

The Physical and Social Environments as Determinants of Health: Implications for Substance and Behavioral Addictions

By: [Robert W. Strack](#), [Muhsin M. Orsini](#), [D. Rose Ewald](#), and [Lawrence M. Scheier](#)

Robert W. Strack, Muhsin M. Orsini, D. Rose Ewald, & Lawrence M. Scheier. (2020). The Physical and Social Environments as Determinants of Health: Implications for Substance and Behavioral Addictions. In Steven Y. Sussman (Ed.), *The Cambridge Handbook of Substance and Behavioral Addictions* (pp. 182-198). New York, NY: Cambridge University Press.

<https://doi.org/10.1017/9781108632591.019>

This material has been published in *The Cambridge Handbook of Substance and Behavioral Addictions* edited by Steven Y. Sussman <https://dx.doi.org/10.1017/9781108632591>. This version is free to view and download for private research and study only. Not for re-distribution or re-use. © 2020 Cambridge University Press.

Abstract:

Whether unintentional or by design, built, social, and perceived environments influence the human experience. Behavior is not solely the product of a rational motivated actor, operating independently from his or her environment; rather, it is also a function of edifices, neighborhoods, and public spaces, as well as the inhabitants, community norms, and the social capital they generate. Likewise, addictive behaviors have as much to do with the environmental contexts surrounding individuals as with their unique biological factors, specific brain mechanisms, and psychogenic causes. Any attempt to address addiction at either individual or population levels would benefit from careful consideration of the social and contextual influences on cognitions, opportunities, motivations, and behaviors. Interventions informed by this understanding are more likely to be efficacious than those solely targeted toward individual biology, motivations, or attitudes. In this chapter, we discuss the relationship between physical and social environments (PSE), health, and the behavior of humans. We then focus on the influential role of the PSE on the consumption of alcohol, tobacco, and other substances; food, eating behaviors, and addictions contributing to the current obesity epidemic; and a selection of other behavioral addictions. The chapter closes by discussing methodological considerations and implications for professional practice.

Keywords: built environment | outlet density | public spaces | normative environment | social capital | collective efficacy | PSE

Article:

Introduction

Organization of the spaces in which people live, work, and play affects the way they function and thrive. This can be as trivial as having a neatly arranged bedroom or living room, or it can extend to include the office workspace, mass transit used to access work, and the local parks where one may enjoy recreation and health maintenance. All of these “structural” factors

impinge on one's daily routine and can influence health. Operationally speaking, urban planners and public health advocates label these physical and spatial features as the *built environment* (BE). One only has to consider neighborhoods characterized by vacant dilapidated buildings, unkempt parks, dense residential spaces cluttered with litter, and poorly maintained bicycle paths or running trails to appreciate how this must influence the residents' health and well-being. Add to the equation transportation deficiencies for commuting to work and a limited mix of employment options, and the impact of environmental constraints is even more pronounced (Braveman & Egerter, 2013; Federal Reserve System & Brookings Institution, 2008; Sharkey, 2013).

Contextual factors that influence human behaviors encompass the *physical environment* (e.g., natural and built environments), the *social environment* (e.g., social support, norms, beliefs and attitudes), as well as the potential nuances of objective (actual) versus subjective (perceived) environments (Glanz & Kegler, 2008; Sallis, Owen & Fisher, 2008). Put quite simply, behavior is not solely the product of a rational motivated actor, operating independently from his or her environment; rather, it is also a function of edifices, neighborhoods, and public spaces, as well as the inhabitants, community norms, and the social capital they generate. As discussed by Hoffman and Unger in Chapter 13 on the role of culture in addiction, this perspective suggests that the environment is persuasive, and can control, manage, and shape behavior and well-being in its own right.

Society's inclination for "health individualism" results in an overemphasis on solutions that expect individuals to moderate their own behaviors (Goldberg, 2012; Higgs et al., 2009; Hughes, 2007; Ulijaszek & McLennan, 2016). This approach fails fully to appreciate the profound influence that shifts in the social and ecological environments have had on collective health, inclusive of a broad array of addictions. Complex problem behaviors that lead to addiction and dependence often defy amelioration or prevention and have no single solution. As discussed in this chapter, addictive behaviors have as much to do with the environmental contexts surrounding individuals as with their unique biological factors, specific brain mechanisms, and psychogenic causes. Any attempt to address addiction at either individual or population levels would benefit from careful consideration of the social and contextual influences surrounding addictions. Interventions informed by this understanding are more likely to be efficacious than those solely targeted toward individual biology, motivations, or attitudes. As the Institute of Medicine (IOM) (2000) affirmed:

To prevent disease, we increasingly ask people to do things that they have not done previously, to stop doing things they have been doing for years, and to do more of some things and less of other things. ... It is unreasonable to expect that people will change their behavior easily when so many forces in the social, cultural, and physical environment conspire against such change. (p. 4)

Ecologically informed strategies that acknowledge and address growing awareness of connections between socioeconomic, cultural, political, environmental, organizational, psychological, and biological determinants of health and illness will hold a greater promise for success than those limited in scope to the laboratory of the individual.

In this chapter, we discuss the relationship between physical and social environments (PSE), health, and the behavior of humans. We begin by presenting a theoretical framework supporting a multidimensional conceptualization of the environment. We broaden this conceptual perspective to include social determinants of health, incorporating into this framework the people relied upon for one's daily social commerce, the domestic groups that form one's local friendship network, and the day-to-day transactions in one's residential neighborhood. We then focus on the influential role of the PSE on the consumption of alcohol, tobacco, and other substances; food, eating behaviors, and addictions contributing to the current obesity epidemic; and a selection of other behavioral addictions. The chapter closes by discussing methodological considerations and implications for professional practice.

Theory and Conceptualization of the Physical and Social Environments (PSE)

Operationally defining the PSE and conceptualizing how it operates to influence behavior requires a theoretical framework (Perdue, Gostin & Stone, 2003; Renalds, Smith & Hale, 2010). Unlike a building perched on an unmoving foundation, the effect of the environment is not static by any means. Rather, the PSE is dynamic, moving, intertwined with many different factors, and constantly exerting an influence. Conceptual frameworks for understanding the PSE rely mainly on dynamical systems approaches to explain how they influence behavior. Dynamical systems approaches (von Bertalanffy, 1968), whether drawing from ecological (Bronfenbrenner, 1977; McLeroy et al., 1988), transactional (Sameroff, 2010), or reciprocal interactional (Lerner & Kauffman, 1985; Scarr & McCartney, 1983) perspectives, posit that human behavior reflects a myriad of contextual influences. Stated differently, the "parts cannot be separated from wholes" (Sameroff, 2010, p. 7), thus requiring that one not focus on distinguishing the noise from the signal, but rather seek to understand the signal in the context of the noise.¹

Whether unintentional or by design, built and social environments influence the human experience. A core premise of dynamical systems views, and threaded throughout this chapter, is the notion of a "reciprocal" relation between individuals and groups (the *agent*) and their external PSE (the *exposure*). In other words, individuals thrive within a certain socio-physical milieu through which they transact to produce behavior (Stokols & Shumaker, 1981). This milieu, described as the *agent-exposure interface*, becomes central to understanding the causal linkages between humans and their environs and the effect this has on behavior. This approach is meant to challenge the rational decision-making paradigm and broaden the lens of diagnosis, prevention, and treatment of the addictions.

One way of conceptualizing the PSE is to recognize that it represents a shift from emphasizing "downstream" factors mainly concerned with the individual as a responsible party for his/her own behavior to focus on "upstream" factors including the physical and spatial layout of a community and normative social influences (Braveman, Egerter & Williams, 2011). While the downstream has been associated with methodologic individualism, the upstream includes physical features of the environment (e.g., roads, buildings, food sources, and parks), economic factors (income, wealth, and education), and social transactions that transpire on a daily basis

¹ This is perhaps best stated by Sameroff (2010), when discussing the perennial nature-nurture question and how to address rectifying problems with children, who wrote, "it is both child and parent, but it also neurons and neighborhoods, synapse and schools, proteins and peers, and genes and governments" (p. 7).

(i.e., people milling about). Upstream factors also characterize neighborhoods based on residential stability, whether residents perceive it as “safe,” brimming with economic and social resources (employment, housing, and safety), and the quality of social interactions that promote neighborhood cohesion. The latter PSE feature emphasizes “bonding” and forming trustworthy networks that provide a form of social capital (Ferlander, 2016; Song, 2011). This change in perspective can be summarized as “rather than regarding lifestyle as the prime cause of health problems, we need to analyze the determinants of lifestyle” (Freudenberg, 2007).

Empirical Studies of the PSE

Studies of the PSE and health in numerous fields have examined such topics as whether mass transportation (Winters et al., 2010) or bicycling paths (Moudon et al., 2006) influence commutation behavior, pedestrian walkability studies (Giles-Corti & Donovan, 2003; Leyden, 2003), physical layout and activity (Handy et al., 2002), and whether additional street lighting makes neighborhood residents feel safe enough to walk or exercise outdoors at night (Wood et al., 2008). Research on the PSE also extends to include the degree to which access to healthy food options impact dietary patterns and obesity (Larson, Story & Nelson, 2009).

In each of these examples, the complexion of a neighborhood, its physical spaces and spatial layout, provides a window from which to view a person’s choices regarding their health and well-being. This has been the focus of *smart growth* strategies (Dalbey, 2008; Hutch et al., 2011) that consider the effects of housing access, transportation, land use, housing density, open space, sidewalk utilization, food outlets, proximity to shopping, local community investment strategies, and recreation as they influence decisions to exercise, eat well, and form enduring bonds with neighbors. Encouraging stronger bonds reflects a growing need to overcome social isolation, particularly among residents of disadvantaged neighborhoods, or the disabled or elderly, and can promote social cohesion and garner a sense of community (Kawachi, 1999; Putnam, 2000; Victor et al., 2000).

Numerous studies have now linked neighborhood social and physical disorganization with both adverse mental (Latkin & Curry, 2003; Leventhal & Brooks-Gunn, 2003) and medical health outcomes (Latkin & Curry, 2003; Renalds et al., 2010). Two examples of the latter include associations between where one lives and risk of cardiovascular disease (Cubbin, Hadden & Winkleby, 2001; Diez-Roux, 2004; Hankey, Marshall & Brauer, 2012) and Type 2 diabetes (Chaix et al., 2011). Added to this body of work, there is evidence obtained from space, place, and crime studies (Perkins et al., 1993; Wilcox, Quisenberry & Jones, 2016) and, more recently, studies conducted both in the USA (Satcher, Okafor & Dill, 2012) and abroad (Burns & Snow, 2012) emphasizing the role of the BE in sexual health.

A handful of studies have examined the role of the PSE in fostering drug use and have demonstrated an increase in drug overdoses in the context of physical qualities of the neighborhood (Cerdá et al., 2013; Hembree et al., 2005), the association of negative BE characteristics on alcohol consumption (Bernstein et al., 2007), and the importance of social environments for understanding differences in youth cannabis use (Hyshka, 2013). The study by Hembree et al. (2005) showed a positive association between drug overdose death and physical features of the neighborhood environment (i.e., external factors including building decay and

proper upkeep as well as internal maintenance factors affecting heat, water, toilets, and cleanliness). Bernstein et al. (2007) surveyed 1570 residents of the fifty-nine community districts that constitute New York City and found that various physical features of the BE (rundown nature of buildings, maintenance, heating, and water problems) were associated with increased odds of heavy drinking (five or more drinks in one sitting). These models adjusted for depression and many of the demographic factors (age, income, race, education, and marital status) that are likely to contribute to where a person lives and also influence their alcohol consumption.

More than Bricks and Mortar: A Social Determinant Perspective on Health

The combined emphasis of the PSE on both physical and social determinants necessitates a more elaborate model. This is reflected in the work of Northridge and colleagues, who blend urban planning, sociology, and a public health perspective into a Social Determinants of Health and Environmental Health Promotion conceptual model (Northridge, Sclar & Biswas, 2003; Schulz & Northridge, 2016). According to this framework, the built environment is construed as buildings, spaces, and products modified by people inclusive of land use, transportation, services, public resources, zoning regulations, and edifices, all designed to incorporate multiple levels of influence.² However, separate from the BE is the social context, including community investment, policies, ordinance enforcement, community capacity, civic participation, and quality of education, the latter of which represents a capital investment in the future. Both the physical and social environmental contexts are hypothesized to influence more proximal factors including stressors that occur in the environment, neighborhood and workplace, violent crime and safety, police response, financial insecurity, environmental toxins, and health and resource disparities that may exist because of race, gender, or nationality (Braveman et al., 2011; Freudenberg et al., 2015; Gostin & Martinez, 2004).

The social determinants of health (SDoH) are thus a framework that views the PSE as nonmedical factors that interact to affect health outcomes and behavioral choices. When the environment is unhealthy, there is also a direct effect on the physiological stress response, resulting in production of excess cortisol that has further detrimental health effects. The interactions between environmental effects and behavioral choices and health outcomes are depicted in Figure 14.1, and form the basis of the evidence provided in this chapter linking PSEs as key determinants of our health (Ewald, Strack & Orsini, 2019).

Within this framework, it becomes clear that the SDoH affect all people, but not equally. Disadvantaged neighborhoods often lack the assets that are necessary to support good health, resulting in significant inequities that can lead to profound social, economic, and health consequences for the residents (American Public Health Association [APHA], 2016). The association of adverse health outcomes with neighborhood-level poverty and deprivation persists after adjustment for individual-level factors (Adler et al., 1993; Diez-Roux, 1998), suggesting that the influence of neighborhood conditions on personal health behaviors and addictions related to alcohol and drug use, smoking, physical activity, and dietary habits is independent of individual SES (APHA, 2016).

² Environmental factors like toxins and biological pollutants are considered part of the “natural” environment.

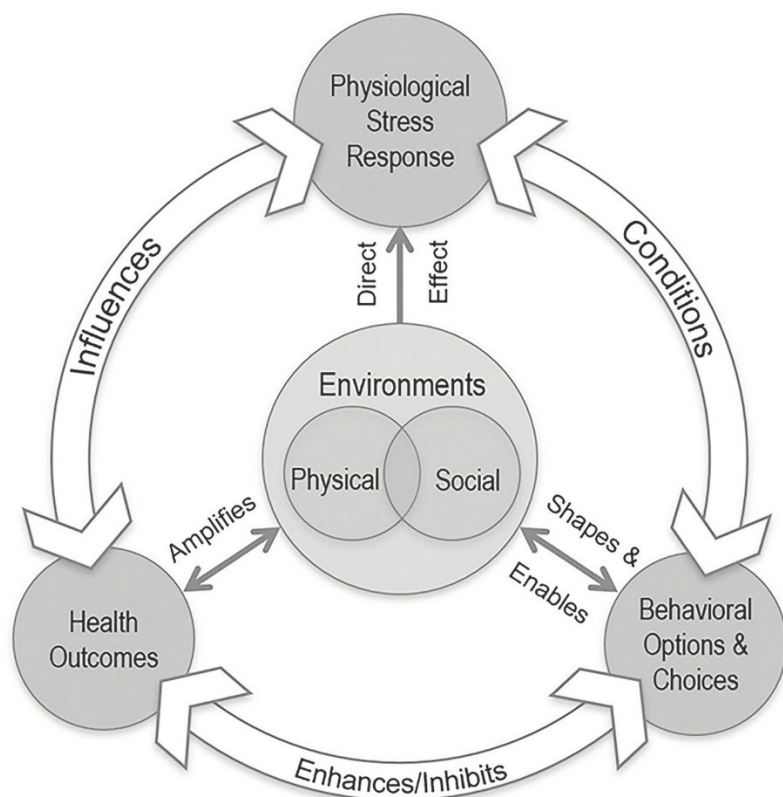


Figure 14.1 How the physical and social environment affects human behaviors and health.

Copyright © Ewald, D. R., Strack, R. W. & Orsini, M. M. Originally published under CC BY-NC license by Sage Publishers. (2019). Rethinking Addiction. *Global Pediatric Health*, 6, 1–16.

<https://doi.org/10.1177/2333794X18821943>

A study of over 57,000 youth found that poorer child health was strongly associated with accumulated social disadvantage, reflected by poverty, low parental education, living in a single-parent family, and minority race/ethnic status. This study evaluated the effect of these factors on child health status and found that low income accounted for most of the morbidity and mortality disparities associated with race and ethnic status. The remaining three factors were found to be independent and cumulative, in that they additively and exponentially increased risk of poor child health status. Thus, they did not act as separate proxies for a single underlying disadvantage. Of note, these disadvantages were not ameliorated or eliminated when the child had health insurance or access to healthcare. The authors concluded that the physical, developmental, and psychological disadvantages experienced by poor children could be explained by cumulative environmental and psychosocial exposures, and these effects carry over throughout childhood and into adulthood (Bauman, Silver & Stein, 2006). Studies such as these influence our understanding of the protective as well as risk-engendering influences that place and social order have on human behaviors, addictions, and health.

Operational Definitions of Social Determinants

There are a number of different perspectives regarding how to construct and operationally define SDoH. The World Health Organization (WHO) defines SDoH as the conditions of daily life and the environmental and structural factors that produce health-damaging or enhancing experiences

(Commission on Social Determinants of Health, 2008). Social determinants encompass five key areas that influence health in different ways: health and healthcare, education, economic stability, social and community context, and neighborhood and built environment (Healthy People 2020, 2017). The Public Health Institute ([PHI], 2015) review of twenty-two SDoH frameworks found that even while variations in terminology and definitions were present, SDoH were consistently recognized as the broad set of influences that shape individual and population health. In general, the common threads involved influences that “reach far beyond the healthcare system, and include structural drivers (e.g., the inequitable distribution of power, money, opportunity, and resources) and conditions of daily life (e.g., the environments in which people are born, live, work, play, worship, and age)” (Davis, Rivera & Parks, 2015, p. 3). The PHI (2015) report also differentiates social determinants into discrete categories involving: (a) physical conditions and built environment, (b) resource and services environment, and (c) social environment. Each of these is briefly described below.

Physical conditions include water, soil, and air quality, and hazardous substances from the natural environment (PHI, 2015), and the *built environment* describes the physical structures and design elements of a neighborhood, including land use, housing, sidewalks, street quality, connectivity, green spaces, and retail mix (Suglia et al., 2016). The *resource and services environment* refers to those aspects of the natural and built environment that provide services and access to resources to the public, such as parks and public recreation areas; light rail, bus, and other public transportation systems; child-care centers and schools; grocery, convenience, and liquor stores; fast food restaurants, exercise facilities, and other retail businesses (PHI, 2015). *Social environment* includes the *socioeconomic* conditions of the community, which refers to the level of education and financial condition of the residents themselves, both individually and collectively, as well as the *normative characteristics* of a neighborhood, which can be defined as the social relationships and social processes between the people and groups who live and work there (Carroll-Scott et al., 2013).

All of these social determinant influences are construed as “bidirectional” with the health of the community influencing both proximal (e.g., ongoing crime) and distal (e.g., natural environment) causes. One can illustrate the two-way effects³ using examples from the literature. For example, studies have linked hazards and poor safety features in domestic residential buildings with the prevalence of accidents and crime. Likewise, radon, mold, and damp living conditions have been associated with high rates of respiratory disease, and communicable diseases have been found to occur in overcrowded housing. In these cases, social conditions and health are impacted by the physical environment. These “interfaces” are the targets of interventions, usually in the form of policy and legal initiatives which provide better housing facilities to the poor, who are disproportionately affected by PSE conditions (Curtis, Cave & Coutts, 2002).

Health and well-being are also influenced through public policies regarding housing and education, the social hierarchy relative to income distribution and workplace control, the effect of discrimination and social networks on social relationships, and the role of cultural norms (Galea & Vlahov, 2002), as well as neighborhood crime and safety, segregation, and social norms developed over time (Suglia et al., 2016). Specific to addictive behaviors, public policies

³ This relationship can be portrayed in the same way as “reciprocal determinism” is used in Bandura’s (1986) model of social learning theory to capture cycles of mutual influence characterizing interdependencies.

can greatly influence the PSE and either enhance or suppress the exposure to influences that lead to the adoption or continuation of addictions. Recognizing the combined influences of these factors on health risks, the *risk environment framework* defines the risk environment as “the space – whether social or physical – in which a variety of factors interact to increase the chances of drug-related harm” (Rhodes, 2002, p. 88).

The bidirectional influence of the PSE is perhaps seen most clearly in neighborhoods with high rates of substance use and visible sex-trade activity. Moreover, the close ties between the economic, political, and moral interests of a community are reflected in zoning regulations that congregate strip clubs, bars, motels, and rooming houses in designated geographic zones, often near commercial areas or economically depressed neighborhoods. Policing practices often restrict these immoral or illegal behaviors and lead to geographic concentrations of marginalized populations, already stratified by economic, racial, ethnic, and gender barriers (Deering et al., 2014; Draus, Roddy & Asabigi, 2015). Draus et al. (2015) report that it is the combined effects of local zoning and policing practices, client/customer behaviors, cultural norms, and economic imperatives that produce an environment conducive to sex-trade work. While these factors produce the physical and structural aspects of sex-trade work, the social environmental aspects are primarily produced by gender and power inequities, with women historically having fewer financial options than men and frequently needing to support children. It is perhaps no surprise that women turned to sex work as the best available strategy for meeting daily survival needs.

Spatial isolation in the physical, structural, and social environments increases health risks among drug users and sex workers, including increased risk of contracting HIV. Health risks are increased when sex workers barter sex for drugs or engage in sex while high, because they are less likely to follow safe-sex practices. Where sex work and drug use overlap, sex workers are at a disadvantage when negotiating terms, are less able to assess drug quality, and may share drug use equipment (Deering et al., 2014). The risk environment thus encompasses the bidirectional nature of the PSE, reflecting not only the risk behaviors of the individual and their vulnerability to drug-related harm, but the myriad social, physical, and structural determinants of harm that contribute to and reinforce risk behaviors, drug use, and health inequalities (Deering et al., 2014; Rhodes, 2002). These bidirectional influences of PSE on human behavior and health are illustrated in Figure 14.1, with PSE shaping and enabling our behavioral options and choices as well as positively or negatively amplifying health outcomes directly.

Social Determinant Influence on Social Capital and Collective Efficacy

In addition to the physical environment, the social environment provides a basis for social capital and collective efficacy; these assets combine to provide benefits to individual residents and the community as a whole (Cohen, Inagami & Finch, 2008). Social hierarchies that evolve in response to characteristics such as SES may influence social support and can increase psychological vulnerabilities. The psychosocial stressors associated with income disparity can lead to increased tension and violence between individuals. Such factors increase the potential for substance use and abuse and erode social trust. Neighborhoods with lower social capital and less collective efficacy experience higher rates of violence and homicide, and greater potential for drug use and abuse, whereas neighborhoods with greater collective efficacy can discourage

undesirable behaviors before they escalate and thus reduce or prevent these outcomes. The degree of collective efficacy in a neighborhood is directly related to the ability of the residents to respond to visible signs of social disorder (Galea, Rudenstine & Vlahov, 2005; Vaeth, Wang-Schweig & Caetano, 2017). Here again, the bidirectional nature of the PSE and its influences on addictions reinforces the importance of SDoH.

Social Capital

Studies of the PSE are rooted in the concept of *social capital* as a contributor to health and well-being (Song, 2011). For instance, there is evidence that socioeconomic status in the form of poverty or social disadvantage is related to health outcomes (Evans & Kantrowitz, 2002; Kawachi, 1999), including obesity (Beech et al., 2011) and children's health (Bauman et al., 2006), as well as psychological functioning (Kessler & Cleary, 1980; Mulatu & Schooler, 2002). *Social capital* refers to the resources available that help individuals prosper and can include community organizational features like libraries as places to learn, community involvement (i.e., civic participation, also called *bonding* social capital) to improve political stature, and social networks that can be mobilized in support of the individual (Coleman, 2000; Ferlander, 2016).⁴ According to Coleman (2000), social capital must be productive and achieve the aims of its social actors to achieve certain goals, economic or otherwise. Putnam (2000) augments this by suggesting that “norms of trustworthiness” are part of social capital as these expectations of reciprocity motivate people to create enduring social ties within the realms of community activities (e.g., faith-based organizations) and commerce (e.g., trusting bankers to underwrite new local community business growth), and provide access to a network of supportive friendships (i.e., tangible support).

A body of work has examined social capital in relation to mental health, distress, and other health outcomes. Several studies have shown that socially isolated, lower income individuals in race-stratified neighborhoods that lack access to interpersonal supports have higher rates of psychological distress (Irwin et al., 2008; Mitchell & LaGory, 2002).⁵ Both US and international studies reinforce that the lack of social capital in terms of human resources (friendships) and connection to the community (civic participation) is related to distress or poor health, even when controlling for the usual contextual and individual-level risk factors (Kim, Subramanian & Kawachi, 2006; Yip et al., 2007; Ziersch, Baum & Putland, 2005). Social capital plays a prominent role by boosting self-esteem and reinforcing coping resources, which enable individuals to deal with stress and provocation from the environment.

Collective Efficacy

While exposure to features in the PSE can influence both the experience and perception of social interactions, the blending of these factors leads to the development of collective efficacy (Cohen

⁴ Song (2011), among others, takes the view that social capital is a network resource phenomenon distinct from social cohesion, social integration, and social support. The socioeconomic assets and means that social networks provide through close associates (monetary wealth, occupation, and education) enhance ones' social capital.

⁵ This should include mention of the classic study by Brown and Harris (1978) of poor women residing in the Outer Hebrides, a remote collection of islands located on the northwest edge of Scotland, that established both protective and damaging effects from social networks on psychiatric outcomes like depression and anxiety.

et al., 2008). *Collective efficacy* has been defined as social cohesion among neighbors within a community combined with a willingness to intervene to promote the common good (Sampson, Raudenbush & Earls, 1997) and represents a group's capacity to achieve collective goals that are not imposed by regulations or outside forces (Galea et al., 2005). Collective efficacy or social trust does not refer to specific networks or individual ties to them; rather it is an aggregate of individual perceptions of the social environment in a neighborhood. Neighborhoods characterized by high collective efficacy feel safe, and foster resident familiarity through increased social interaction. Residents of such neighborhoods are capable of effectively maintaining social controls exercised through development plans, effective police regulation, pedestrian-friendly neighborhoods and civic pride. Neighborhoods characterized by loose social ties and lacking efficacy are more likely to be unsafe and dangerous and have high numbers of alcohol outlets and desolate or rundown parks. Each of these consequences of poor PSEs greatly influences the select architectural layout of the community and detrimentally alters behavioral choices (Hansen, Skov & Skov, 2016).

To illustrate the influence of PSE and social determinants on human behaviors and health, one can examine evidence from the literature that demonstrates the relationship between PSE and substance use and addiction. We extend this discussion to include the environment's influence on eating addictions, including eating behaviors that affect obesity, as well as other behavioral addictions.

PSE Studies, Substance Use, and Addiction

PSE studies that focus on unique neighborhood features have generally emphasized various facets of social cohesion, social disorganization, and other social determinants that render one neighborhood more or less vulnerable to drug use outcomes (Bernstein et al., 2007; Tucker et al., 2013; Wilson et al., 2016). One way to capture these relations is to examine spatial relationships between alcohol retail outlet density and consumption practices.⁶ Density studies acknowledge that individuals drink alcohol partly because of internal motivations (i.e., personality factors like self-esteem or depression) but also consider the role of distinct neighborhood features that reflect BE pressures and availability.

Consumption of Alcohol

The literature on geospatial relationships infers that, independent of internal motivations, there are *place characteristics* that influence whether neighborhood residents will engage in high-risk behaviors, including alcohol misuse and excessive or binge drinking. Place characteristics are direct proxies for the BE because they include both physical features of the environment (e.g., the density of retail outlets selling alcohol and their physical proximity to residences) as well as social determinants, which can include social mingling that occurs outside of nightclubs, adherence to zoning regulations, decision-making by planning commissions when they confer

⁶ We have purposely avoided focusing on studies that examine community-based environmental prevention strategies (i.e., responsible beverage service, shoulder tap and commercial regulatory policies, compliance and roadside sobriety checks, and social host ordinances). This decision was based on the fact these efforts target "features" of the environment but in most cases not the physical BE itself. A more thorough understanding of these environmental prevention approaches can be found in Treno et al. (2015).

licensing on establishments that serve alcohol, and police activity related to loitering and public nuisance complaints for intoxicated patrons (Nowell et al., 2006; Treno et al., 2007).

In the case of alcohol outlet density studies, the high prevalence of retail outlets located in a particular neighborhood creates a normative climate that condones use of alcohol, making it relatively easy to obtain (e.g., purchasing liquor while walking home from work or school) and socially acceptable (e.g., drinking in local pubs and bars). The results of these studies are consistent with *availability theory* positing that in the absence of normative constraints, drinking increases with the proliferation of sales outlets, resulting in an increase in the number of heavy drinkers, and also increases in drinking-related consequences (Stockwell & Gruenewald, 2004).⁷

Alcohol Outlet Density

Several factors may contribute to inconsistent findings from studies of alcohol density and consumption (Livingston, Chikritzhs & Room, 2007). The variation of study designs may contribute to different findings; most studies have relied on cross-sectional designs hindering their ability to render causal assertions. Outlet types have also varied considerably, with some studies focusing on pubs, bars, and nightclubs, while others emphasize off-premise alcohol sales, which can include supermarkets and convenience stores in some US locales. Furthermore, studies vary in the composition of outcomes, including self-reported consumption, consumption calculated based on per capita sales, and alcohol-related harms, the latter exemplified by motor vehicle accidents (Treno et al., 2007) and pedestrian injury collisions (LaScala, Johnson & Gruenewald, 2001). Notwithstanding these differences, it is known that alcohol retail density is greater in poor, racial minority, and disadvantaged communities (Bernstein et al., 2007; Pollack et al., 2005), and is independently associated with greater alcohol consumption among both adults and adolescents (Gruenewald, Ponicki & Holder, 1993; Milam et al., 2014; Scribner, Cohen & Fisher, 2000).

In one study, Scribner et al. (2000) showed that the effect of alcohol outlet density (liquor and convenience stores) on consumption (number of drinks in the past week) can be explained entirely through neighborhood factors (all persons within a particular census tract reside in a high outlet density zone) rather than individual-level processes (individual's proximity to retail outlet), controlling for demographics and individual level norms and consumption. At the aggregate census tract level, drinking norms were more supportive of consumption in areas with low mean distances to alcohol outlets and the same held for rates of consumption, with low mean distance to the closest alcohol outlet leading to higher consumption. Schonlau and colleagues (2008) used aggregated mean distance to alcohol retail outlets by census tract in their study conducted in Los Angeles County and southern Louisiana. For Louisiana residents only, the models revealed that the number of retail outlets was associated with twelve-month and ninety-day ethanol consumption (computed based on the average ethanol content of a drink, for drinks per day in the past year and previous ninety days).

⁷ This does not factor into the equation the price, utility, opportunity cost and other "economic" factors that behavioral economists have cited as crucial to understanding consumption practices (e.g., Stockwell & Gruenewald, 2004). It also does not address the potential for reciprocal causation where availability stimulates consumption, but consumption also fosters increased sales with the potential for increasing the number of institutions selling spirits at reduced cost to meet commodity demand.

There is also the possibility that proscriptive norms differ based on land use, with higher tolerance for drinking in some locales than others. For example, some neighborhoods willingly support local pubs as long as there are restrictions on hours of operation and public loitering. This stands in contrast to residential areas that border closely to restaurants that serve alcohol. A few small neighborhood pubs are quite different from ten pubs, bars, or restaurants in close proximity that may transform an area into an entertainment district. Retail establishments choosing to locate near each other, called *commercial bunching* as discussed by Livingston et al. (2007), may produce an increase in alcohol-related harms among specific subgroups; most notably individuals at high risk for excessive drinking (and this effect may be masked by larger null population effects that fail to address subgroups based on consumption practices). Taverns and sports bars that provide food and alcohol incentives in the form of happy hours, ladies drink for free, and cheap well drinks on football nights are likely to attract younger male patrons who engage in heavy drinking, which leads to disinhibition (i.e., promoting aggression and violent acts). This is an example that epitomizes the spatial relations between alcohol outlet density and high-risk drinking, where people and place come together in a perfect storm to create opportunities for excessive drinking (Livingston et al., 2007).

The notion of high-risk subgroups raises another important concern. Do researchers find that alcohol retail density contributes to consumption in populations that are more prone to drink (i.e., problem drinkers, people attending sporting events, or among high-risk groups)? One way to address this concern is to examine whether alcohol retail outlets and liquor sales influence college student drinking. It is not uncommon to find college youth drinking at football tailgating parties and fraternity or sorority events (Sher, Bartholow & Nanda, 2001). Moreover, national surveillance data indicate that young adulthood corresponds with peak alcohol consumption including alcohol misuse and binge drinking (Schulenberg et al., 2017). As a result, establishing linkages between college drinking and alcohol density has been a focal topic both in the USA (Wechsler et al., 2002; Weitzman et al., 2003), a country with a zero tolerance policy for underage drinking, and other countries that favor harm reduction approaches (Kypri et al., 2008). Several environmental considerations have been examined, including deterrence strategies, restrictions in sales of alcohol, limited licensing, and changes to the physical environment through restriction of off-premise retail outlets (Chaloupka & Wechsler, 1996; Toomey, Lenk & Wagenaar, 2007).

Consumption of Tobacco and Other Substances

Alcohol outlets are frequently also tobacco outlets and provide opportunities for purchase and sale of illicit drugs (Milam et al., 2016). Greater frequency of youth smoking is significantly associated with increased density of tobacco outlets within one mile of children's homes, and schools in neighborhoods that have the highest tobacco outlet density (five or more outlets within half a mile of the school) also have a higher prevalence of current smokers (Lipperman-Kreda et al., 2014). Alcohol and tobacco advertising, as a specific component of the PSE, is frequently targeted to racially segregated neighborhoods, as well as schools with more racial/ethnic minority students (e.g., Hispanic), which spurs use of tobacco products (Milam et al., 2014; Vaeth et al., 2017). Children are three times more likely to pass an alcohol or tobacco billboard when walking or commuting to school in mostly racial/ethnic minority neighborhoods

than in mostly Caucasian neighborhoods (Milam et al., 2014). Exposure to the promotion of unhealthy products is directly related to behavioral uptake. The relationship of a tobacco prompting PSE on tobacco use behaviors is additionally complicated with the added reciprocal influence of a smoker's social network also contributing to the uptake and continuation of tobacco use. Each of these PSE influences are critical for our understanding of the etiology of individual tobacco use and supports the use of environmental strategies for addressing tobacco addiction. Higher smoking rates are associated with neighborhoods segregated by SES (Galea et al., 2005). As a marker for deprivation, SES is such a strong predictor of tobacco use that smoking prevalence can be used to identify disadvantaged populations. SES is believed to explain the difference in smoking cessation rates between 1973 and 1996, which were virtually unchanged for the poor but doubled for the most affluent during the same time period (Cummings, Fong & Borland, 2009).

Examining the public health efforts surrounding the USA's reduction in tobacco use provides a rich illumination of a powerful multilevel approach that specifically targeted an array of physical and social environments associated with tobacco use, resulting in tobacco use rates dropping from 42 percent in 1965 to only 15 percent in 2015 (Centers for Disease Control and Prevention [CDC], 2007). While the addictive properties of nicotine are well-established scientifically, it is likely that most individuals have now come to appreciate the influences of manipulating environmental triggers that promote health and/or discourage the uptake of tobacco products. Physical and social environmental changes, such as smoke-free zones, taxation policies, restaurant smoking bans and restrictions, and social norming campaigns, have all interacted to yield a remarkable public health success. These findings strongly support the importance of PSE studies in both the understanding of tobacco use etiology, and prevention and treatment modalities.

The Role of Population Density

In addition to the density of alcohol and tobacco retail outlets, the influence of the PSE is also affected by population density. The local neighborhood environment directly influences youth risk behaviors, including drug and alcohol use and abuse; however, there are notable differences between urban and rural behavior patterns, which change over time (Galea et al., 2005). Recent surveillance data in the USA indicates that rural adolescents may use substances at the same or higher rates than their urban counterparts and that, in addition to alcohol, the use of methamphetamine, smokeless tobacco, and inhalants is higher among rural youth (Warner, 2016). A large national survey of adolescents conducted in 2000 suggested that heroin use was comparable between urban and rural areas and that other forms of illicit drug use were more likely in urban environments (Galea et al., 2005). The same survey was conducted again in 2012 and found that perceived ease of access to illicit drugs, including marijuana, LSD, ecstasy, and cocaine, was greater among urban students in more densely populated areas, which may reflect greater availability, greater prevalence of use, or both. Perceived ease of access to alcohol was found to be about the same for both rural and urban adolescents, increasing from about 25 percent of middle school students to about 60 percent of high-school students. There was a correlation between perceived ease of access and actual use of alcohol by rural adolescents, and compared to urban youth, actual alcohol and tobacco use by rural adolescents was higher (Warren, Smalley & Barefoot, 2015).

In contrast to other illicit drug use, rates of use and misuse of prescription opioids for nonmedical purposes is somewhat higher in rural areas, which have a higher proportion of older residents, possibly as a result of more young people leaving for school or work opportunities (Brooks et al., 2017). Here again, the same mechanisms of the PSE influencing behavioral choices leading to addictions are also present when one examines opioid use. With the greater number of close kinship ties in rural communities, it is easier for rural adolescents to obtain these drugs with or without a prescription (Brooks et al., 2017; Keyes et al. 2014). One study found that 62 percent of rural adolescents obtained prescription opioids through diversion from friends and family members and 23 percent obtained them from physicians (Monnat & Rigg, 2016). Curiously, although rural adolescents perceive prescription opioids as more harmful than other prescription medications, such as amphetamines, they also perceive the use of prescription opioids as less harmful than other drugs, except alcohol and marijuana. This may be because prescription opioids can be taken orally, without the need for needles, smoking, or snorting, and therefore have less stigma associated with them, or because adolescents using prescription opioids have observed others taking these drugs and are familiar with their effects (Keyes et al., 2014).

PSE Studies, Eating Behaviors, and Obesity

Unlike consumption of other substances, it is not possible to entirely abstain from food consumption. The downside of the need to eat is that the foods we consume are increasingly more highly processed and studies continue to highlight the impact of industry-orchestrated changes of our food environment on our collective health (Popkin, 2006; WHO & Food and Agriculture Organization of the United Nations, 2003). The manipulation of fats, sugars, flavor enhancers, and caffeine have greatly increased the consumption of foods containing highly saturated fats and refined sugar, increased the profits of food companies, and coincided with a dramatic rise in obesity rates (Gearhardt et al., 2011; Monteiro et al., 2011). The result of these industry changes is the increased consumption of readily available, energy-dense but nutrient-poor foods at the expense of healthier options (Gearhardt et al., 2012; Gearhardt, Corbin & Brownell, 2009).

Considerable evidence shows that blended food products containing highly palatable stimuli contribute to addictive-type eating behaviors in humans. The evidence suggests that, while these food formulations may not result in a physiological addiction to the substances in food, there is frequently a neurobiological response in the brain reward centers that is similar to that seen with substance addictions (Burrows et al., 2017; Davis, 2013; Olsen, 2011; Schreiber, Odlaug & Grant, 2013). For this reason, eating behaviors such as binge eating, compulsive overeating, and food cravings are frequently described as food addictions. Food addiction is a topic of intense debate and research which is further discussed by Schulte, Schiestl and Gearhardt in Chapter 28, but there is no debate that these highly processed foods are now known to be a significant contributor to the unhealthy eating behaviors of humans and can contribute to obesity. While eating behaviors have a significant influence on the choices that lead to the consumption of various foods, the situation is further complicated by the fact that food choices change as a result of stress (Zellner et al., 2006), and psychosocial stressors have been linked with childhood obesity (Gundersen et al., 2011). Food choices can contribute to obesity in other ways as well.

A promising area of behavioral research involves the application of behavioral economics to understand how environmental availability and other factors influence the food choices we make daily (as illustrated in Figure 14.1). Consumers' food choices are influenced by ready availability, convenience, low price, large portion sizes, and food preferences based on habits, which can become automatic (beneath the radar of consciousness) or "default" choices. Making different, healthier food choices requires conscious effort and deliberate actions, and the ability to delay immediate gratification in favor of long-term health (Roberto & Kawachi, 2014). Healthy eating involves food choices frequently made in an environment that promotes unhealthy choices. Research has shown that small changes to promote healthier foods, such as price discounts or product positioning for ease of access, increased visibility, or greater convenience, can nudge consumers to make healthier choices (Jilcott Pitts et al., 2016; Just & Gabrielyan, 2016).

An obesogenic environment occurs when neighborhood environmental conditions encourage lifestyles and habits that promote the development of obesity; such an environment includes cultural and social pressure for eating energy-dense foods, ready availability and access to such foods, and limited opportunities or encouragement to engage in physically active behavior during work or leisure time, or while commuting (Corrêa, Schmitz & Vasconcelos, 2015). Obesity is also influenced by a variety of other factors in the residential environment that influence behaviors, including neighborhood crime rate; integrated parks, green spaces, lighting, bike paths, and sidewalks; convenient, robust public transportation; the availability of recreational facilities, primary care practices, and obesity counseling centers; and the density of food outlets, including quality grocery stores, farmer's markets, and fast food restaurants (Beech et al., 2011; Rahman, Cushing & Jackson, 2011).

Retail Food and Fast Food Outlet Density

Residents of neighborhoods that have short supplies of healthy foods, or what are called "food deserts" have very limited access to nutritious foods at reasonable prices, consume fewer fruits and vegetables and more dietary fats, have a poorer diet quality, and are more likely to be overweight or obese (Corrêa et al., 2015; Galvez, Pearl & Yen, 2010). The USDA defines a *food desert* as a census tract in which the poverty rate is at least 20 percent and, for at least 33 percent of the residents, the nearest large grocery store or supermarket is more than one mile away, if metropolitan, or more than ten miles away, if nonmetropolitan (Casazza et al., 2015). Fast food density's influence on behavior is similar to those referenced earlier for alcohol outlet density. Fast food restaurants are more highly concentrated in low-income neighborhoods around schools, and sodas and fast food are more available than fruits and vegetables. Perhaps not surprisingly, students had healthier diets and lower BMI scores if they attended schools that were further away from fast food restaurants and convenience stores (Corrêa et al., 2015).

It is clear that the environment actively shapes one's eating behaviors and habits. One has only to recognize government-sponsored referendums, such as Healthy People 2020 (2017), and efforts by the CDC (2009), the National Prevention Strategy (National Prevention Council, 2012), and the National Institutes of Health (NIH) Strategic Plan (Obesity Research Task Force, 2011) to appreciate the concerted national responses to the unhealthy environments contributing to the

obesity crisis (and potentially facilitating binge eating or even food addiction disorder). Collectively, these institutions recognize that a range of individual, social, economic, and environmental factors contribute to obesity. There is sufficient evidence to associate the detrimental effects of unhealthy and unsupportive PSE in a neighborhood with residents' sometimes-addictive behaviors, excessive consumption of unhealthy foods, extreme amounts of screen time, and lack of activity. It is essential to continue to expand the public's understanding of the PSE surrounding the food they eat and the degree to which they build physical activity into their daily lives, as each is critical for addressing obesity as a nation.

PSE Studies and Other Behavioral Addictions

As with substance use, eating behaviors, food choices, obesity, and physical activity, PSE also plays a role in other activities and can lead to problem behaviors and behavioral addictions. Addictions to substances and to behaviors like eating, sex, and gambling predate the invention of the telephone, television, computers, or the internet. Behavioral addictions to television, smartphones, and the internet (and their content) have only become possible since these technologies became widely available. These technologies have enabled unlimited access to and virtual participation in activities that formerly required in-person participation (e.g., gambling, sports, game playing, dating, and other social activities) and either in-person or mail-order purchases (e.g., pornography, shopping). These technologies have also created the potential for new addictive behaviors, such as texting, use of social media for chatting, and live streaming videos. Part of the challenge of researching behavioral addictions that involve the use of the internet or other "mobile" technologies is distinguishing between harmless behavior and problem or pathological behavior.

The field of behavioral addictions is rapidly evolving, and this is reflected in recent changes in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), which now includes a new category *Substance-Related and Addictive Disorders* with two sub-categories: *Substance-Related Disorders* and *Non-Substance-Related Disorders*. Gambling behaviors are listed in the *Non-Substance-Related Disorders* subcategory, based on the strength of evidence indicating activation of the same central pathways in the brain and behavioral symptoms similar to those of substance addictions (American Psychiatric Association [APA], 2013). At the time of the DSM-5 publication, the evidence was not strong enough to include internet gaming, eating behaviors/obesity, sex addiction, or shopping addiction in the *Non-Substance-Related Disorders* subcategory (Hebebrand et al., 2014); however, Internet Gaming Disorder (IGD) was listed as a condition for further study (Sussman et al., 2018).

Impulse Control and our Understanding of Addictions

Research into behavioral addictions is complicated by the fact that excessive behaviors are associated with impaired impulse control (Fattore, 2014) as well as psychiatric conditions such as obsessive-compulsive disorder, ADHD, anxiety, and depression (Andreassen et al., 2016). Individuals may experience more than one problem behavior at the same time, which can reinforce each other, alternate with each other, or mask one another (Konkolý Thege, Hodgins & Wild, 2016). Similar regions of the brain are activated by pathological or problem behaviors and substance addictions (Fattore, 2014); when they co-occur, it is more difficult to provide effective

treatment (Konkolý Thege et al., 2016). There is also strong evidence that these same regions of the brain undergo physiological remodeling (including new neural pathways) when exposed to chronic stressors in the PSE during childhood and adolescence, a time when the brain is still developing (Everitt & Robbins, 2016; Ewald et al., 2019). As illustrated in Figure 14.1, the direct effects of PSE on individual physiological stress responses and associated brain remodeling, are important elements for the diagnosis and treatment of addictions. These brain changes are associated with impaired impulse control and may predispose individuals to addictive behaviors or substance addiction (Everitt & Robbins, 2016; Ewald et al., 2019). There is much to be resolved before there is clear understanding of the causes of behavioral addictions.

Debate continues among researchers about potential behavioral addictions, including online gaming addiction (considered legitimate), pornography, sex, and television addictions (considered controversial), and shoplifting, tanning, and love addictions (considered highly speculative) (Konkolý Thege et al., 2016). The term *addiction* is often used to describe excessive work and exercise behaviors, but these behaviors may also arise in conjunction with psychiatric or eating disorders (Andreassen et al., 2016; Cook, Hausenblas & Freimuth, 2014). Until screening instruments are fully validated and consensus reached on diagnostic criteria, there will continue to be debate about the nature of behavioral addictions. There is a paucity of research regarding the effect of the BE and the PSE on the individual engaging in most of these behaviors. Nevertheless, it is instructive to explore what is known.

Gambling

Gambling behavior can range from occasional or social participation, to frequent participation (at least twice a week), problem gambling, and pathological gambling, as defined in the DSM (Welte et al., 2016a). Gambling participation and gambling frequency do not necessarily equate with problem or pathological gambling. *Problem gambling* is associated with severe adverse consequences but does not meet any of the DSM criteria (Nowak & Aloe, 2014). *Pathological gambling* generally begins during adolescence or childhood, but there are gender differences in the timing and its progression. Males start gambling at a significantly younger age than females, but once females do start gambling, they progress to pathological gambling at a much faster rate than males. About 10 percent of women who are pathological gamblers finance their addiction through prostitution (Fattore, 2014).

Research findings are inconsistent regarding problem or pathological gambling behaviors. Although frequency of gambling participation is greater in areas where casinos are located, many cross-sectional studies have found that risk of problem or pathological gambling increased with closer proximity to a casino during the first year after a casino opened (Tong & Chim, 2013; Welte et al., 2016a); however, other studies have found an inverse relationship, and some found no relationship between proximity and problem or pathological gambling (Sévigny et al., 2008; Tong & Chim, 2013). Studies that examined the prevalence of problem or pathological gambling before and after casinos opened consistently found that proximity to a casino did not result in higher prevalence rates for local residents (Sévigny et al., 2008; Welte et al., 2016b), leading some to suggest that the novelty of the initial exposure is followed by adaptations in behavior or loss of interest (Sévigny et al., 2008; Tong & Chim, 2013; Welte et al., 2016b). In states with more types of legalized gambling, there is no significant association between the prevalence of

problem gambling and the number of types of gambling, but the number of years of exposure to various forms of gambling is associated with increased rates of problem gambling (Welte et al., 2016b).

Problem and pathological gambling behaviors can occur with any type of gambling activity, even in the absence of gambling venues like casinos or race tracks. In addition to casino gambling, noncasino gambling can include games of chance (e.g., cards, dice, bingo, charitable gambling, raffles, office pools), games of skill (e.g., golf, billiards), sports betting, horse or dog racing (on- or off-track), lotteries, video lottery terminals or gambling machines, and internet gambling (Welte et al., 2016b). Sports gambling, such as fantasy football leagues and basketball playoff brackets, has become increasingly popular in recent years. Legalized gambling activity has been normalized and incorporated into daily life in the form of popular televised poker competitions (Lee, Lemanski & Jun, 2008), as well as internet gambling, state lotteries, and scratch-off tickets (Nowak & Aloe, 2014), which are readily available at most convenience stores and gas stations. These changes in the number of venues for legal gambling create opportunities that make gambling easier, while at the same time making it more difficult to determine the extent of problem and pathological gambling in the general population.

College students are highly susceptible to gambling for a variety of reasons. They are “a population group specifically targeted by the media, a vast number of whom have the resources, proximity, and free time to become involved” and who are not averse to engaging in risky behaviors (Nowak & Aloe, 2014, p. 822). Several studies have reported that the majority (72 percent to 80 percent) of college students have a significantly increased risk of problem gambling when compared to the general population (6 percent to 8 percent versus 2 percent to 4 percent, respectively; Sherba & Gersper, 2017). A meta-analysis retrieving data from eighteen studies and an aggregate of over 13,000 college students estimated that 10.23 percent were probable pathological gamblers (Nowak & Aloe, 2014). This prevalence reflects the fact that gambling, once dependent on physical access or interactions in the BE, has been enabled and exacerbated by the development of the internet, cell phones, and other digital technology, which are used extensively by college students.

Internet and Other Technology

Summarizing the literature on internet and video game addiction (IVGA) Sussman and colleagues (2018) wrote that “a wide variety of online activities are engaging enough to be potentially addictive, including video games, social media, smartphone use, texting, streaming videos, and online pornography” (p. 308). Research into IVGA and its subtypes is ongoing, and the subtype of video game addictions known as IGD “concerns only addiction to online video gaming and excludes that of other potentially addictive screen habits included in IVGA” (p. 309). The most popular types of online video games are role-playing games, such as massive multiplayer online games or MMOs, multiplayer online battle arena games, “shooters,” and real-time strategy games (Sussman et al., 2018).

Because the use of internet and online technology is not dependent on specific locations in the BE (unless internet or Wi-Fi service is only available in certain locations), other PSE factors appear to make a greater contribution to the risk for development of IVGA. Sussman et al.

(2018) reported that IVGA appears to be associated with alcohol use, ADHD, depression, and anxiety. Psychosocial factors associated with development of IVGA in adolescents include “poor family support, poor family relationships, high family conflict, and poor psychosocial support” (p. 313). Severity of IVGA is mitigated by greater social support and parental involvement and exacerbated by poor parental mental health. The risk of developing IVGA is higher for males in relation to computer gaming and higher for females in relation to social networking or smart phone use (Sussman et al., 2018).

Media Exposure and Physical Activity

The reach of media exposure on behaviors goes beyond gaming practice and is increasingly impacting the behavioral choices made for leisure time activities, which have become a significant environmental influence among youth. Children spend an average of nearly four hours a day being sedentary while playing video games and utilizing electronic media, all of which decreases free time available for physical activity. The increasing screen time exposes them to advertising that is specifically tailored to children, and much of what they see promotes unhealthy foods. In the USA, 75 percent of food manufacturer’s advertising budgets, and 95 percent of the fast food industry’s advertising budgets, are spent on television advertising, and many food manufacturers target additional advertising to children through direct product placement in children’s movies, by partnering with toy companies, and by creating kids’ clubs and featuring video games on their websites. Compared to their white counterparts, low-income racial/ethnic minority children watch more movies and television, and there are more food commercials on television shows that target African American audiences; these programs are also more likely to promote fast foods, candy, and soda than programs for more general audiences (Hillier, 2008).

Methodological Considerations

Research and measurement challenges will continue to be an issue in exploring the connection between the PSE and human behaviors. For instance, alcohol outlet density studies should continue to expand development of PSE theories to guide discovery in the field. Many investigators used, as a weak metric, administrative data to obtain the number of outlets in a designated geospatial area, and coupled this with information about distances between business entities and per capita consumption based on aggregate alcohol sales. This generates demand curves and economic models as plausible explanations for why increasing outlet density is associated with increased consumption and alcohol-related harms. This same lack of specificity affects any transactional or “ecological” models of behavior that rely on multiple levels of influence. Quite frankly, outside of a few mentions of criminological, availability, or social disorganization theories, there is heavy reliance on pure conjecture to establish why specific features of the PSE like alcohol outlet density are related to consumption and alcohol-related harms. At the individual level, there is little in the way of testable hypotheses showing connections between different levels of influence and how they shape behavior. The precise mechanisms that motivate behaviors leading to consumption are rarely, if ever, modeled. Studies are needed to identify the actual underlying mechanisms driving consumption in order to move away from correlational studies to the production of more “causal” evidence.

Within studies of alcohol density, many study designs utilized multilevel hierarchical linear modeling to tease apart the relative contributions of individual versus aggregate neighborhood effects on consumption. From an analysis point of view, the study design controls for spatial autocorrelation, which arises from underlying similarity that occurs within members from the same geographical space (i.e., neighborhood), and that can occur between adjacent or neighboring blocks. The lack of independence between members within neighborhoods can occur because they share physical parameters that define neighborhoods (i.e., distributive traffic patterns or physical street layout, proximity to industry or mass transportation) or social determinants (i.e., low-income projects or elderly housing) (Chaix et al., 2011; Getis, 2010).⁸

No matter how they are structured, studies examining whether the BE and likewise neighborhood factors affect health behaviors and addictions are not without their drawbacks. Two important methodological issues raised include the lack of control for both selective participation and selection bias (Diez-Roux, 2004; Leventhal & Brooks-Gunn, 2003) leading to distortion of effects and also the complex multi-level and reciprocal nature of these effects that make it hard to determine causation.⁹ The latter is often called a “reflection” or endogeneity problem because many researchers construe neighborhood contextual effects as the sum of all the individual-level effects (i.e., SES is often used as a proxy to measure the aggregate neighborhood attribute of wealth). This has also been discussed as the *ecological fallacy* (Diez-Roux, 1998) because inferences are being made from one level (individual) to another (aggregate neighborhood) and may not hold in situ outside of statistical models.

Conclusions

The environmental contexts that surround humans, whether defined as physical, built, social, or perceived have an enormous influence on the cognitions, opportunities, motivations, and behaviors of humans. The challenges professionals face in assessing and intervening to address the consequences of human behaviors, inclusive of addictions, is limited by their ability to understand the complex interactions of said environments on socially constructed lives. This chapter has attempted to call attention to the all-too-common narrow lens focused on the moral character or biological shortcomings of individuals who are ultimately nested within larger social structures. The theoretical perspectives and examples of physical and social environmental influences on human behavior are provided to illuminate and encourage a broadening of perspective to consider these systemic and powerful influences.

⁸ The problem of clustering among adjoining neighborhoods is termed spatial autocorrelated measurement error (Moran coefficient) and corresponds statistically with the intraclass correlation coefficient. In either case, in a hierarchically clustered design some portion of variance in the outcome is accounted for by the larger aggregate collection (i.e., neighborhoods distinguished by block or census tract) and some portion is accounted for by members that are found residing within the aggregate (block or census tract). Failure to address these different variance components could lead to biased estimates of effects (i.e., inflated standard errors).

⁹ A good deal of social epidemiology relies on the assumption that an individual can be transported from one neighborhood to another with little effect of this relocation on the outcome under study (units can be exchanged, assuming control for individual-level differences). However, individual-level characteristics in the form of predisposing factors (spatial proximity to hospital for sicker people) may confound (or mediate) neighborhood “selection,” thus introducing a modicum of bias into the equation. Greenland and Robins (1986) discuss this epidemiological confounding in greater detail (and also see Diez-Roux, 1998, for a similar discussion).

The growing awareness of the influence that environmental contexts have on human behavior will continue to evolve as governments, organizations, and professions increasingly prioritize investigation and targeted efforts for shaping healthier physical and social environments. Governmental and philanthropic funding geared toward systemic and structural environmental changes would hasten the ability to build the etiologic knowledge and practice base required for these more efficacious social and physical environment strategies.

Within professional practice, addressing addictive behaviors will not reach the level of effectiveness desired without intervention efforts that include consideration of built and social environmental influences. This is particularly important in light of the neurobiological evidence associating environmental stressors with physiological changes in brain structures that precede addictive behaviors. Here, it is important that addiction experts augment and strengthen efforts to identify upstream factors that influence behavior. This effort can then be integrated with what is known about social determinants that influence health. This emphasis requires professions to revisit professional values and statements of purpose. Revised professional statements may encourage the rethinking of professional preparation programs, and subsequent professional practices and obligations to incorporate social and physical influences in the current addictions etiology, prevention, and treatment models and practices.

A minimum outcome of considering built and social environmental influences would be a burgeoning cadre of health and addictions professionals with sensitized appreciation of some of the PSEs that influence health-related behaviors and health status itself. With expanded understanding, clinicians and healthcare settings may be able to strengthen routine care by developing health-promotion strategies that embrace new partnerships for ameliorating or mitigating the social determinants that are shown to be most important and changeable (Gottlieb, Sandel & Adler, 2013). Because addressing social determinants and altering physical and social environments are beyond health care setting's typical practice, these professionals can advocate for expanded research to continue exploration of causal mechanisms and effective strategies. With increased awareness of the PSE influence on addictions, professionals can use their informed and expert voice to educate and advocate for policy makers to address the detrimental social influences causing ill health in society (Gruen, Pearson & Brennan, 2004).

Not only does this broader lens of health behavior and addictions causality remove the often-unjust onus on individuals, it also points to a growing literature that continues to demonstrate the key factors that influence all human behavior on a daily basis. Addressing social ills from both a personal responsibility (individual agency) as well as a social responsibility (collective agency) perspective provides the best hope for shaping the PSE, behaviors, and health (Blacksher & Lovasi, 2012). It also provides a plethora of new opportunities for understanding human suffering on a larger scale, rather than individual by individual, which should be seen as a welcomed addition to one's professional tool kit. As long as problems of human behavior are defined at an individual level, practitioners will be burdened with simply pulling people from the river rather than looking upstream to more clearly see what is responsible for pushing people into harm's way.

References

- Adler, N. E., Boyce, W. T., Chesney, M. A., Folkman, S. & Syme, S. L. (1993). Socioeconomic inequalities in health: No easy solution. *Journal of the American Medical Association*, 269(24), 3140–3145. <https://doi.org/10.1001/jama.193.03500240084031>
- American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th edition). Washington, DC: American Psychiatric Association.
- American Public Health Association [APHA] (2016). *Opportunities for health collaboration: Leveraging community development investments to improve health in low-income neighborhoods*. Retrieved October 17, 2017, from www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2017/01/17/opportunities-for-health-collaboration
- Andreassen, C. S., Griffiths, M. D., Sinha, R., Hetland, J. & Pallesen, S. (2016). The relationships between workaholism and symptoms of psychiatric disorders: A large-scale cross-sectional study. *PLoS ONE*, 11(5), e0152978. <https://doi.org/10.1371/journal.pone.0152978>
- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bauman, L. J., Silver, E. J. & Stein, R. E. K. (2006). Cumulative social disadvantage and child health. *Pediatrics*, 117(4), 1321–1328. <https://doi.org/10.1542/ped.2005-1647>
- Beech, B. M., Fitzgibbon, M. L., Resnicow, K. & Whitt-Glover, M. C. (2011). The impact of socioeconomic factors and the built environment on childhood and adolescent obesity. *Childhood Obesity*, 7(1), 19–24. <https://doi.org/10.1089/chi.2011.0106>
- Bernstein, K. T., Galea, S., Ahern, J., Tracy, M. & Vlahov, D. (2007). The built environment and alcohol consumption in urban neighborhoods. *Drug and Alcohol Dependence*, 91(2–3), 244–252. <https://doi.org/10.1016/j.drugalcdep.2007.06.006>
- Blacksher, E. & Lovasi, G. S. (2012). Place-focused physical activity research, human agency, and social justice in public health: Taking agency seriously in studies of the built environment. *Health & Place*, 18(2), 172–179. <https://doi.org/10.1016/j.healthplace.2011.08.019>
- Braveman, P. A. & Egerter, S. (2013). *Overcoming obstacles to health in 2013 and beyond*. Robert Wood Johnson Foundation Commission to Build a Healthier America. Retrieved from <https://www.rwjf.org/en/library/research/2013/06/overcoming-obstacles-to-health-in-2013-and-beyond.html>
- Braveman, P. A., Egerter, S. & Williams, D. R. (2011). The social determinants of health: Coming of age. *Annual Review of Public Health*, 32(1), 381–398. <https://doi.org/10.1146/annurev-publhealth-031210-101218>
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32(7), 513–531. <https://doi.org/10.1037/0003-066X.32.7.513>

- Brooks, B., McBee, M., Pack, R. & Alamian, A. (2017). The effects of rurality on substance use disorder diagnosis: A multiple-groups latent class analysis. *Addictive Behaviors*, 68, 24–29. <https://doi.org/10.1016/j.addbeh.2017.01.019>
- Brown, G. W. & Harris, T. O. (1978). *Social Origins of Depression: A Study of Psychiatric Disorder in Women*. New York: Free Press.
- Burns, P. A. & Snow, R. C. (2012). The built environment & the impact of neighborhood characteristics on youth sexual risk behavior in Cape Town, South Africa. *Health & Place*, 18(5), 1088–1100. <https://doi.org/10.1016/j.healthplace.2012.04.013>
- Burrows, T., Skinner, J., McKenna, R. & Rollo, M. (2017). Food addiction, binge eating disorder, and obesity: Is there a relationship? *Behavioral Sciences*, 7(3), bs7030054. <https://doi.org/10.3390/bs7030054>
- Carroll-Scott, A., Gilstad-Hayden, K., Rosenthal, L., et al. (2013). Disentangling neighborhood contextual associations with child body mass index, diet, and physical activity: The role of built, socioeconomic, and social environments. *Social Science & Medicine*, 95, 106–114. <https://doi.org/10.1016/j.socscimed.2013.04.003>
- Casazza, K., Brown, A., Astrup, A., et al. (2015). Weighing the evidence of common beliefs in obesity research. *Critical Reviews in Food Science and Nutrition*, 55(14), 2014–2053. <https://doi.org/10.1080/10408398.2014.922044>
- Centers for Disease Control and Prevention [CDC] (2007). Cigarette smoking among adults – United States, 2006. *Morbidity and Mortality Weekly Report*, 56(44), 1157–1161. Retrieved from <http://www.jstor.org/stable/23318296>
- Centers for Disease Control and Prevention [CDC] (2009). *Recommended Community Strategies and Measurements to Prevent Obesity in the United States: Implementation and Measurement Guide* (Vol. MMWR 2009). Atlanta, GA: US Dept of Health & Human Services.
- Cerdá, M., Ransome, Y., Keyes, K. M., et al. (2013). Revisiting the role of the urban environment in substance use: The case of analgesic overdose fatalities. *American Journal of Public Health*, 103(12), 2252–2260. <https://doi.org/10.2105/AJPH.2012.301347>
- Chaix, B., Billaudeau, N., Thomas, F., et al. (2011). Neighborhood effects on health: Correcting bias from neighborhood effects on participation. *Epidemiology*, 22(1), 18–26. <https://doi.org/10.1097/EDE.0b013e3181fd2961>
- Chaloupka, F. J. & Wechsler, H. (1996). Binge drinking in college: The impact of price, availability, and alcohol control policies. *Contemporary Economic Policy*, 14(4), 112–124. <https://doi.org/10.1111/j.1465-7287.1996.tb00638.x>
- Cohen, D. A., Inagami, S. & Finch, B. (2008). The built environment and collective efficacy. *Health & Place*, 14(2), 198–208. <https://doi.org/10.1016/j.healthplace.2007.06.001>

- Coleman, J. S. (2000). Social capital in the creation of human capital. In E. L. Lesser (Ed.), *Knowledge and Social Capital: Foundations and Applications*. Boston: Butterworth-Heinemann, pp. 17–41.
- Commission on Social Determinants of Health (2008). *Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health. Final Report of the Commission on Social Determinants of Health*. Retrieved from World Health Organization: www.who.int/social_determinants/thecommission/finalreport/en/
- Cook, B., Hausenblas, H. & Freimuth, M. (2014). Exercise addiction and compulsive exercising: Relationship to eating disorders, substance use disorders, and addictive disorders. In T. Brewerton & D. A. Baker (Eds.), *Eating Disorders, Addictions and Substance Use Disorders*. Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-642-45378-6_7
- Corrêa, E. N., Schmitz, B. de A. S. & Vasconcelos, F. de A. G. de. (2015). Aspects of the built environment associated with obesity in children and adolescents: A narrative review. *Revista de Nutrição*, 28(3), 327–340. <https://doi.org/10.1590/1415-52732015000300009>
- Cubbin, C., Hadden, W. C. & Winkleby, M. A. (2001). Neighborhood context and cardiovascular disease risk factors: The contribution of material deprivation. *Ethnicity & Disease*, 11(4), 687–700.
- Cummings, K. M., Fong, G. T. & Borland, R. (2009). Environmental influences on tobacco use: Evidence from societal and community influences on tobacco use and dependence. *Annual Review of Clinical Psychology*, 5, 433–458. <https://doi.org/10.1146/annurev.clinpsy.032408.153607>
- Curtis, S., Cave, B. & Coutts, A. (2002). Is urban regeneration good for health? Perceptions and theories of the health impacts of urban change. *Environment & Planning C: Government & Policy*, 20(4), 517–534. <https://doi.org/10.1068/c02r>
- Dalbey, M. (2008). Implementing smart growth strategies in rural America: Development patterns that support public health goals. *Journal of Public Health Management and Practice*, 14(3), 238–243. <https://doi.org/10.1097/01.PHH.0000316482.65135.e8>
- Davis, C. (2013). Compulsive overeating as an addictive behavior: Overlap between food addiction and binge eating disorder. *Current Obesity Reports*, 2(2), 171–178. <https://doi.org/10.1007/s13679-013-0049-8>
- Davis, R., Rivera, D. & Parks, L. F. (2015). *Moving from Understanding to Action on Health Equity: Social Determinants of Health Frameworks and THRIVE*. Retrieved from www.preventioninstitute.org/publications/moving-understanding-action-health-equity-social-determinants-health-frameworks-and
- Deering, K. N., Rusch, M., Amram, O., et al. (2014). Piloting a “spatial isolation” index: The built environment and sexual and drug use risks to sex workers. *International Journal of Drug Policy*, 25(3), 533–542. <https://doi.org/10.1016/j.drugpo.2013.12.002>

- Diez-Roux, A. V. (1998). Bringing context back into epidemiology: Variables and fallacies in multilevel analysis. *American Journal of Public Health*, 88(2), 216–222. <https://doi.org/10.2105/AJPH.88.2.216>
- Diez-Roux, A. V. (2004). Estimating neighborhood health effects: The challenges of causal inference in a complex world. *Social Science & Medicine*, 58(10), 1953–1960. [https://doi.org/10.1016/S0277-9536\(03\)00414-3](https://doi.org/10.1016/S0277-9536(03)00414-3)
- Draus, P., Roddy, J. & Asabigi, K. (2015). Streets, strolls and spots: Sex work, drug use and social space in Detroit. *International Journal of Drug Policy*, 26(5), 453–460. <https://doi.org/10.1016/j.drugpo.2015.01.004>
- Evans, G. W. & Kantrowitz, E. (2002). Socioeconomic status and health: The potential role of environmental risk exposure. *Annual Review of Public Health*, 23(1), 303–331. <https://doi.org/10.1146/annurev.publhealth.23.112001.112349>
- Everitt, B. J. & Robbins, T. W. (2016). Drug addiction: Updating actions to habits to compulsions ten years on. *Annual Review of Psychology*, 67, 23–50. <https://doi.org/10.1146/annurev-psych-122414-033457>
- Ewald, D. R., Strack, R. W. & Orsini, M. M. (2019). Rethinking addiction. *Global Pediatric Health*, 6, 1–16. <https://doi.org/10.1177/2333794X18821943>
- Fattore, L. (2014). Sex differences in addictive disorders. *Frontiers in Neuroendocrinology*, 35(3), 272–284. <https://doi.org/10.1016/j.yfrne.2014.04.003>
- Federal Reserve System & Brookings Institution (2008). *The Enduring Challenge of Concentrated Poverty in America: Case Studies from Communities Across the U.S.*, In D. Erickson, C. Reid, L. Nelson, A. O’Shaughnessy & A. Berube (Eds.). Washington, DC: Federal Reserve System. Retrieved from www.federalreserve.gov/publications.htm
- Ferlander, S. (2016). The importance of different forms of social capital for health. *Acta Sociologica*, 50(2), 115–128. <https://doi.org/10.1177/0001699307077654>
- Freudenberg, N. (2007). From lifestyle to social determinants: New directions for community health promotion research and practice. *Preventing Chronic Disease*, 4(3). Retrieved from www.cdc.gov/pcd/issues/2007/jul/06_0194.htm
- Freudenberg, N., Franzosa, E., Chisholm, J. & Libman, K. (2015). New approaches for moving upstream: How state and local health departments can transform practice to reduce health inequalities. *Health Education & Behavior*, 42(1), 46S–56S. <https://doi.org/10.1177/1090198114568304>
- Galea, S. & Vlahov, D. (2002). Social determinants and the health of drug users: Socioeconomic status, homelessness, and incarceration. *Public Health Reports*, 117(Supplement 1), S135–S145.
- Galea, S., Rudenstine, S. & Vlahov, D. (2005). Drug use, misuse, and the urban environment. *Drug and Alcohol Review*, 24(2), 127–136. <https://doi.org/10.1080/09595230500102509>

- Galvez, M. P., Pearl, M. & Yen, I. H. (2010). Childhood obesity and the built environment. *Current Opinion in Pediatrics*, 22(2), 202–207. <https://doi.org/10.1097/MOP.0b013e328336eb6f>
- Gearhardt, A. N., Bragg, M. A., Pearl, R. L., et al. (2012). Obesity and public policy. *Annual Review of Clinical Psychology*, 8(1), 405–430. <https://doi.org/10.1146/annurev-clinpsy-032511-143129>
- Gearhardt, A. N., Corbin, W. R. & Brownell, K. D. (2009). Food addiction: An examination of the diagnostic criteria for dependence. *Journal of Addiction Medicine*, 3(1), 1–7. <https://doi.org/10.1097/ADM.0b013e318193c993>
- Gearhardt, A. N., Grilo, C. M., DiLeone, R. J., Brownell, K. D. & Potenza, M. N. (2011). Can food be addictive? Public health and policy implications. *Addiction*, 106(7), 1208–1212. <https://doi.org/10.1111/j.1360-0443.2010.03301.x>
- Getis, A. (2010). Spatial autocorrelation. In M. M. Fischer & A. Getis (Eds.), *Handbook of Applied Spatial Analysis*. Berlin, Heidelberg: Springer Berlin Heidelberg, pp. 255–278. https://doi.org/10.1007/978-3-642-03647-7_14
- Giles-Corti, B. & Donovan, R. J. (2003). Relative influences of individual, social environmental, and physical environmental correlates of walking. *American Journal of Public Health*, 93(9), 1583–1589. <https://doi.org/10.2105/AJPH.93.9.1583>
- Glanz, K. & Kegler, M. C. (2008). *Environments: Theory, Research and Measures of the Built Environment*. Division of Cancer Control and Population Sciences, National Cancer Institute. Retrieved from <https://cancercontrol.cancer.gov/brp/research/constructs/environments.html>
- Goldberg, D. S. (2012). Social justice, health inequalities and methodological individualism in US health promotion. *Public Health Ethics*, 5(2), 104–115. <https://doi.org/10.1093/phe/phs013>
- Gostin, L. O. & Martinez, R. M. (2004). The future of the public's health: Vision, values, and strategies. *Health Affairs*, 23(4), 96–107. <https://doi.org/10.1377/hlthaff.23.4.96>
- Gottlieb, L., Sandel, M. & Adler, N. E. (2013). Collecting and applying data on social determinants of health in health care settings. *JAMA Internal Medicine*, 173(11), 1017–1020. <https://doi.org/10.1001/jamainternmed.2013.560>
- Greenland, S. & Robins, J. M. (1986). Identifiability, exchangeability, and epidemiological confounding. *International Journal of Epidemiology*, 15(3), 413–419.
- Gruen, R. L., Pearson, S. D. & Brennan, T. A. (2004). Physician-citizens – Public roles and professional obligations. *Journal of the American Medical Association*, 291(1), 94–98. <https://doi.org/10.1001/jama.291.1.94>
- Gruenewald, P. J., Ponicki, W. R. & Holder, H. D. (1993). The relationship of outlet densities to alcohol consumption: A time series cross-sectional analysis. *Alcoholism: Clinical and Experimental Research*, 17(1), 38–47. <https://doi.org/10.1111/j.1530-0277.1993.tb00723.x>

- Gundersen, C., Mahatmya, D., Garasky, S. & Lohman, B. (2011). Linking psychosocial stressors and childhood obesity. *Obesity Reviews*, 12(5), e54–e63. <https://doi.org/10.1111/j.1467-789X.2010.00813.x>
- Handy, S. L., Boarnet, M. G., Ewing, R. & Killingsworth, R. E. (2002). How the built environment affects physical activity: Views from urban planning. *American Journal of Preventive Medicine*, 23(2), 64–73. [https://doi.org/10.1016/S0749-3797\(02\)00475-0](https://doi.org/10.1016/S0749-3797(02)00475-0)
- Hankey, S., Marshall, J. D. & Brauer, M. (2012). Health impacts of the built environment: Within-urban variability in physical inactivity, air pollution, and ischemic heart disease mortality. *Environmental Health Perspectives*, 120(2), 247–253. <https://doi.org/10.1289/ehp.1103806>
- Hansen, P. G., Skov, L. R. & Skov, K. L. (2016). Making healthy choices easier: Regulation versus nudging. *Annual Review of Public Health*, 37(1), 237–251. <https://doi.org/10.1146/annurev-publhealth-032315-021537>
- Healthy People 2020 (2017). *Social determinants of health*. Retrieved October 23, 2017, from www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health
- Hebebrand, J., Albayrak, Ö., Aden, R., et al. (2014). “Eating addiction,” rather than “food addiction,” better captures addictive-like eating behavior. *Neuroscience and Biobehavioral Reviews*, 47, 295–306. <https://doi.org/10.1016/j.neubiorev.2014.08.016>
- Hembree, C., Galea, S., Ahern, J., et al. (2005). The urban built environment and overdose mortality in New York City neighborhoods. *Health & Place*, 11(2), 147–156. <https://doi.org/10.1016/j.healthplace.2004.02.005>
- Higgs, P., Leontowitsch, M., Stevenson, F. & Rees Jones, I. (2009). Not just old and sick - the “will to health” in later life. *Ageing and Society*, 29(5), 687–707. <https://doi.org/10.1017/S0144686X08008271>
- Hillier, A. (2008). Childhood overweight and the built environment: Making technology part of the solution rather than part of the problem. *Annals of the American Academy of Political and Social Science*, 615(1), 56–82. <https://doi.org/10.1177/0002716207308399>
- Hughes, K. (2007). Migrating identities: The relational constitution of drug use and addiction. *Sociology of Health & Illness*, 29(5), 673–691. <https://doi.org/10.1111/j.1467-9566.2007.01018.x>
- Hutch, D. J., Bouye, K. E., Skillen, E., et al. (2011). Potential strategies to eliminate built environment disparities for disadvantaged and vulnerable communities. *American Journal of Public Health*, 101(4), 587–595. <https://doi.org/10.2105/AJPH.2009.173872>
- Hyshka, E. (2013). Applying a social determinants of health perspective to early adolescent cannabis use – An overview. *Drugs: Education, Prevention and Policy*, 20(2), 110–119. <https://doi.org/10.3109/09687637.2012.752434>
- Institute of Medicine. (2000). *Promoting Health: Intervention Strategies from Social and Behavioral Research*. Washington, DC: National Academies Press. <https://doi.org/10.17226/9939>

- Irwin, J., LaGory, M., Ritchey, F. & Fitzpatrick, K. (2008). Social assets and mental distress among the homeless: Exploring the roles of social support and other forms of social capital on depression. *Social Science & Medicine*, 67(12), 1935–1943. <https://doi.org/10.1016/j.socscimed.2008.09.008>
- Jilcott Pitts, S. B., Wu, Q., Sharpe, P. A., et al. (2016). Preferred healthy food nudges, food store environments, and customer dietary practices in 2 low-income southern communities. *Journal of Nutrition Education and Behavior*, 48(10), 735–742. <https://doi.org/10.1016/j.jneb.2016.08.001>
- Just, D. R. & Gabrielyan, G. (2016). Why behavioral economics matters to global food policy. *Global Food Security*, 11, 26–33. <https://doi.org/10.1016/j.gfs.2016.05.006>
- Kawachi, I. (1999). Social capital and community effects on population and individual health. *Annals of the New York Academy of Sciences*, 896(1), 120–130. <https://doi.org/10.1111/j.1749-6632.1999.tb08110.x>
- Kessler, R. C. & Cleary, P. D. (1980). Social class and psychological distress. *American Sociological Review*, 45(3), 463–478. <https://doi.org/10.2307/2095178>
- Keyes, K. M., Cerdá, M., Brady, J. E., Havens, J. R. & Galea, S. (2014). Understanding the rural-urban differences in nonmedical prescription opioid use and abuse in the United States. *American Journal of Public Health*, 104(2), 52–59. <https://doi.org/10.2105/AJPH.2013.301709>
- Kim, D., Subramanian, S. V & Kawachi, I. (2006). Bonding versus bridging social capital and their associations with self rated health: A multilevel analysis of 40 US communities. *Journal of Epidemiology and Community Health*, 60(2), 116–122. <https://doi.org/10.1136/jech.2005.038281>
- Konkolöy Thege, B., Hodgins, D. C. & Wild, T. C. (2016). Co-occurring substance-related and behavioral addiction problems: A person-centered, lay epidemiology approach. *Journal of Behavioral Addictions*, 5(4), 614–622. <https://doi.org/10.1556/2006.5.2016.079>
- Kypri, K., Bell, M. L., Hay, G. C. & Baxter, J. (2008). Alcohol outlet density and university student drinking: A national study. *Addiction*, 103(7), 1131–1138. <https://doi.org/10.1111/j.1360-0443.2008.02239.x>
- Larson, N. I., Story, M. T. & Nelson, M. C. (2009). Neighborhood environments: Disparities in access to healthy foods in the U.S. *American Journal of Preventive Medicine*, 36(1), 74–81. <https://doi.org/10.1016/j.amepre.2008.09.025>
- LaScala, E. A., Johnson, F. W. & Gruenewald, P. J. (2001). Neighborhood characteristics of alcohol-related pedestrian injury collisions: A geostatistical analysis. *Prevention Science*, 2(2), 123–134. <https://doi.org/10.1023/A:1011547831475>
- Latkin, C. A. & Curry, A. D. (2003). Stressful neighborhoods and depression: A prospective study of the impact of neighborhood disorder. *Journal of Health and Social Behavior*, 44(1), 34–44. <https://doi.org/10.2307/1519814>

- Lee, H.-S., Lemanski, J. L. & Jun, J. W. (2008). Role of gambling media exposure in influencing trajectories among college students. *Journal of Gambling Studies*, 24(1), 25–37. <https://doi.org/10.1007/s10899-007-9078-0>
- Lerner, R. M. & Kauffman, M. B. (1985). The concept of development in contextualism. *Developmental Review*, 5(4), 309–333. [https://doi.org/10.1016/0273-2297\(85\)90016-4](https://doi.org/10.1016/0273-2297(85)90016-4)
- Leventhal, T. & Brooks-Gunn, J. (2003). Moving to opportunity: An experimental study of neighborhood effects on mental health. *American Journal of Public Health*, 93(9), 1576–1582. <https://doi.org/10.2105/AJPH.93.9.1576>
- Leyden, K. M. (2003). Social capital and the built environment: The importance of walkable neighborhoods. *American Journal of Public Health*, 93(9), 1546–1551. <https://doi.org/10.2105/AJPH.93.9.1546>
- Lipperman-Kreda, S., Mair, C., Grube, J. W., et al. (2014). Density and proximity of tobacco outlets to homes and schools: Relations with youth cigarette smoking. *Prevention Science*, 15(5), 738–744. <https://doi.org/10.1007/s11121-013-0442-2>
- Livingston, M., Chikritzhs, T. & Room, R. (2007). Changing the density of alcohol outlets to reduce alcohol-related problems. *Drug and Alcohol Review*, 26(5), 557–566. <https://doi.org/10.1080/09595230701499191>
- McLeroy, K. R., Bibeau, D., Steckler, A. & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education & Behavior*, 15(4), 351–377. <https://doi.org/10.1177/109019818801500401>
- Milam, A. J., Furr-Holden, C. D. M., Cooley-Strickland, M. C., Bradshaw, C. P. & Leaf, P. J. (2014). Risk for exposure to alcohol, tobacco, and other drugs on the route to and from school: The role of alcohol outlets. *Prevention Science*, 15(1), 12–21. <https://doi.org/10.1007/s11121-012-0350-x>
- Milam, A. J., Johnson, S. L., Furr-Holden, C. D. M. & Bradshaw, C. P. (2016). Alcohol outlets and substance abuse among high schoolers. *Journal of Community Psychology*, 44(7), 819. <https://doi.org/10.1002/jcop.21802>
- Mitchell, C. U. & LaGory, M. (2002). Social capital and mental distress in an impoverished community. *City & Community*, 1(2), 199–222. <https://doi.org/10.1111/1540-6040.00017>
- Monnat, S. M. & Rigg, K. K. (2016). Examining rural/urban differences in prescription opioid misuse among US adolescents. *Journal of Rural Health*, 32(2), 204–218. <https://doi.org/10.1111/jrh.12141>
- Monteiro, C. A., Levy, R. B., Claro, R. M., de Castro, I. R. R. & Cannon, G. (2011). Increasing consumption of ultra-processed foods and likely impact on human health: Evidence from Brazil. *Public Health Nutrition*, 14(1), 5–13. <https://doi.org/10.1017/S1368980010003241>
- Moudon, A. V., Lee, C., Cheadle, A. D., et al. (2006). Operational definitions of walkable neighborhood: Theoretical and empirical insights. *Journal of Physical Activity and Health*, 3(Supplement 1), S99–S117. <https://doi.org/10.1123/jpah.3.s1.s99>

- Mulatu, M. S. & Schooler, C. (2002). Causal connections between socio-economic status and health: Reciprocal effects and mediating mechanisms. *Journal of Health and Social Behavior*, 43(1), 22–41. <https://doi.org/10.2307/3090243>
- National Prevention Council. (2012). *National Prevention Council Action Plan: Implementing the National Prevention Strategy*. Washington, DC: National Prevention Council. Retrieved from <http://purl.fdlp.gov/GPO/gpo50605>
- Northridge, M. E., Sclar, E. D. & Biswas, P. (2003). Sorting out the connections between the built environment and health: A conceptual framework for navigating pathways and planning healthy cities. *Journal of Urban Health*, 80(4), 556–568. <https://doi.org/10.1093/jurban/jtg064>
- Nowak, D. E. & Aloe, A. M. (2014). The prevalence of pathological gambling among college students: a meta-analytic synthesis, 2005–2013. *Journal of Gambling Studies*, 30(4), 819–843. <https://doi.org/10.1007/s10899-013-9399-0>
- Nowell, B. L., Berkowitz, S. L., Deacon, Z. & Foster-Fishman, P. (2006). Revealing the cues within community places: Stories of identity, history, and possibility. *American Journal of Community Psychology*, 37(1–2), 29–46. <https://doi.org/10.1007/s10464-005-9006-3>
- Obesity Research Task Force (2011). *Strategic Plan for NIH Obesity Research*. Rockville, MD: National Institutes of Health (NIH Publication No. 11-5493). Retrieved from https://obesityresearch.nih.gov/about/StrategicPlanforNIH_Obesity_Research_Full-Report_2011.pdf
- Olsen, C. M. (2011). Natural rewards, neuroplasticity, and non-drug addictions. *Neuropharmacology*, 61(7), 1109–1122. <https://doi.org/10.1016/j.neuropharm.2011.03.010>
- Perdue, W. C., Gostin, L. O. & Stone, L. A. (2003). Public health and the built environment: Historical, empirical, and theoretical foundations for an expanded role. *Journal of Law, Medicine & Ethics*, 31(4), 557–566. <https://doi.org/10.1111/j.1748-720X.2003.tb00123.x>
- Perkins, D. D., Wandersman, A., Rich, R. C. & Taylor, R. B. (1993). The physical environment of street crime: Defensible space, territoriality and incivilities. *Journal of Environmental Psychology*, 13(1), 29–49. [https://doi.org/10.1016/S0272-4944\(05\)80213-0](https://doi.org/10.1016/S0272-4944(05)80213-0)
- Pollack, C. E., Cubbin, C., Ahn, D. & Winkleby, M. (2005). Neighbourhood deprivation and alcohol consumption: Does the availability of alcohol play a role? *International Journal of Epidemiology*, 34(4), 772–780. <https://doi.org/10.1093/ije/dyi026>
- Popkin, B. M. (2006). Global nutrition dynamics: The world is shifting rapidly toward a diet linked with noncommunicable diseases. *American Journal of Clinical Nutrition*, 84(2), 289–298. <https://doi.org/10.1093/ajcn/84.1.289>
- Public Health Institute [PHI] (2015). *Making the case for linking community development and health: A resource for those working to improve low-income communities and the lives of the people living in them*. Public Health Institute. Retrieved from www.phi.org/resources/?resource=making-the-case-for-linking-community-development-and-health

- Putnam, R. D. (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster.
- Rahman, T., Cushing, R. A. & Jackson, R. J. (2011). Contributions of built environment to childhood obesity. *Mount Sinai Journal of Medicine*, 78(1), 49–57. <https://doi.org/10.1002/msj.20235>
- Renalds, A., Smith, T. H. & Hale, P. J. (2010). A systematic review of built environment and health. *Family and Community Health*, 33(1), 68–78. <https://doi.org/10.1097/FCH.0b013e3181c4e2e5>
- Rhodes, T. (2002). The risk environment: A framework for understanding and reducing drug-related harm. *International Journal of Drug Policy*, 13(2), 85–94. [https://doi.org/10.1016/S0955-3959\(02\)00007-5](https://doi.org/10.1016/S0955-3959(02)00007-5)
- Roberto, C. A. & Kawachi, I. (2014). Use of psychology and behavioral economics to promote healthy eating. *American Journal of Preventive Medicine*, 47(6), 832–837. <https://doi.org/10.1016/j.amepre.2014.08.002>
- Sallis, J. F., Owen, N. & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer & K. Viswanath (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice* (4th edition). San Francisco, CA: Jossey-Bass, pp. 465–485.
- Sameroff, A. (2010). A unified theory of development: A dialectic integration of nature and nurture. *Child Development*, 81(1), 6–22. <https://doi.org/10.1111/j.1467-8624.2009.01378.x>
- Sampson, R. J., Raudenbush, S. W. & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*, 277(5328), 918–924. Retrieved from www.jstor.org/stable/2892902
- Satcher, D., Okafor, M. & Dill, L. J. (2012). Impact of the built environment on mental and sexual health: Policy implications and recommendations. *ISRN Public Health*, 2012(9), 1–7. <https://doi.org/10.5402/2012/806792>
- Scarr, S. & McCartney, K. (1983). How people make their own environments: A theory of genotype → environment effects. *Child Development*, 54(2), 424–435. <https://doi.org/10.2307/1129703>
- Schonlau, M., Scribner, R., Farley, T. A., et al. (2008). Alcohol outlet density and alcohol consumption in Los Angeles county and southern Louisiana. *Geospatial Health*, 3(1), 91–101. <https://doi.org/10.4081/gh.2008.235>
- Schreiber, L. R. N., Odlaug, B. L. & Grant, J. E. (2013). The overlap between binge eating disorder and substance use disorders: Diagnosis and neurobiology. *Journal of Behavioral Addictions*, 2(4), 191–198. <https://doi.org/10.1556/JBA.2.2013.015>
- Schulenberg, J. E., Johnston, L. D., O'Malley, P. M., et al. (2017). *Monitoring the Future National Survey Results on Drug Use, 1975–2016: Volume II, College Students and Adults Ages 19–55*. Ann Arbor: Institute for Social Research, The University of Michigan. Retrieved from <http://monitoringthefuture.org/pubs.html#monographs>

- Schulz, A. & Northridge, M. E. (2016). Social determinants of health: Implications for environmental health promotion. *Health Education & Behavior*, 31(4), 455–471. <https://doi.org/10.1177/1090198104265598>
- Scribner, R. A., Cohen, D. A. & Fisher, W. (2000). Evidence of a structural effect for alcohol outlet density: A multilevel analysis. *Alcoholism: Clinical and Experimental Research*, 24(2), 188–195. <https://doi.org/10.1111/j.1530-0277.2000.tb04590.x>
- Sévigny, S., Ladouceur, R., Jacques, C. & Cantinotti, M. (2008). Links between casino proximity and gambling participation, expenditure, and pathology. *Psychology of Addictive Behaviors*, 22(2), 295–301. <https://doi.org/10.1037/0893-164X.22.2.295>
- Sharkey, P. (2013). *Stuck in Place: Urban Neighborhoods and the End of Progress Toward Racial Equality*. Chicago: The University of Chicago Press.
- Sher, K. J., Bartholow, B. D. & Nanda, S. (2001). Short- and long-term effects of fraternity and sorority membership on heavy drinking: A social norms perspective. *Psychology of Addictive Behaviors*, 15(1), 42–51. <https://doi.org/10.1037/0893-164X.15.1.42>
- Sherba, R. T. & Gersper, B. E. (2017). Community college and university student gambling beliefs, motives, and behaviors. *Community College Journal of Research and Practice*, 41(12), 823–841. <https://doi.org/10.1080/10668926.2016.1233142>
- Song, L. (2011). Social capital and psychological distress. *Journal of Health and Social Behavior*, 52(4), 478–492. <https://doi.org/10.1177/0022146511411921>
- Stockwell, T. & Gruenewald, P. J. (2004). Controls on the physical availability of alcohol. In N. Heather & T. Stockwell (Eds.), *The Essential Handbook of Treatment and Prevention of Alcohol Problems*. Hoboken, NJ: Wiley, pp. 213–233.
- Stokols, D. & Shumaker, S. A. (1981). People in places: A transactional view of settings. In J. H. Harvey (Ed.), *Cognition, Social Behaviour and the Environment*. Hillsdale, NJ: Lawrence Erlbaum Assoc., pp. 441–488.
- Suglia, S. F., Shelton, R. C., Hsiao, A., et al. (2016). Why the neighborhood social environment is critical in obesity prevention. *Journal of Urban Health*, 93(1), 206–212. <https://doi.org/10.1007/s11524-015-0017-6>
- Sussman, C. J., Harper, J. M., Harper, J. M., Stahl, J. L. & Weigle, P. (2018). Internet and video game addictions: Diagnosis, epidemiology, and neurobiology. *Child and Adolescent Psychiatric Clinics of North America*, 27(2), 307–326. <https://doi.org/10.1016/j.chc.2017.11.015>
- Tong, H. H. & Chim, D. (2013). The relationship between casino proximity and problem gambling. *Asian Journal of Gambling Issues and Public Health*, 3(1), 1–17. <https://doi.org/10.1186/2195-3007-3-2>
- Toomey, T. L., Lenk, K. M. & Wagenaar, A. C. (2007). Environmental policies to reduce college drinking: An update of research findings. *Journal of Studies on Alcohol and Drugs*, 68(2), 208–219. <https://doi.org/10.15288/jsad.2007.68.208>

- Treno, A. J., Gruenewald, P. J., Grube, J. W., Saltz, R. F. & Paschal, M. J. (2015). Environmental approaches to prevention: A community-based perspective. In R. K. Ries, D. A. Fiellin, S. C. Miller & R. Saitz (Eds.), *The ASAM Principles of Addiction Medicine* (5th edition). Philadelphia, PA: Wolters Kluwer Health.
- Treno, A. J., Johnson, F. W., Remer, L. G. & Gruenewald, P. J. (2007). The impact of outlet densities on alcohol-related crashes: A spatial panel approach. *Accident Analysis and Prevention*, 39(5), 894–901. <https://doi.org/10.1016/j.aap.2006.12.011>
- Tucker, J. S., Pollard, M. S., de la Haye, K., Kennedy, D. P. & Green, H. D. (2013). Neighborhood characteristics and the initiation of marijuana use and binge drinking. *Drug and Alcohol Dependence*, 128(1–2), 83–89. <https://doi.org/10.1016/j.drugalcdep.2012.08.006>
- Ulijaszek, S. J. & McLennan, A. K. (2016). Framing obesity in UK policy from the Blair years, 1997–2015: The persistence of individualistic approaches despite overwhelming evidence of societal and economic factors, and the need for collective responsibility. *Obesity Reviews*, 17(5), 397–411. <https://doi.org/10.1111/obr.12386>
- Vaeth, P. A. C., Wang-Schweig, M. & Caetano, R. (2017). Drinking, alcohol use disorder, and treatment access and utilization among U.S. racial/ethnic groups. *Alcoholism: Clinical and Experimental Research*, 41(1), 6–19. <https://doi.org/10.1111/acer.13285>
- Victor, C., Scambler, S., Bond, J. & Bowling, A. (2000). Being alone in later life: Loneliness, social isolation and living alone. *Reviews in Clinical Gerontology*, 10(4), 407–417. <https://doi.org/10.1017/S0959259800104101>
- von Bertalanffy, L. (1968). *General System Theory: Foundations, Development, Applications*. New York: George Braziller.
- Warner, T. D. (2016). Up in smoke: Neighborhood contexts of marijuana use from adolescence through young adulthood. *Journal of Youth Adolescence*, 45(1), 35–53. <https://doi.org/10.1007/s10964-015-0370-5>
- Warren, J. C., Smalley, K. B. & Barefoot, K. N. (2015). Perceived ease of access to alcohol, tobacco and other substances in rural and urban US students. *Rural and Remote Health*, 15(4), 1–10. Retrieved from www.rrh.org.au/journal/article/3397
- Wechsler, H., Lee, J. E., Nelson, T. F. & Kuo, M. (2002). Underage college students' drinking behavior, access to alcohol, and the influence of deterrence policies. Findings from the Harvard School of Public Health College Alcohol Study. *Journal of American College Health*, 50(5), 223–236. <https://doi.org/10.1080/07448480209595714>
- Weitzman, E. R., Folkman, A., Folkman, K. L. & Wechsler, H. (2003). The relationship of alcohol outlet density to heavy and frequent drinking and drinking-related problems among college students at eight universities. *Health & Place*, 9(1), 1–6. [https://doi.org/10.1016/S1353-8292\(02\)00014-X](https://doi.org/10.1016/S1353-8292(02)00014-X)
- Welte, J. W., Barnes, G. M., Tidwell, M.-C. O., Hoffman, J. H. & Wieczorek, W. F. (2016a). The relationship between distance from gambling venues and gambling

- participation and problem gambling among U.S. adults. *Journal of Gambling Studies*, 32(4), 1055–1063. <https://doi.org/10.1007/s10899-015-9583-5>
- Welte, J. W., Tidwell, M.-C. O., Barnes, G. M., Hoffman, J. H. & Wieczorek, W. F. (2016b). The relationship between the number of types of legal gambling and the rates of gambling behaviors and problems across U.S. states. *Journal of Gambling Studies*, 32(2), 379–390. <https://doi.org/10.1007/s10899-015-9551-0>
- Wilcox, P., Quisenberry, N. & Jones, S. (2016). The built environment and community crime risk interpretation. *Journal of Research in Crime and Delinquency*, 40(3), 322–345. <https://doi.org/10.1177/0022427803253801>
- Wilson, N., Syme, S. L., Boyce, W. T., Battistich, V. A. & Selvin, S. (2016). Adolescent alcohol, tobacco, and marijuana use: The influence of neighborhood disorder and hope. *American Journal of Health Promotion*, 20(1), 11–19. <https://doi.org/10.4278/0890-1171-20.1.11>
- Winters, M., Brauer, M., Setton, E. M. & Teschke, K. (2010). Built environment influences on healthy transportation choices: Bicycling versus driving. *Journal of Urban Health*, 87(6), 969–993. <https://doi.org/10.1007/s11524-010-9509-6>
- Wood, L., Shannon, T., Bulsara, M., et al. (2008). The anatomy of the safe and social suburb: An exploratory study of the built environment, social capital and residents perceptions of safety. *Health & Place*, 14(1), 15–31. <https://doi.org/10.1016/j.healthplace.2007.04.004>
- World Health Organization & Food and Agriculture Organization of the United Nations (2003). *Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation*. Geneva, Switzerland: World Health Organization (Technical Report Series 916). Retrieved from www.who.int/nutrition/publications/obesity/WHO_TRS_916/en/
- Yip, W., Subramanian, S. V., Mitchell, A. D. & Lee, D. T. S. (2007). Does social capital enhance health and well-being? Evidence from rural China. *Social Science & Medicine*, 64(1), 35–49. <https://doi.org/10.1016/j.socscimed.2006.08.027>
- Zellner, D. A., Loaiza, S., Gonzalez, Z., et al. (2006). Food selection changes under stress. *Physiology & Behavior*, 87(4), 789–793. <https://doi.org/10.1016/j.physbeh.2006.01.014>
- Ziersch, A. M., Baum, F. E. & Putland, C. (2005). Neighbourhood life and social capital: The implications for health. *Social Science & Medicine*, 60(1), 71–86. <https://doi.org/10.1016/j.socscimed.2004.04.027>