evidence suggests that the relation between income distribution and the use of cigarettes and alcohol is substantially different [22]. Although here we accepted this simplification in order to present a heuristic that we hope will be useful in integrating research across levels of influence, further theoretic development and empiric work will need to be carried out to hypothesize and assess how different characteristics of the urban environment may be associated with drug-specific behaviours and their consequences.

Secondly, we argue for more comprehensive, systematic and comparative study of the relations between characteristics of the urban environment and differences in use, misuse, and consequences of different substances. Very few studies are designed in a manner that allows the integration of important determinants at different levels. Such work could help clarify how characteristics of the urban environment can shape both individual-risk factors and drug use and misuse itself.

Thirdly, our understanding of the characteristics of the urban environment that are associated with the consequences of drug use and misuse (e.g. HIV) is limited and, in particular, there are few studies that have assessed how these other factors modify or mediate the relations between the urban environment, drug use, and its consequences. In order to develop a comprehensive model that establishes *why* differences in drug use and misuse exist and *how* these differences manifest in differential morbidity and mortality we will need to move towards a multi-factorial model that considers the contributions of characteristics of the urban environment together with individual-level determinants of drug use and misuse.

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