

Annual Review of Public Health

Promoting Health Equity Through Preventing or Mitigating the Effects of Gentrification: A Theoretical and Methodological Guide

Helen V.S. Cole,¹ Isabelle Anguelovski,^{1,2}
Margarita Triguero-Mas,^{1,3} Roshanak Mehdipanah,⁴
and Mariana Arcaya³

¹Barcelona Lab for Urban Environmental Justice and Sustainability, Institut de Ciència i Tecnologia Ambientals (ICTA-UAB), Universitat Autònoma de Barcelona, Barcelona, Spain; email: helen.cole@uab.cat

²Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

³Department of Urban Studies and Planning, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

⁴School of Public Health, University of Michigan, Ann Arbor, Michigan, USA

ANNUAL
REVIEWS **CONNECT**

www.annualreviews.org

- Download figures
- Navigate cited references
- Keyword search
- Explore related articles
- Share via email or social media

Annu. Rev. Public Health 2023. 44:193–211

The *Annual Review of Public Health* is online at publhealth.annualreviews.org

<https://doi.org/10.1146/annurev-publhealth-071521-113810>

Copyright © 2023 by the author(s). This work is licensed under a Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See credit lines of images or other third-party material in this article for license information.



Keywords

gentrification, displacement, urban regeneration, health equity, urban health

Abstract

Public health researchers are increasingly questioning the consequences of gentrification for population health and health equity, as witnessed in the rapid increase in public health publications on the health (equity) effects of gentrification. Despite methodological challenges, and mixed results from existing quantitative research, qualitative evidence to date points to the role of gentrification processes in exacerbating health inequities. Here we discuss past methodological and theoretical challenges in integrating the study of gentrification with public health research. We suggest taking an interdisciplinary approach, considering the conceptualization of gentrification in measurement techniques and conceiving this process as a direct exposure or as a part of broader neighborhood changes. Finally, we discuss existing

policy approaches to mitigating and preventing gentrification and how these could be evaluated for effectiveness and as public health promotion and specifically as interventions to promote health equity.

INTRODUCTION

From its origin in 1964, with Ruth Glass's now classic study of London's working-class neighborhood transformations into higher-income enclaves from which original residents were displaced (55), gentrification has gained huge interest from urban policy and planning, academic disciplines, media, and activism. Many urban residents themselves know how to recognize gentrification, from the introduction of trendy barber shops, organic food stores, \$5 barista-made lattes, and yoga studios to iconic parks and, of course, large-scale luxury real estate development and condo conversion in previously underinvested yet affordable areas. Yet, moving from a broader understanding of this process of unequal urban (re)development toward formalizing indicators of gentrification and using these measures to investigate the impact of gentrification on health and health equity requires a few key steps: engaging with key literature across the social sciences; innovating measurements, methods, and design; incorporating policy and planning perspectives (33); and thus producing a more critical, interdisciplinary, and socially engaged public health scholarship. Here we provide an overview of key conceptual challenges, discuss the progress to date in studying gentrification from a public health perspective, and finally suggest future directions for research and for the development and evaluation of policies to prevent the negative health (equity) effects of gentrification processes.

GENTRIFICATION VERSUS OTHER URBAN PROCESSES

Gentrification is often grouped together with urban "renewal," "regeneration," or "revitalization" (91, 117), urban development processes all presented globally as means to "improve" neighborhoods or address so-called "blight" or "decay." European scholars tend to use the term regeneration, while the US literature refers to renewal or revitalization. As a group, these terms all involve physical and financial investments, policies, and programs crafted to respond to underinvestment, concentrated poverty, building and land abandonment, and related social and health problems (104, 118), including cardiovascular diseases, diabetes, and obesity; substance use; and stress and depression. Yet, gentrification is a direct consequence of new public and private investment in neighborhoods and also leads to further resources and amenities being brought into the area after new, wealthier residents start to arrive (83).

Gentrification generally refers to commercial, demographic, and real estate price changes due to local, national, or global investments geared toward higher-income and white residents (24, 31, 80, 81). Social change indicative of gentrification tends to be measured using publicly available data (56, 59, 134), at the census tract or neighborhood level. Gentrification is found to take place when researchers identify increases in median income, percentage of residents with a university education, white residents, and housing prices/values, along with decreases in non-university-educated residents, nonwhite residents, and lower-priced homes (15, 52). These factors combined with sociocultural and physical displacement of long-term traditional residents are the core difference between gentrification and other urban development processes. Scholars have identified a variety of drivers to explain how gentrification processes start. These drivers include an influx of artists (27), commercial revitalization (125), migration of white professionals (67, 126), physical proximity of the neighborhood to affluent areas and economic amenities (86), decreased crime rates

(16, 98), a gap between existing and potential ground rent (120, 121) including “green gaps” (that is, the perceived benefits and accrued values generated by land cleanup and green interventions) (7), urban renewal and public housing demolition policies (79, 130), and global competition for resources and the so-called “knowledge economy” (82, 133).

In response to a long-time scholarly neglect in explaining how racial conflict shapes gentrification (23), the gentrification literature has recently paid more attention to the racial dimension of gentrification and the central role played by racial capitalism in shaping urban space (103), extracting financial value from previously marginalized neighborhoods (107), especially those with a legacy of segregation, discrimination, and stigmatization. In the United States, cities such as Detroit, Michigan, are at the center of such contemporary urban struggles through new land and property devaluation and acquisition dynamics by white investors and developers, especially since the 2007 financial crisis (108). Racial capitalism, as an economic system through which racial difference defines opportunities for value and profit accumulation (105), is able to use gentrification in order to reproduce difference and exclusion as well as segregation dynamics (73) through a process known as racial ordering. This ordering maintains or exacerbates racial hierarchies through unequal resource distribution and through the discursive characterization of inferiority geared toward racialized groups whose neighborhoods are seeing redevelopment and reinvestment (23).

Through both settler colonial and postcolonial lenses [i.e., those explaining the racial and colonial structures behind gentrification (5, 72)], urban geographers and sociologists are demonstrating the complexities of how racialized hierarchies affect everyday relations in gentrification, most recently in health outcomes (6, 94). For instance, in cities Black and Brown residents have been shown to experience the imposed commercial choices, esthetics, and norms of white settlers (22, 125) who devalue and selectively appropriate racialized aspects of neighborhood culture and history. In Washington, DC, for example, the rebuilding and reimagining of the H Street NE (Northeast) corridor involved the branding of a depoliticized Black “coolness” in this multicultural neighborhood. After decades of racialized disinvestment, Blackness is now being appropriated by investors and new residents who are accruing the benefits of new commodities, revamped cultural venues, and new condos (109). Put differently, research shows that gentrification, and commercial-led gentrification in particular, tends to have deep sociocultural ramifications for communities of color because gentrification, through the common process of rent seeking, involves the selective revaluation and appropriation of features that can be attractive to gentrification as “cool” or “vibrant” and thus have been shown to commodify racialized spaces (101, 125).

The early stages of gentrification, which may begin with students or artists, for example (27), moving into affordable neighborhoods to benefit from lower commercial or residential rental prices, pave the way for more advanced gentrification processes later on, including those that involve large-scale real estate development and more extreme demographic changes occurring over time, in what is sometimes referred to as hypergentrification (78). While early-stage gentrification can seemingly bring a new array of benefits to a neighborhood—including lower crime and new green space—more advanced stages of gentrification tend to create a new wave of social ills and health impacts (75, 96, 111, 132). Several studies also demonstrate that as neighborhoods begin to gentrify, they experience an increase in punitive policing strategies such as order-maintenance citations and proactive arrests, potentially catering to the demands of new residents from the “creative class” (19, 39, 76). As gentrification becomes a more consolidated process, the health impacts of new urban amenities tend to be positive mostly for the gentrifiers, but less so for gentrified residents (38).

Despite long-standing debates about the global and local variations of gentrification (70, 81) and about the production-side versus consumption-side explanations for the causes of gentrification (83), scholars tend to agree that structural forces (production) as defined by Smith (120)

and cultural dynamics (consumption) as proposed by Ley (85) are interdependent and coexist in gentrification (30, 60, 83). Of major importance for studying the potential health impacts of gentrification is whether and how gentrification contributes to displacement; most studies concur about the strong relationship between the two types of gentrification causes (production side and consumption side). Displacement is found to occur through multiple forms of violence, including the destruction of networks and resources vulnerable residents have access to, appropriation of existing or new amenities by gentrifiers, and housing loss and evictions (47, 48, 89, 93). Fear of displacement—with all the anxiety, stress, and uncertainty linked to fighting for one's home and searching for a new home (21)—is different from experienced displacement—with all the uprooting and adaptation it has triggered—and thus likely has different—although also acute—health impacts.

From a research standpoint, the health outcomes of gentrification are difficult to measure once residents are forced to move out because it tends to be difficult to track and identify displaced residents and, thus, difficult to monitor their health over time (6, 37). Displacement can also be experienced in multiple ways (6, 89): for example, direct physical displacement caused by homes being demolished and replaced by mixed or upper-income developments, as has been the case throughout urban renewal projects in the United States; financial displacement due to rising rents, home sale prices, and property taxes that price out existing residents; and sociocultural displacement causing residents to feel a sense of social erasure, a loss of sense of community and place attachment, and a sense of discomfort as their neighborhood changes.

Gentrification–Health Pathways

As far as we know, only four studies have previously formally and purposefully explored the potential pathways between gentrification and health (6, 13, 51, 109), summarized in **Figure 1**. We present a comprehensive framework that visualizes the relationships between the main hypothesized pathways linking gentrification and health: (a) increased real estate speculation and housing costs leading to displacement; (b) sociocultural, legal, symbolic, and emotional erasure and displacement; and (c) the transformation of the physical environment and changes to amenity accessibility. These different pathways may have varying roles for different health outcomes and for the patterns of health and health inequity among residents of gentrifying neighborhoods, providing many directions for future research.

Relationship Between Gentrification and Health: Findings to Date

While the literature on the health effects of gentrification is growing, the relationship between gentrification and health—and the health of historically marginalized residents in particular—remains poorly understood, owing, in part, to analytic challenges that are inherent to studying a highly spatially and socially patterned neighborhood-level phenomenon that lacks a singular shared definition, operates over variable geographic and temporal scales, and displaces affected residents to new areas, complicating the collection of longitudinal data on residents' lives, living conditions, and health. As a result and in response to this core methodological challenge, the literature on gentrification and health uses a wide range of definitions and measures of gentrification, uses repeated cross-sectional designs that fail to track displaced residents, studies the relationship among highly selected (i.e., not representative) samples, lacks theoretical justification for outcome and covariate selection, or covers time or geographic scales of questionable theoretical relevance (49, 129), all of which makes it challenging to combine insights across studies to definitively say how and how much gentrification matters for the health of historically marginalized residents across different time periods.

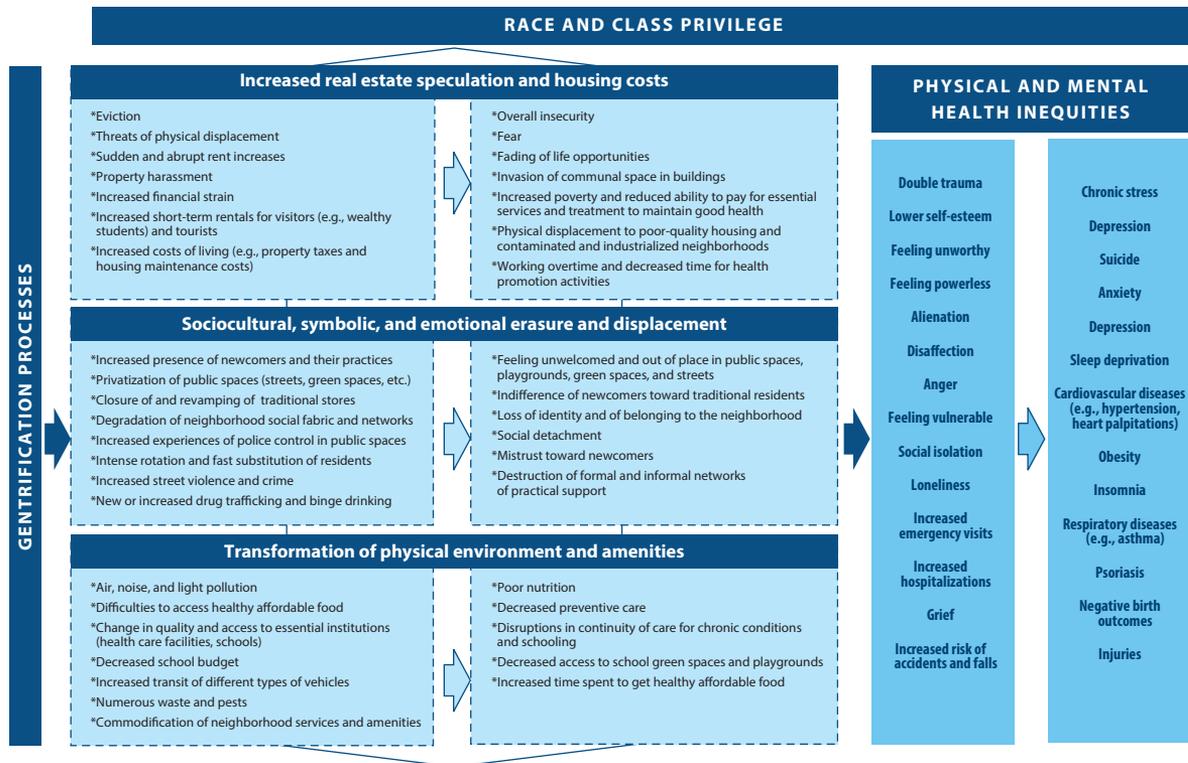


Figure 1

Potential pathways through which gentrification can affect physical and mental health inequities. Figure based on information from Anguelovski et al. 2020 (13), Anguelovski et al. 2021 (6), Sánchez-Ledesma et al. 2020 (109), and Formoso et al. 2010 (51).

In recent years, several review articles have taken on the challenge of summarizing this literature, all of which concluded that collected evidence on the health effects of gentrification is currently still recent and weak but also that effects, when documented, are highly heterogeneous. However, much of this literature focuses on the health of all residents, including gentrifiers, and thus does not often start from the life changes experienced by vulnerable residents nor does it prioritize health equity considerations. For example, Smith et al. (119) screened the titles and abstracts of ~6,000 studies for potential inclusion in a systematic review on US population-based studies investigating the health effects of gentrification published as of July 2018. Their search yielded only six peer-reviewed, US-based studies that were eligible for inclusion based on relevance and the use of health and gentrification measures to estimate a quantitative measure of association between the two. Results from the review suggested that while overall associations between gentrification and health were largely null, gentrification was associated with worse health among Black populations in particular (119). A second review study also examined studies on gentrification and health published between 2000 and 2018, concluding, based on 22 empirical studies, that the literature is characterized by a mix of positive, negative, and null associations (111). In 2020, a third review of 36 eligible studies, including 12 published after the cutoff dates of the first two, found similar results, highlighting that gentrification appears not to have a uniform effect across different population groups; those in more marginalized groups such as the elderly and Black residents are affected more than younger, white residents (20). Several other reviews examine the health effects of neighborhood changes theorized to accompany gentrification, for example,

urban development more generally (90), transportation infrastructure changes (74), changes in the food environment, or disruption to social networks (64), without direct analyses of gentrification itself.

Since the publication of these reviews, additional published studies have suggested that the relationship between gentrification and health, when examined through quantitative data measuring associations, is negligible after controlling for potential confounders and is highly contingent on other factors when documented at all. For example, Barton et al. (17) show crude associations between gentrification and worse self-rated physical and mental health, but these associations disappear after adjustment for neighborhood collective resources and other neighborhood measures. Schnake-Mahl et al. (110) use a quasi-experimental design to examine the effects of gentrification on body-mass index, psychological distress, and self-rated health among a sample of Hurricane Katrina survivors and also find null effects for all three outcomes. Agbai (2) uses longitudinal data from Los Angeles to examine associations between residence in a gentrifying neighborhood and self-reported health and found that longer residence in a gentrifying neighborhood is actually associated with better self-reported health, without variation by race/ethnicity. A lack of longitudinal follow-up data in this case means that it is unclear whether these results may be due to selection bias regarding who leaves and who stays. However, Henson et al. (61) find that gentrification is associated with more asthma-related visits to the emergency department.

While these and other primarily quantitative studies about the costs that gentrification imposes on health create a confusing evidence base, qualitative work paints a more nuanced but clearer picture of gentrification as a process that causes stress, exclusion, lower social cohesion, loss of control, and other psychosocial stressors on vulnerable groups (21, 63). This discrepancy points to the need for mixed-methods research to be applied to improving our understanding of how and when gentrification may be linked to health and health equity.

Types of Gentrification and Their Unique Implications for Health

In addition to a broad focus on gentrification as a form of unequal and extractive urban development (83), scholars have also distilled different types of gentrification (37), each of them with both common and unique implications for social and health outcomes. For instance, commercial gentrification is implicated by the replacement of traditional stores and businesses with trendy and exclusive boutiques (3, 112). A subset of commercial gentrification is food gentrification. Here new expensive organic stores and supermarkets open up and often replace more affordable options, creating “food mirages” (4, 124) for working-class residents now faced with new food options but with increasing difficulty to pay for that food (and housing) and, therefore, to make healthy nutrition choices (6, 131). Tourism gentrification—and at times related student gentrification—also concerns the loss of food and other store options in favor of new tourism (and student) venues, although in the case of tourism/student gentrification, access to housing, public services, and safe public spaces also becomes compromised for traditional residents (12, 31, 43, 57, 88, 96, 109, 113). Commercial changes also take place in health care gentrification, whereby health care as an essential service and public good is increasingly transformed into a luxury elite amenity for wealthy residents and those with private insurance through the siting of facilities according to payer mix rather than need; transformations in health care systems themselves then lead to the closing of hospitals that do not make a profit and to changes in the types of care provided (6, 35, 37). These factors in turn affect historically marginalized residents’ access to quality health care, especially for those most at risk for chronic disease, for whom providing needed care is not profitable.

Greenways, parks, plazas, gardens, or climate infrastructure can also be the object of gentrification through environmental gentrification (8, 9, 40, 53, 58, 84). Here researchers focus on the role of the improvement or creation of new environmental amenities in driving gentrification

processes. This dynamic is itself broken into transit or bike gentrification (42, 50, 122), through new transit and bike infrastructure and their related transit-oriented development; green gentrification (9, 10, 14, 36, 58), when referring to green infrastructure per se; and climate gentrification, when concerning the role played by climate mitigation or adaptation infrastructure in gentrification (11, 71, 114, 115). The relationship between new green spaces and gentrification may also vary by time, type of green space, or contextual aspects of the specific city (8, 127). Environmental gentrification poses unique health impacts (36) on historically marginalized residents, including increased loss of place attachment and social cohesion, loss of relational well-being, chronic stress, and mental health burdens (6). These impacts are created by what researchers identify as “disruptive green landscapes” (102, 128), whereby the social impacts such as exclusion resulting from gentrification lead residents not to engage with or benefit from new or improved green spaces in their neighborhoods. As environmental gentrification often occurs in areas with histories of environmental degradation, cleanup of environmental hazards and new green amenities occurring along with gentrification may lead instead to compounded environmental health risks (34). Rather than being environmental resources for neighborhood residents, as traditionally conceptualized, the health benefits of new green amenities seem thus to accrue only for higher-income and more educated groups (38).

NEW DIRECTIONS FOR RESEARCH ON THE HEALTH EFFECTS OF GENTRIFICATION

In addition to the need to further clarify how and when gentrification affects health and health equity, and those challenges in current research mentioned above (i.e., a lack of longitudinal studies, nonrepresentative samples, a lack of theoretically justified outcomes and covariates, and the challenge of selecting a relevant geographical scale), there are several directions in which research on the health effects of gentrification can be advanced. We highlight three such aspects below: future directions in exposure assessment, evaluation of the effects of different types of gentrification, and movement toward interdisciplinary approaches.

Exposure Assessment

In nearly all studies exploring the associations between gentrification and health, exposure to gentrification generally implies the existence of gentrification processes near one’s residence, although no standardized method of measuring gentrification, or exposure to it, exists (20, 92, 111, 129). In quantitative research, such as those methods most used by public health researchers, the method commonly used to assess the existence of gentrification has been the use of census data to measure various aspects of demographic and socioeconomic changes, although variations in the variables and details of methods used to calculate gentrification also lead to variation in exposure assessment (92).

A common gentrification indicator used in health studies is a composite score that includes all or some of the following dimensions, often benchmarking neighborhood-level change to the average change across the city being studied: changes in household income, percentage of underprivileged races/ethnicities, population level of education, population occupation, rental prices, population age distribution, building age, and/or urbanized area over a period of 3–20 years at the census tract or neighborhood level (38, 54, 65, 68, 69, 87); no gold standard exists, however, regarding which variables and how many variables should be included. Indicators can also vary by country or even city, depending on which groups are locally deemed as most vulnerable. For example, in one study from Barcelona, Spain, researchers included a variable with local relevance on the percentage of residents over age 65 who live alone (10). Different demographic and real

estate indicators may be available at different geographical units and at different regularity in different cities and countries, so gentrification exposure assessment is highly dependent on the availability of secondary data. However, as research on gentrification and health increases, having comparable gentrification indicators is increasingly important (20, 111), even if using the same exact measures across different places and types of gentrification may not be advisable (33). Accordingly, researchers may want to develop highly customized indicators to evaluate with high internal validity the associations between gentrification and health in specific cities, while also using more general indicators that can be comparable across contexts; this approach therefore would also increase the external validity of studies on the relationships between gentrification and health.

Moreover, determining the appropriate time period to be studied is an important challenge for researchers because different periods may be pertinent for specific health outcomes and populations. For example, anxiety and insomnia may appear during early stages of gentrification, whereas studying the effect of gentrification on birth outcomes and cardiovascular diseases may be relevant only after months or years of exposure to gentrification. Complicating these decisions are the practical decisions that one must make owing to the availability of data, particularly when relying on secondary data such as census data often used to measure gentrification quantitatively; these data are available only for certain years and cannot track changes more regularly and over short time increments. Similarly, the question of which geographic indicators best approximate a neighborhood is complicated both conceptually and practically, owing to the lack of availability of data attached to finite geographic indicators, especially in the case of health data that must be kept secure and confidential. The use of residential administrative boundaries may not represent actual experiences and exposure to gentrification. Administrative boundaries do not correspond to residents' experiences of their neighborhoods, and residential location may not correspond with where people spend most of their time. Future studies should shed light on whether associations with health are sensitive to the use of different gentrification indicators, neighborhood definitions, and different time periods, balancing the need to produce results that are both valid and generalizable.

In addition to using secondary data to estimate levels of gentrification by neighborhood quantitatively, researchers have begun to develop and validate survey questions to measure subjective gentrification, which they estimate may be more strongly associated with health outcomes than are objective measures because the former express the actual experiences and perceptions of residents (44, 62). Although these indicators can detect differences in perceptions and experiences within neighborhoods, collecting such data requires substantial resources and time from researchers, and thus they are less likely to allow researchers to collect representative data across multiple neighborhoods or cities. Moreover, so far, these questions have been validated only in isolated neighborhoods or cities. Looking forward, researchers should work toward refining subjective gentrification indicators and testing their validity across diverse settings. Future research can also compare how such indicators may reveal associations between gentrification and health (equity) that are different from or similar to those measured in past studies using indexes created using secondary data.

Evaluating the Health Effects of Different Types of Gentrification

As discussed above, gentrification research to date highlights the many drivers and respective types of gentrification. So far, few studies have conceptualized the type of gentrification—real estate, commercial, tourism, student, green—present when studying its health effects (for exceptions, see 32, 37, 94), despite that different types of gentrification may indicate different impacts on health and different pathways between gentrification and health (37). Thus, in cases where a specific driver or type of gentrification is identified, in designing a study to evaluate the health effects

of these processes, the specific type of gentrification should be considered, thus matching the narrative and trajectory of neighborhood changes occurring in the area studied.

For instance, in some cases, rather than considering gentrification a primary exposure, it might be more relevant to consider gentrification a moderating or mediating factor and plan analyses accordingly (33). Thus, if the hypothesized pathway includes a driver of gentrification (such as mass tourism, green space or climate mitigation infrastructure development, or a commercial landscape that provides health-promoting resources such as healthy foods but caters to a middle- or upper-class population rather than long-term residents), perhaps the question worth asking is whether the gentrification process resulting from these changes has changed who or how residents benefit from these driving changes and less so how gentrification directly affects health.

Because gentrification has been shown to lead to social exclusion (63) and often to lead to actual or threatened physical displacement (47, 48, 89, 93) affecting long-term, lower-income, and/or racialized minority residents, it is important to understand how exclusion resulting from gentrification may affect residents' access to important neighborhood resources (such as green and open space, healthy food, affordable health care, and others). Research designs must reflect this understanding but also ensure that the corresponding exposures are included in quantitative or qualitative analysis. Doing so may then reflect the intended impact of the study: to advance general knowledge and/or to have an impact on policy or inform the development of interventions and to determine what new knowledge or information could contribute most to debates around the effects of gentrification.

Towards an Interdisciplinary Approach

Emerging literature relating to the health effects of gentrification generally takes a public health approach, using epidemiological study designs and analytical methods to test whether living in a gentrifying neighborhood may affect one's health. As such, some investigators have argued for the need for a more standardized quantitative measure of gentrification itself (see above) in order to increase the generalizability of findings across cities using such methods. At the same time, others advocate for a more context-dependent definition and measurement of gentrification, which would allow for a more valid and fine-tuned analysis of a specific gentrification dynamic being studied, despite potentially decreasing generalizability (33). Methods used to understand gentrification from a more nuanced approach include surveys, interviews, observation, participatory methods such as photovoice or photo walks, as well as more ethnographic methods. Here we argue that both approaches are valid and should be recognized and used for their intrinsic value rather than delegitimized by either scholarly tradition. More recently, several authors have pointed to the potential pathways by which gentrification may affect health (6, 13, 109). These analyses have relied on a more interdisciplinary approach, including geography, sociology, and planning, that concerns the potential drivers and consequences of gentrification, which may in turn lead to better or worse health outcomes or to exacerbated health inequities.

Moving forward in our understanding of how gentrification impacts health, we must consider not just the rigor of the methods we use but also the appropriateness of the types of questions we ask. Here deductive reasoning—or the determination that if the premises argued are true then the conclusion is also true (29)—is often preferred in biomedical and public health research (for good reason, when research concerns analysis of physiological outcomes or exposures and when the goal of a study is to determine the cause or effect of an exposure or an intervention, with potentially deadly or life-saving implications). Despite that this logic predominates in medical and public health research, it may not be how many people process and understand public health information (41). On the other hand, inductive reasoning is employed in many social sciences, such as those disciplines that have pioneered the development, theorization, and conceptualization of

complex urban social processes such as gentrification. This approach uses the synthesis of a set of observations to develop a general principle or theory, therefore allowing for less certainty, but more nuances and a finer understanding of processes and impacts, than the deductive approach (29).

By extension, repeatedly asking whether gentrification affects health is potentially not helpful in the overall public health goal of achieving better and more equitable health outcomes for all. Based on what we know about gentrification from a legacy of sociological, urban geography, and urban planning scholars, we might instead ask, Whom does gentrification benefit, or harm, and how? Asking this question requires that we embrace a more inductive approach to asking questions rather than relying on deductive approaches, which lead to results that are sound but may not be useful for developing policies or programs that attempt to reduce the negative effects of gentrification on health or health equity. As discussed above, the complexities of gentrification processes have so far led to mixed quantitative epidemiological results regarding the health effects of these processes, whereas qualitative work clearly identifies more complex and refined gentrification–health pathways and how social and cultural exclusion resulting from gentrification may change which or how different populations experience their neighborhood environments and changes to them. Thus, taking an interdisciplinary approach to posing questions, and answering them, may ultimately drive forward our ability to address complex social issues such as gentrification from a public health perspective.

POLICY IMPLICATIONS

Existing research highlights the potential of gentrification to contribute to the exacerbation of health inequities along various pathways. Thus, advancing and evaluating policy interventions that can ameliorate the effects of gentrification, or prevent gentrification from occurring in the first place, could help to improve health equity in neighborhoods and cities experiencing, or at risk for experiencing, gentrification.

Preventing Gentrification

Interventions addressing affordable housing and community development to prevent gentrification and displacement have focused largely on efforts that help with the preservation and production of affordable housing and the stabilization of neighborhoods (135). However, interventions that tackle the root causes of gentrification (including racial capitalism, the financialization of housing, economic and urban development policy that favors wealthy interests, and lack of political power among low-income and racialized populations) are also needed (66). Here we provide examples of each of these types of efforts.

The preservation and new construction of affordable and public housing in existing buildings in gentrified neighborhoods could help counteract displacement within a shorter time frame compared with housing production strategies (28). The feasibility of these interventions is often more within the reach and budget of municipalities. Interventions can include protection of unsubsidized affordable housing; housing rehabilitations; funding for public and social housing through tax levies, including development tax, transfer tax, tax on empty housing, and tax on tourism venues; and incentives such as density bonuses, inclusionary zoning, tax breaks, or improved financing conditions for the development of affordable homes (28, 95, 97). By identifying areas that have the potential to be gentrified, cities can either acquire vacant homes and rehabilitate them or provide resources, including funding to owners, to do so. Community land trusts, which offer collective ownership to ensure community stewardship of land, are a more extensive approach to preserving housing. Over time, community land trusts, as compared with conventional home

mortgages, help provide low- and middle-income owners with the opportunity to build equity and provide more protection against foreclosures (1, 32). However, much like other interventions, their success relies on various factors, including the combination of several measures, resources to manage them, arrangements for financing with owners, and the current housing market surrounding them (32). Nonetheless, they provide some protection against gentrification and promote the ability for low- and middle-income residents to remain in the neighborhood.

The production of new affordable housing not only increases the supply but also could help moderate housing costs by making housing more affordable to more residents. However, research has also shown that new production at the market rate could increase rent across the area, making it unaffordable for low-income households to move in (28). This strategy also does not protect the interests of already housed residents who are threatened with displacement due to rising rents, property taxes, home insurance prices (for low-income homeowners), and other costs of living. Therefore, a focus on the production and permanent protection of subsidized housing or housing intended for lower-income residents could promote income-diverse areas but provide only moderate protection against displacement among current residents. The production of protected housing can also help to house residents previously displaced by gentrification through a Right to Return program in their previous neighborhood (i.e., Portland).

Programs aimed at stabilizing neighborhoods, which help ensure that tenants can stay in their gentrified neighborhoods, are considered more direct forms of antidisplacement policies than the production and preservation of housing. Such programs include rent control policies and initiatives aimed at helping renters and owners at risk for eviction and foreclosure, respectively. Rent control policies that restrict the annual rent increases in certain buildings or areas are one of the more common interventions used in the United States and in many parts of Europe to stabilize rent (123). While these policies could help prevent displacement and stabilize neighborhoods, some studies have found that landlords can let these units deteriorate until tenants leave, allowing landlords to remove the unit so that it is no longer covered by rent control (45, 46). In some places, rent control or rent caps are put in place beyond the city limits, at the state or metropolitan level, such as in Oregon, United States, or Berlin, Germany, a strategy intended to prevent developers from locating their investments right next to their original location. Tenant right-to-counsel programs provide access to legal representation for renters facing eviction, while rental assistance programs can help prevent evictions by providing low-income renters facing economic difficulties with emergency funds to pay rent. For low-income owners, foreclosure assistance programs can offer financial support, payment plans, or counseling during economic hardships. In other cities, such as Cleveland, Ohio, local nonprofits and legal groups such as the Legal Aid Society of Cleveland and the Housing Justice Alliance have developed an eviction aversion initiative, an educational methodology for teaching landlords and tenants in order to build new relations between these two collectives, improve housing security, and reduce displacement.

Many examples of such policies and programs exist, but the effectiveness of these programs has rarely been evaluated owing largely to the complexities associated with data availability and the difficulties of measuring gentrification effects. Furthermore, most of the evidence from these evaluations has come from areas with a strong housing market such as San Francisco and New York, when the variability of the housing market between neighborhoods could play a significant role in the effectiveness of the program (18, 99, 100). However, combinations of these efforts can be effective against displacement. Such protections not only provide assistance to individuals, but also help reduce population turnover in neighborhoods, strategies that preserve stability and ultimately prevent cities from displacing low-wage workers needed for city function, including those working in essential professions such as retail, food and beverage services, construction, and building maintenance (106).

Evaluating the Health Impacts of Gentrification and Displacement-Prevention Policies and Programs

In addition to furthering research on how and when gentrification affects health, and designing interventions such as those described above that may either prevent gentrification and gentrification-related displacement or mitigate the social or health effects of gentrification processes, more research is also needed to evaluate the health impacts of these policies and programs. Along with seeking to understand whether such programs and policies work, evaluating their potential health benefits could be an important tool for advocacy and activism around the prevention of gentrification, in line with past strategies used by environmental justice activists more broadly (25, 26, 77, 116). Testing the potential health, or health equity, benefits of interventions meant to prevent or mitigate the effects of gentrification will require careful attention to both theoretical and methodological considerations. Researchers must decide which types of interventions to study, weighing the usefulness of evaluating common, but not comprehensive, interventions, against more intensive, but harder-to-fund, interventions. For example, researchers might want to test the ways in which building slightly more affordable housing blunts the effects of gentrification processes and therefore protects health so that they can show the importance of this standard housing production process. Researchers might want to study housing production victories won in the context of building housing justice movements, through direct action to protest racialized wealth extraction through real estate, or through power shifting to community actors with the logic that effect sizes associated with a more comprehensive response to gentrification would likely be larger.

Theoretical and content area expertise will also be required to determine which health outcomes would be most likely to respond to specific anti-gentrification interventions. For example, while largely quantitative papers show negligible or mixed associations between gentrification and health, qualitative data underscore the effects of gentrification in the form of stress, loss of control, damaged social cohesion, and other psychosocial outcomes. Evaluating interventions will require measuring health outcomes that are most affected by, or related to, the psychosocial processes described confidently in qualitative studies on gentrification and health. Methodologically, studies evaluating antidisplacement interventions with respect to health outcomes will need to grapple with identifying locally appropriate, available, recent, and interpretable measures of gentrification. They will also need to establish both geographic and temporal boundaries that make sense for the study of an inherently ever-evolving process. Finally, they will need to account for the health status of residents displaced by gentrification during the sampling phase of the project.

CONCLUSIONS

Over the past 15 years, interest in and discussion on the consequences of gentrification have reached the public health community and the community at large. This interest can be seen in the rapid increase in public health publications on the health effects of gentrification and in the increased discussions of gentrification in social and mass media as well as in local policy forums and municipal working groups. Despite methodological challenges, and mixed results from existing quantitative research, qualitative evidence to date points to the role of gentrification processes in exacerbating health inequities. To move public health research on this topic forward, we suggest taking an interdisciplinary approach, considering the conceptualization of gentrification in measurement techniques and conceiving this process as a direct exposure or as a part of broader neighborhood changes. Consideration should also be taken for the specific drivers of gentrification, in turn resulting in different types of gentrification and potentially different impacts on health or health equity. Finally, existing policy approaches to mitigating and preventing

gentrification should be evaluated for effectiveness and as public health promotion, and specifically as interventions to promote health equity.

SUMMARY POINTS

1. Although results of research examining the relationship between gentrification and the health of the population at large are mixed, a growing collection of quantitative and qualitative research shows that exposure to gentrification may be particularly detrimental to the health of historically marginalized groups.
2. External validity of studies on the relationship between gentrification and health may be improved by both (a) developing customized indicators to evaluate with high internal validity the associations between gentrification and health in specific cities, and (b) using more general indicators that can be comparable across contexts.
3. Future studies should shed light on whether associations with health are sensitive to the use of different gentrification indicators and neighborhood definitions and whether associations vary over different time periods, balancing the need to produce results that are both valid and generalizable.
4. Researchers should work toward refining subjective gentrification indicators and testing their validity across diverse settings. Future research can also compare how such indicators may reveal different or similar associations between gentrification and health (equity) as compared to those measured in past studies using indexes created using secondary data.
5. Taking an interdisciplinary approach to posing questions, and answering them, may ultimately drive forward our ability to address complex social issues such as gentrification from a public health perspective.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

The authors received financial support from the following sources during the writing of this article: the UAB–Banco Santander TALENT Fellowship program (to H.V.S.C.) and the Unit of Excellence María de Maeztu Programme of the Spanish Ministry of Science and Innovation (CEX2019-000940-M) (to H.V.S.C., I.A., and M.T.-M.).

LITERATURE CITED

1. Acolin A, Ramiller A, Walter RJ, Thompson S, Wang R. 2021. Transitioning to homeownership: asset building for low- and moderate-income households. *Hous. Policy Debate* 31(6):1032–49
2. Agbai CO. 2021. Shifting neighborhoods, shifting health: a longitudinal analysis of gentrification and health in Los Angeles County. *Soc. Sci. Res.* 100:102603
3. Angelovski I. 2015. Alternative food provision conflicts in cities: contesting food privilege, injustice, and whiteness in Jamaica Plain, Boston. *Geoforum* 58:184–94

4. Anguelovski I. 2015. Healthy food stores, greenlining and food gentrification: contesting new forms of privilege, displacement and locally unwanted land uses in racially mixed neighborhoods. *Int. J. Urban Reg. Res.* 39(6):1209–30
5. Anguelovski I, Brand AL, Ranganathan M, Hyra D. 2022. Decolonizing the green city: from environmental privilege to emancipatory green justice. *Environ. Justice* 15(1):1–11
6. Anguelovski I, Cole HVS, O’Neill E, Baró F, Kotsila P, et al. 2021. Gentrification pathways and their health impacts on historically marginalized residents in Europe and North America: global qualitative evidence from 14 cities. *Health Place* 72:102698
7. Anguelovski I, Connolly J, Brand AL. 2018. From landscapes of utopia to the margins of the green urban life. *City* 22(3):417–36
8. Anguelovski I, Connolly JJT, Cole H, Garcia Lamarca M, Triguero-Mas M, et al. 2022. Green gentrification in European and North American cities. *Nat. Commun.* 13:3816
9. Anguelovski I, Connolly JJT, Garcia-Lamarca M, Cole H, Pearsall H. 2019. New scholarly pathways on green gentrification: What does the urban ‘green turn’ mean and where is it going? *Prog. Hum. Geogr.* 43(6):1064–86
10. Anguelovski I, Connolly JJT, Masip L, Pearsall H. 2018. Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. *Urban Geogr.* 39(3):458–91
11. Anguelovski I, Connolly JJT, Pearsall H, Shokry G, Checker M, et al. 2019. Why green “climate gentrification” threatens poor and vulnerable populations. *PNAS* 116:26139–43
12. Anguelovski I, Kotsila P, Moore D, Lennon M. 2022. Environmental inequities in fast-growing Dublin: combined scarcity of green space and affordable housing for The Liberties. In *The Green City and Social Injustice: 21 Tales from North America and Europe*, ed. I Anguelovski, JJT Connolly, pp. 200–12. New York: Routledge
13. Anguelovski I, Triguero-Mas M, Connolly JJT, Kotsila P, Shokry G, et al. 2020. Gentrification and health in two global cities: a call to identify impacts for socially-vulnerable residents. *Cities Health* 4:40–49
14. Argüelles L, Cole HVS, Anguelovski I. 2021. Rail-to-park transformations in 21st century modern cities: green gentrification on track. *Environ. Plan. E Nat. Space* 5:810–34
15. Atkinson R, Bridge G. 2005. *Gentrification in a Global Context: The New Urban Colonialism*. New York: Routledge
16. Barton MS. 2014. Gentrification and violent crime in New York City. *Crime Delinq.* 62(9):1180–202
17. Barton MS, Weil FD, Van de Voorde N. 2022. Interrogating the importance of collective resources for the relationship of gentrification with health. *Hous. Policy Debate*. <https://doi.org/10.1080/10511482.2022.2055616>
18. Barton SE. 2011. Land rent and housing policy: a case study of the San Francisco Bay area rental housing market. *Am. J. Econ. Sociol.* 70(4):845–73
19. Beck B. 2020. Policing gentrification: stops and low-level arrests during demographic change and real estate reinvestment. *City Community* 19(1):245–72
20. Bhavsar NA, Kumar M, Richman L. 2020. Defining gentrification for epidemiologic research: a systematic review. *PLOS ONE* 15(5):e0233361
21. Binet A, Zayas Del Rio G, Arcaya M, Roderigues G, Gavin V. 2022. “It feels like money’s just flying out the window”: financial security, stress and health in gentrifying neighborhoods. *Cities Health* 6:536–51
22. Bockman J. 2021. The aesthetics of gentrification: modern art, settler colonialism, and anti-colonialism in Washington, DC. *Int. J. Urban Reg. Res.* 45(5):759–77
23. Boyd M. 2008. Defensive development: the role of racial conflict in gentrification. *Urban Aff. Rev.* 43(6):751–76
24. Brown-Saracino J. 2009. *A Neighborhood That Never Changes: Gentrification, Social Preservation, and the Search for Authenticity*. Chicago/London: Univ. Chicago Press
25. Brulle RJ, Pellow DN. 2006. Environmental justice: human health and environmental inequalities. *Annu. Rev. Public Health* 27:103–24
26. Bullard RD, Wright BH. 1990. The quest for environmental equity: mobilizing the African-American community for social change. *Soc. Nat. Resour.* 3(4):301–11

27. Cameron S, Coaffee J. 2005. Art, gentrification and regeneration—from artist as pioneer to public arts. *Eur. J. Hous. Policy* 5(1):39–58
28. Chapple K, Loukaitou-Sideris A. 2021. *White paper on anti-displacement strategy effectiveness*. Agreem. 19RD018, Calif. Air Resour. Board, Sacramento
29. Christakos G, Olea RA, Serre ML, Yu H-L, Want L-L. 2005. *Interdisciplinary Public Health Reasoning and Epidemic Modelling: The Case of Black Death*. Berlin: Springer
30. Clark E. 2005. The order and simplicity of gentrification: a political challenge. See Ref. 15, pp. 261–69
31. Cocola-Gant A. 2018. Tourism gentrification. In *Handbook of Gentrification Studies*, pp. 281–93. Cheltenham, UK: Edward Elgar
32. Cohen M, Tatian PA. 2018. Can a community land trust give long-term residents a foothold in a changing neighborhood? *Urban Wire*, Jan. 29. <https://www.urban.org/urban-wire/can-community-land-trust-give-long-term-residents-foothold-changing-neighborhood>
33. Cole HVS. 2020. A call to engage: considering the role of gentrification in public health research. *Cities Health* 4:278–87
34. Cole HVS, Anguelovski I, Connolly JJT, García-Lamarca M, Perez-del-Pulgar C, et al. 2021. Adapting the environmental risk transition theory for urban health inequities: an observational study examining complex environmental risks in seven neighborhoods in Global North cities. *Soc. Sci. Med.* 277:113907
35. Cole HVS, Franzosa E. 2022. Advancing urban health equity in the United States in an age of health care gentrification: a framework and research agenda. *Int. J. Equity Health* 21(1):66
36. Cole HVS, Garcia Lamarca M, Connolly JJT, Anguelovski I. 2017. Are green cities healthy and equitable? Unpacking the relationship between health, green space and gentrification. *J. Epidemiol. Community Health.* 71(11):1118–21
37. Cole HVS, Mehdipanah R, Gullón P, Triguero-Mas M. 2021. Breaking down and building up: gentrification, its drivers, and urban health inequality. *Curr. Environ. Health Rep.* 8(2):157–66
38. Cole HVS, Triguero-Mas M, Connolly JJT, Anguelovski I. 2019. Determining the health benefits of green space: Does gentrification matter? *Health Place* 57:1–11
39. Collins CR, Stuart F, Janulis P. 2021. Policing gentrification or policing displacement? Testing the relationship between order maintenance policing and neighbourhood change in Los Angeles. *Urban Stud.* 59(2):414–33
40. Connolly JJT. 2019. From Jacobs to the Just City: a foundation for challenging the green planning orthodoxy. *Cities* 91:64–70
41. Cummings L. 2013. Public health reasoning: much more than deduction. *Arch. Public Health* 71(1):25
42. Dawkins C, Moeckel R. 2016. Transit-induced gentrification: Who will stay, and who will go? *Hous. Policy Debate* 26(4–5):801–18
43. Degen M, García M. 2012. The transformation of the “Barcelona Model”: an analysis of culture, urban regeneration and governance. *Int. J. Urban Reg. Res.* 36(5):1022–38
44. DeVlyder J, Fedina L, Jun H-J. 2019. The neighborhood change and gentrification scale: factor analysis of a novel self-report measure. *Soc. Work Res.* 43(4):279–84
45. Diamond R. 2018. *What does economic evidence tell us about the effects of rent control?* Rep., Brookings Inst., Washington, DC. <https://www.brookings.edu/research/what-does-economic-evidence-tell-us-about-the-effects-of-rent-control/>
46. Diamond R, McQuade T, Qian F. 2019. The effects of rent control expansion on tenants, landlords, and inequality: evidence from San Francisco. *Am. Econ. Rev.* 109(9):3365–94
47. Easton S, Lees L, Hubbard P, Tate N. 2020. Measuring and mapping displacement: the problem of quantification in the battle against gentrification. *Urban Stud.* 57(2):286–306
48. Elliott-Cooper A, Hubbard P, Lees L. 2020. Moving beyond Marcuse: gentrification, displacement and the violence of un-homing. *Progr. Hum. Geogr.* 44(3):492–509
49. Firth CL, Fuller D, Wasfi R, Kestens Y, Winters M. 2020. Causally speaking: challenges in measuring gentrification for population health research in the United States and Canada. *Health Place* 63:102350
50. Flanagan E, Lachapelle U, El-Geneidy A. 2016. Riding tandem: Does cycling infrastructure investment mirror gentrification and privilege in Portland, OR and Chicago, IL? *Res. Transp. Econ.* 60:14–24

51. Formoso D, Weber RN, Atkins MS. 2010. Gentrification and urban children's well-being: tipping the scales from problems to promise. *Am. J. Community Psychol.* 46(3-4):395-412
52. Freeman L, Braconi F. 2007. Gentrification and displacement New York City in the 1990s. *J. Am. Plan. Assoc.* 70(1):39-52
53. Garcia-Lamarca M, Anguelovski I, Cole H, Connolly JJT, Argüelles L, et al. 2021. Urban green boosterism and city affordability: For whom is the 'branded' green city? *Urban Stud.* 58(1):90-112
54. Gibbons J, Barton MS. 2016. The association of minority self-rated health with Black versus White gentrification. *J. Urban Health* 93(6):909-22
55. Glass R. 2010 (1964). Aspects of change. In *The Gentrification Debates: A Reader*, ed. J Brown Saracino, pp. 19-30. New York: Routledge
56. Glick J. 2008. Gentrification and the racialized geography of home equity. *Urban Aff. Rev.* 44(2):280-95
57. Gotham KF. 2005. Tourism gentrification: the case of New Orleans' Vieux Carre (French Quarter). *Urban Stud.* 42(7):1099-121
58. Gould KA, Lewis TL. 2017. *Green Gentrification: Urban Sustainability and the Struggle for Environmental Justice*. New York: Routledge
59. Hammel DJ, Wylie EK. 1996. A model for identifying gentrified areas with census data. *Urban Geogr.* 17(3):248-68
60. Hamnett C. 1991. The blind men and the elephant: the explanation of gentrification. *Trans. Inst. Br. Geogr.* 16(2):173-89
61. Henson LCO, Lyles CR, Khouderschah CJ, Law TJ. 2022. Impact of gentrification on asthma visits to the emergency department. *SN Soc. Sci.* 2(1):3
62. Hirsch JA, Grunwald HE, Miles KL, Michael YL. 2021. Development of an instrument to measure perceived gentrification for health research: perceptions about changes in environments and residents (PACER). *SSM Popul. Health* 15:100900
63. Holt SL, del Río-González AM, Massie JS, Bowleg L. 2021. "I live in this neighborhood too, though": the psychosocial effects of gentrification on low-income Black men living in Washington, DC. *J. Racial Etnic. Health Disparities* 8(5):1139-52
64. Hutchinson N, Dean LT, Smith GS. 2021. Gentrification and children's health: conceptualizing the impacts of neighborhood change through an environmental health disparities framework. *Int. Public Health J.* 13(4):389-401
65. Huynh M, Maroko AR. 2014. Gentrification and preterm birth in New York City, 2008-2010. *J. Urban Health* 91(1):211-20
66. Hwang J, Lin J. 2016. What have we learned about the causes of recent gentrification? *Cityscape* 18(3):9-26
67. Hyra DS. 2017. *Race, Class, and Politics in the Cappuccino City*. Chicago: Univ. Chicago Press
68. Izenberg JM, Mujahid MS, Yen IH. 2018. Gentrification and binge drinking in California neighborhoods: It matters how long you've lived there. *Drug Alcohol Depend.* 188:1-9
69. Izenberg JM, Mujahid MS, Yen IH. 2018. Health in changing neighborhoods: a study of the relationship between gentrification and self-rated health in the state of California. *Health Place* 52:188-95
70. Janoschka M, Sequera J, Salinas L. 2014. Gentrification in Spain and Latin America—a critical dialogue. *Int. J. Urban Reg. Res.* 38(4):1234-65
71. Keenan JM, Hill T, Gumber A. 2018. Climate gentrification: from theory to empiricism in Miami-Dade County, Florida. *Environ. Res. Lett.* 13(5):054001
72. Kent-Stoll P. 2020. The racial and colonial dimensions of gentrification. *Sociol. Compass* 14(12):e12838
73. Kirkland E. 2008. What's race got to do with it? Looking for the racial dimensions of gentrification. *West. J. Black Stud.* 32:18-30
74. Klingbaum A, Afful A, Gunaseelan V, Sathiyamoorthy T. 2021. Impacts of light rail transit development on neighborhood health: a scoping review through a social determinants of health lens. *J. Transp. Health* 21:101063
75. Kreager DA, Lyons CJ, Hays ZR. 2011. Urban revitalization and Seattle crime, 1982-2000. *Soc. Probl.* 58(4):615-39
76. Lanியonu A. 2018. Coffee shops and street stops: policing practices in gentrifying neighborhoods. *Urban Aff. Rev.* 54(5):898-930

77. Lee C. 2002. Environmental justice: building a unified vision of health and the environment. *Environ. Health Perspect.* 110(Suppl. 2):141–44
78. Lees L. 2008. Gentrification and social mixing: towards an inclusive urban renaissance? *Urban Stud.* 45(12):2449–70
79. Lees L, Ferreri M. 2016. Resisting gentrification on its final frontiers: learning from the Heygate Estate in London (1974–2013). *Cities* 57:14–24
80. Lees L, Ley D. 2008. Introduction to special issue on gentrification and public policy. *Urban Stud.* 45(12):2379–84
81. Lees L, Shin HB, López-Morales E. 2015. *Global Gentrifications: Uneven Development and Displacement*. Bristol, UK: Policy Press
82. Lees L, Shin HB, López-Morales E. 2016. *Planetary Gentrification*. Cambridge, UK: Polity
83. Lees L, Slater T, Wylie EK. 2008. *Gentrification*. New York: Routledge
84. Levenda AM, Tretter E. 2020. The environmentalization of urban entrepreneurialism: from technopolis to start-up city. *Environ. Plan. A Econ. Space* 52(3):490–509
85. Ley D. 1981. Inner-city revitalization in Canada: a Vancouver case study. *Can. Geogr./Géograph. Can.* 25(2):124–48
86. Ley D. 1986. Alternative explanations for inner-city gentrification: a Canadian assessment. *Ann. Assoc. Am. Geogr.* 76(4):521–35
87. Lim S, Chan PY, Walters S, Culp G, Huynh M, Gould LH. 2017. Impact of residential displacement on healthcare access and mental health among original residents of gentrifying neighborhoods in New York City. *PLOS ONE* 12(12):e0190139
88. Maldonado-Guzmán DJ. 2022. Airbnb and crime in Barcelona (Spain): testing the relationship using a geographically weighted regression. *Ann. GIS* 28:147–60
89. Marcuse P. 1985. Gentrification, abandonment, and displacement: connections, causes, and policy responses in New York City. *J. Urban Contemp. Law* 28:195–240
90. McCartney G, Hearty W, Taulbut M, Mitchell R, Dryden R, Collins C. 2017. Regeneration and health: a structured, rapid literature review. *Public Health* 148:69–87
91. Mehdipanah R, Marra G, Melis G, Gelormino E. 2018. Urban renewal, gentrification and health equity: a realist perspective. *Eur. J. Public Health* 28(2):243–48
92. Mujahid MS, Sohn EK, Izenberg J, Gao X, Tulier ME, et al. 2019. Gentrification and displacement in the San Francisco Bay area: a comparison of measurement approaches. *Int. J. Environ. Res. Public Health* 16(12):2246
93. Newman K, Wylie EK. 2006. The right to stay put, revisited: gentrification and resistance to displacement in New York City. *Urban Stud.* 43(1):23–57
94. Ong V, Skinner K, Minaker LM. 2021. Life stories of food agency, health, and resilience in a rapidly gentrifying urban centre: building a multidimensional concept of food access. *Soc. Sci. Med.* 280:114074
95. Oscilowicz E, Anguelovski I, Triguero-Mas M, García-Lamarca M, Baró F, Cole HVS. 2022. Green justice through policy and practice: a call for further research into tools that foster healthy green cities for all. *Cities Health* 6(5):878–93
96. Oscilowicz E, Honey-Rosés J, Anguelovski I, Triguero-Mas M, Cole H. 2020. Young families and children in gentrifying neighbourhoods: how gentrification reshapes use and perception of green play spaces. *Local Environ.* 25(10):765–86
97. Oscilowicz E, Lewartowska E, Levitch A, Luger J, Hajtmarova S, et al. 2021. *Policy and planning tools for urban green justice: fighting displacement and gentrification and improving accessibility and inclusiveness to green amenities*. Rep., Barcelona Lab. Urban Environ. Justice Sustain., Barcelona. <http://www.bcnuj.org/wp-content/uploads/2021/04/Toolkit-Urban-Green-Justice.pdf>
98. Papachristos AV, Smith CM, Scherer ML, Fugiero MA. 2011. More coffee, less crime? The relationship between gentrification and neighborhood crime rates in Chicago, 1991 to 2005. *City Community* 10(3):215–40
99. Parker M, Chapple K. 2019. Revisiting rent stabilization in the neighborhood context: the potential impact of rent regulation on community stability and security in the New York Metropolitan Region. *Fordham Urban Law J.* 46(5):1137–81

100. Pastor M, Carter V, Abood M. 2018. *Rent matters: What are the impacts of rent stabilization measures?* Rep., Univ. South Calif., Dornsife, Los Angeles. https://dornsife.usc.edu/assets/sites/242/docs/Rent_Matters_PERE_Report_Final_02.pdf
101. Payne AA, Greiner AL. 2019. New-build development and the gentrification of Oklahoma City's Deep Deuce neighborhood. *Geogr. Rev.* 109:108–30
102. Pérez del Pulgar C, Anguelovski I, Connolly J. 2020. Toward a green and playful city: understanding the social and political production of children's relational wellbeing in Barcelona. *Cities* 96:102438
103. Pulido L. 2017. Geographies of race and ethnicity II: environmental racism, racial capitalism and state-sanctioned violence. *Prog. Hum. Geogr.* 41(4):524–33
104. Roberts PW, Sykes H, Granger R. 2016. *Urban Regeneration*. London: Sage
105. Robinson CJ. 2000. *Black Marxism: The Making of the Black Radical Tradition*. Chapel Hill: Univ. N. C. Press
106. Ross M, Bateman N. 2019. *Meet the low-wage workforce*. Rep., Brookings Inst., Washington, DC
107. Rucks-Ahidiana Z. 2022. Theorizing gentrification as a process of racial capitalism. *City Community* 21:173–92
108. Safransky S. 2017. Rethinking land struggle in the postindustrial city. *Antipode* 49(4):1079–100
109. Sánchez-Ledesma E, Vázquez-Vera H, Sagarra N, Peralta A, Porthé V, Díez È. 2020. Perceived pathways between tourism gentrification and health: a participatory Photovoice study in the Gòtic neighborhood in Barcelona. *Soc. Sci. Med.* 258:113095
110. Schnake-Mahl A, Sommers BD, Subramanian SV, Waters MC, Arcaya M. 2020. Effects of gentrification on health status after Hurricane Katrina. *Health Place* 61:102237
111. Schnake-Mahl AS, Jahn JL, Subramanian SV, Waters MC, Arcaya M. 2020. Gentrification, neighborhood change, and population health: a systematic review. *J. Urban Health* 97(1):1–25
112. Shaw KS, Hagemans IW. 2015. 'Gentrification without displacement' and the consequent loss of place: the effects of class transition on low-income residents of secure housing in gentrifying areas. *Int. J. Urban Reg. Res.* 39(2):323–41
113. Shellae Versey H, Murad S, Willems P, Sanni M. 2019. Beyond housing: perceptions of indirect displacement, displacement risk, and aging precarity as challenges to aging in place in gentrifying cities. *Int. J. Environ. Res. Public Health* 16(23):4633
114. Shokry G, Anguelovski I, Connolly JJT, Maroko A, Pearsall H. 2021. "They didn't see it coming": green resilience planning and vulnerability to future climate gentrification. *Hous. Policy Debate* 32(1):211–45
115. Shokry G, Connolly JJT, Anguelovski I. 2020. Understanding climate gentrification and shifting landscapes of protection and vulnerability in green resilient Philadelphia. *Urban Clim.* 31:100539
116. Shrestha R, Flacke J, Martinez J, Van Maarseveen M. 2016. Environmental health related socio-spatial inequalities: identifying "hotspots" of environmental burdens and social vulnerability. *Int. J. Environ. Res. Public Health* 13(7):691
117. Slater T. 2006. The eviction of critical perspectives from gentrification research. *Int. J. Urban Reg. Res.* 30(4):737–57
118. Smith A. 2012. *Events and Urban Regeneration: The Strategic Use of Events to Revitalise Cities*. New York: Routledge
119. Smith GS, Breakstone H, Dean LT, Thorpe RJ Jr. 2020. Impacts of gentrification on health in the US: a systematic review of the literature. *J. Urban Health* 97:845–56
120. Smith N. 1979. Toward a theory of gentrification: a back to the city movement by capital, not people. *J. Am. Plan. Assoc.* 45(4):538–48
121. Smith N. 1987. Gentrification and the rent gap. *Ann. Assoc. Am. Geogr.* 77:462–65
122. Stein S. 2011. Bike lanes and gentrification: New York City's shades of green. *Progr. Plan.* 188:34–37
123. Sturtevant L. 2018. *The impacts of rent control: a research review and synthesis*. Rep., NMHC Res. Found., Washington, DC. <https://www.nmhc.org/globalassets/knowledge-library/rent-control-literature-review-final2.pdf>
124. Sullivan DM. 2014. From food desert to food mirage: race, social class, and food shopping in a gentrifying neighborhood. *Adv. Appl. Sociol.* 4(1):30–35
125. Summers B.T. 2019. *Black in Place: The Spatial Aesthetics of Race in a Post-Chocolate City*. Chapel Hill: Univ. N. C. Press

126. Tissot S. 2015. *Good Neighbors: Gentrifying Diversity in Boston's South End*, transl. D Broder, C Romatowski. London: Verso
127. Triguero-Mas M, Anguelovski I, Connolly JJT, Martin N, Matheney A, et al. 2022. Exploring green gentrification in 28 Global North cities: the role of urban parks and other types of greenspace. *Environ. Res. Lett.* 17(10):104035
128. Triguero-Mas M, Anguelovski I, García-Lamarca M, Argüelles L, Pérez del Pulgar C, et al. 2021. Natural outdoor environments' health effects in gentrifying neighborhoods: disruptive green landscapes for underprivileged neighborhood residents. *Soc. Sci. Med.* 279:113964
129. Tulier ME, Reid C, Mujahid MS, Allen AM. 2019. "Clear action requires clear thinking": a systematic review of gentrification and health research in the United States. *Health Place* 59:102173
130. Visser G, Kotze N. 2008. The state and new-build gentrification in Central Cape Town, South Africa. *Urban Stud.* 45(12):2565–93
131. Whittle HJ, Palar K, Hufstедler LL, Seligman HK, Frongillo EA, Weiser SD. 2015. Food insecurity, chronic illness, and gentrification in the San Francisco Bay Area: an example of structural violence in United States public policy. *Soc. Sci. Med.* 143:154–61
132. Williams K. 2014. *Transforming communities and crime?: An examination of gentrification and crime in St. Louis city*. PhD Diss., Dep. Sociol., N. C. State Univ., Raleigh. <https://repository.lib.ncsu.edu/handle/1840.16/9726>
133. Wylie E. 2015. Gentrification on the planetary urban frontier: the evolution of Turner's noösphere. *Urban Stud.* 52(14):2515–50
134. Zook M, Shelton T, Poorthuis A. 2019. Big data and the city. In *Handbook of Urban Geography*, ed. T Schwanen, R van Kempen, pp. 63–75. Cheltenham, UK: Edward Elgar
135. Zuk M. 2020. Preventing gentrification-induced displacement in the U.S.: a review of the literature and a call for evaluation research. In *The Routledge Handbook of Housing Policy and Planning*, ed. KB Anacker, MT Nguyen, DP Varady, pp. 302–16. New York: Routledge. 1st ed.

Contents

Epidemiology and Biostatistics

- A Literature Review of the Effects of Air Pollution on COVID-19
Health Outcomes Worldwide: Statistical Challenges
and Data Visualization
*A. Bhaskar, J. Chandra, H. Hashemi, K. Butler, L. Bennett, Jacqueline Cellini,
Danielle Braun, and Francesca Dominici* 1
- On-the-Go Adaptation of Implementation Approaches and Strategies
in Health: Emerging Perspectives and Research Opportunities
Elvin H. Geng, Aaloke Mody, and Byron J. Powell 21
- Enhancing Capacity for Food and Nutrient Intake Assessment
in Population Sciences Research
Marian L. Neuhouser, Ross L. Prentice, Lesley F. Tinker, and Johanna W. Lampe 37
- Innovations in Public Health Surveillance for Emerging Infections
Peng Jia, Shiyong Liu, and Shujuan Yang 55
- Cancers Attributable to Modifiable Risk Factors: A Road Map
for Prevention
Giulia Collatuzzo and Paolo Boffetta 279
- Using Rapid Randomized Trials to Improve Health Care Systems
Leora I. Horwitz and Holly A. Krelle 445

Social Environment and Behavior

- Early Childhood Education: Health, Equity, and Economics
Robert A. Hahn and W. Steven Barnett 75
- Environmental Justice: Where It Has Been, and Where It
Might Be Going
Merlin Chowkwanyun 93
- Health Misinformation Exposure and Health Disparities:
Observations and Opportunities
*Brian G. Southwell, Jessica Otero Machuca, Sabrina T. Cherry,
Melissa Burnside, and Nadine J. Barrett* 113

Leveraging Mobile Technology for Public Health Promotion: A Multidisciplinary Perspective <i>Jennifer L. Hicks, Melissa A. Boswell, Tim Althoff, Alia J. Crum, Joy P. Ku, James A. Landay, Paula M.L. Moya, Elizabeth L. Murnane, Michael P. Snyder, Abby C. King, and Scott L. Delp</i>	131
When Moving Is the Only Option: The Role of Necessity Versus Choice for Understanding and Promoting Physical Activity in Low- and Middle-Income Countries <i>Deborah Salvo, Alejandra Jáuregui, Deepti Adlakha, Olga L. Sarmiento, and Rodrigo S. Reis</i>	151
Promoting Health Equity Through Preventing or Mitigating the Effects of Gentrification: A Theoretical and Methodological Guide <i>Helen V.S. Cole, Isabelle Anguelovski, Margarita Triguero-Mas, Roshanak Mehdipanah, and Mariana Arcaya</i>	193
The Impacts of Paid Family and Medical Leave on Worker Health, Family Well-Being, and Employer Outcomes <i>Ann Bartel, Maya Rossin-Slater, Christopher Rubm, Meredith Slopen, and Jane Waldfogel</i>	429
 Environmental and Occupational Health	
A Literature Review of the Effects of Air Pollution on COVID-19 Health Outcomes Worldwide: Statistical Challenges and Data Visualization <i>A. Bhaskar, J. Chandra, H. Hashemi, K. Butler, L. Bennett, Jacqueline Cellini, Danielle Braun, and Francesca Dominici</i>	1
Environmental Justice: Where It Has Been, and Where It Might Be Going <i>Merlin Chowkwanyun</i>	93
Climatic and Environmental Change, Migration, and Health <i>Celia McMichael</i>	171
Promoting Health Equity Through Preventing or Mitigating the Effects of Gentrification: A Theoretical and Methodological Guide <i>Helen V.S. Cole, Isabelle Anguelovski, Margarita Triguero-Mas, Roshanak Mehdipanah, and Mariana Arcaya</i>	193
Public Health Implications of Drought in a Climate Change Context: A Critical Review <i>Coral Salvador, Raquel Nieto, Sergio M. Vicente-Serrano, Ricardo García-Herrera, Luis Gimeno, and Ana M. Vicedo-Cabrera</i>	213

Review of the Impact of Housing Quality on Inequalities in Health and Well-Being <i>Philippa Howden-Chapman, Julie Bennett, Richard Edwards, David Jacobs, Kim Nathan, and David Ormandy</i>	233
Sustainable and Resilient Health Care in the Face of a Changing Climate <i>Jodi D. Sherman, Andrea J. MacNeill, Paul D. Biddinger, Ozlem Ergun, Renee N. Salas, and Matthew J. Eckelman</i>	255
Public Health Practice and Policy	
On-the-Go Adaptation of Implementation Approaches and Strategies in Health: Emerging Perspectives and Research Opportunities <i>Elvin H. Geng, Aaloke Mody, and Byron J. Powell</i>	21
Innovations in Public Health Surveillance for Emerging Infections <i>Peng Jia, Shiyong Liu, and Shujuan Yang</i>	55
Leveraging Mobile Technology for Public Health Promotion: A Multidisciplinary Perspective <i>Jennifer L. Hicks, Melissa A. Boswell, Tim Althoff, Alia J. Crum, Joy P. Ku, James A. Landay, Paula M.L. Moya, Elizabeth L. Murnane, Michael P. Snyder, Abby C. King, and Scott L. Delp</i>	131
Public Health Implications of Drought in a Climate Change Context: A Critical Review <i>Coral Salvador, Raquel Nieto, Sergio M. Vicente-Serrano, Ricardo García-Herrera, Luis Gimeno, and Ana M. Vicedo-Cabrera</i>	213
Cancers Attributable to Modifiable Risk Factors: A Road Map for Prevention <i>Giulia Collatuzzo and Paolo Boffetta</i>	279
Public Health Preparedness for Extreme Heat Events <i>Jeremy J. Hess, Nicole A. Errett, Glenn McGregor, Tania Busch Isaksen, Zachary S. Wettstein, Stefan K. Wheat, and Kristie L. Ebi</i>	301
The State of the US Public Health Workforce: Ongoing Challenges and Future Directions <i>Jonathon P. Leider, Valerie A. Yeager, Chelsey Kirkland, Heather Krasna, Rachel Hare Bork, and Beth Resnick</i>	323
The Value and Impacts of Academic Public Health Departments <i>Paul C. Erwin, Julie H. Grubaugh, Stephanie Mazzucca-Ragan, and Ross C. Brownson</i>	343

Community Health Worker Integration with and Effectiveness in Health Care and Public Health in the United States <i>Molly Knowles, Aidan P. Crowley, Aditi Vasan, and Shreya Kangovi</i>	363
--	-----

Public Health and Prisons: Priorities in the Age of Mass Incarceration <i>David H. Cloud, Ilana R. Garcia-Grossman, Andrea Armstrong, and Brie Williams</i>	407
--	-----

Health Services

Sustainable and Resilient Health Care in the Face of a Changing Climate <i>Jodi D. Sherman, Andrea J. MacNeill, Paul D. Biddinger, Ozlem Ergun, Renee N. Salas, and Matthew J. Eckelman</i>	255
---	-----

Community Health Worker Integration with and Effectiveness in Health Care and Public Health in the United States <i>Molly Knowles, Aidan P. Crowley, Aditi Vasan, and Shreya Kangovi</i>	363
--	-----

Multilevel Determinants of Digital Health Equity: A Literature Synthesis to Advance the Field <i>Courtney R. Lyles, Oanh Kieu Nguyen, Elaine C. Khoong, Adrian Aguilera, and Urmimala Sarkar</i>	383
--	-----

Public Health and Prisons: Priorities in the Age of Mass Incarceration <i>David H. Cloud, Ilana R. Garcia-Grossman, Andrea Armstrong, and Brie Williams</i>	407
--	-----

The Impacts of Paid Family and Medical Leave on Worker Health, Family Well-Being, and Employer Outcomes <i>Ann Bartel, Maya Rossin-Slater, Christopher Ruhm, Meredith Slopen, and Jane Waldfogel</i>	429
--	-----

Using Rapid Randomized Trials to Improve Health Care Systems <i>Leora I. Horwitz and Holly A. Krelle</i>	445
---	-----

Indexes

Cumulative Index of Contributing Authors, Volumes 35–44	459
Cumulative Index of Article Titles, Volumes 35–44	466

Errata

An online log of corrections to *Annual Review of Public Health* articles may be found at <http://www.annualreviews.org/errata/publhealth>

Related Articles

From the *Annual Review of Animal Biosciences*, Volume 11 (2023)

Animal Models, Zoonotic Reservoirs, and Cross-Species Transmission of Emerging Human-Infecting Coronaviruses

Yakhoubu Kane, Gary Wong, and George F. Gao

Domestic Animals as Potential Reservoirs of Zoonotic Viral Diseases

Oyewale Tomori and Daniel O. Oluwayelu

From the *Annual Review of Biomedical Data Science*, Volume 5 (2022)

Genome Privacy and Trust

Gamze Gürsoy

Developing and Implementing Predictive Models in a Learning Healthcare System: Traditional and Artificial Intelligence Approaches in the Veterans Health Administration

David Atkins, Christos A. Makridis, Gil Alterovitz, Rachel Ramoni, and Carolyn Clancy

From the *Annual Review of Cancer Biology*, Volume 6 (2022)

Tracing and Targeting the Origins of Childhood Cancer

Tim H.H. Coorens and Sam Behjati

From the *Annual Review of Clinical Psychology*, Volume 18 (2022)

Cognitive Aging and the Promise of Physical Activity

Kirk I. Erickson, Shannon D. Donofry, Kelsey R. Sewell, Belinda M. Brown, and Chelsea M. Stillman

Police Violence and Public Health

Jordan E. DeVylder, Deidre M. Anglin, Lisa Bowleg, Lisa Fedina, and Bruce G. Link

The Psychology of Pandemics

Steven Taylor

From the *Annual Review of Criminology*, Volume 6 (2023)

The Opioid Crisis: The War on Drugs Is Over. Long Live the War on Drugs

Marie Gottschalk

From the *Annual Review of Developmental Psychology*, Volume 4 (2022)

Practice and Policy Regarding Child Neglect: Lessons from Studies of Institutional Deprivation

Charles H. Zeanah and Lucy S. King

From the *Annual Review of Economics*, Volume 14 (2022)

The Impact of Health Information and Communication Technology on Clinical Quality, Productivity, and Workers

Ari Bronsoler, Joseph Doyle, and John Van Reenen

The Economics of the COVID-19 Pandemic in Poor Countries

Edward Miguel and Ahmed Mushfiq Mobarak

The Affordable Care Act After a Decade: Industrial Organization of the Insurance Exchanges

Benjamin Handel and Jonathan Kolstad

From the *Annual Review of Environment and Resources*, Volume 47 (2022)

COVID-19 and the Environment: Short-Run and Potential Long-Run Impacts

Noah S. Diffenbaugh

Sustainability in Health Care

Howard Hu, Gary Cohen, Bhavna Sharma, Hao Yin, and Rob McConnell

Agrochemicals, Environment, and Human Health

P. Indira Devi, M. Manjula, and R.V. Bhavani

The Concept of Adaptation

Ben Orlove

From the *Annual Review of Law and Social Science*, Volume 18 (2022)

Good Law to Fight Bad Bugs: Legal Responses to Epidemics

Carol A. Heimer and Clay Davis

Environmental Legal Mobilization

Lisa Vanbala

From the *Annual Review of Medicine*, Volume 74 (2023)

COVID-19: Challenges of Viral Variants

Jana L. Jacobs, Ghady Haidar, and John W. Mellors

Post-COVID-19 Condition

Ani Nalbandian, Amar D. Desai, and Elaine Y. Wan

Maternal Mortality in the United States: Trends and Opportunities for Prevention
*Siwen Wang, Kathryn M. Rexrode, Andrea A. Florio, Janet W. Rich-Edwards,
and Jorge E. Chavarro*

Diverse Approaches to Gene Therapy of Sickle Cell Disease
Shanna L. White, Kevyn Hart, and Donald B. Kohn

From the *Annual Review of Nutrition*, Volume 42 (2022)

The Importance of Food Processing and Eating Behavior in Promoting
Healthy and Sustainable Diets
Ciarán G. Forde and Eric A. Decker

Folic Acid and the Prevention of Birth Defects: 30 Years of Opportunity
and Controversies
*Krista S. Crider, Yan Ping Qi, Lorraine F. Yeung, Cara T. Mai, Lauren Head Zauche,
Arick Wang, Kelicia Daniels, and Jennifer L. Williams*

Advancing Health Equity Efforts to Reduce Obesity: Changing the Course
Shiriki K. Kumanyika

From the *Annual Review of Political Science*, Volume 25 (2022)

Three Faces of Climate Justice
Nives Dolšak and Aseem Prakash

Media and Policy Making in the Digital Age
Emiliano Grossman

From the *Annual Review of Psychology*, Volume 74 (2023)

Psychology of Climate Change
Linda Steg

From the *Annual Review of Statistics and Its Application*, Volume 9 (2022)

Is There a Cap on Longevity? A Statistical Review
*Léo R. Belzile, Anthony C. Davison, Jutta Gampe, Holger Rootzén,
and Dmitrii Zholud*

Framing Causal Questions in Life Course Epidemiology
Bianca L. De Stavola, Moritz Herle, and Andrew Pickles

From the *Annual Review of Virology*, Volume 9 (2022)

Lessons from Acquired Natural Immunity and Clinical Trials to Inform
Next-Generation Human Cytomegalovirus Vaccine Development
*Xintao Hu, Hsuan-Yuan Wang, Claire E. Otero, Jennifer A. Jenks,
and Sallie R. Permar*