TITLE: Gentrification pathways and their health impacts on historically marginalized residents in Europe and North America: Global qualitative evidence from 14 cities

ABSTRACT: As global cities grapple with the increasing challenge of gentrification and displacement, research in public health and urban geography has presented growing evidence about the negative impacts of those unequal urban changes on the health of historically marginalized groups. Yet, to date comprehensive research about the variety of health impacts and their pathways beyond single case sites remains scarce. In this paper, we analyze qualitative data on the pathways by which gentrification impacts the health of historically marginalized residents. We build on 77 interviews with key neighborhood stakeholders from 14 cities across Europe and North America. Data analysis indicates four main concurrent processes: Threats to housing and financial security; Socio-cultural displacement; Loss of services and amenities through institutional gentrification; and Increased risks of criminal behavior and compromised public safety. Gentrification is experienced as a chain of community and individual traumas – an overall shock for historically marginalized groups because of living in permanent pressures of insecurity, loss, state of displaceability, and the associated exacerbation of socio-environmental disadvantages.

KEYWORDS (max 6): Gentrification, health, North American cities, European cities, marginalized residents, pathways

Introduction

Over the last four decades, gentrification has prompted intense academic debate in planning and geography, predominately over its manifestations, drivers, and impacts on neighborhoods and residents. However, only recently has the public health community actively engaged with this extensive literature and considered the ramifications of gentrification on the health of different types of urban residents, from new residents to historically marginalized ones. This paper zooms in on the health of marginalized groups, that is working class, low income, racialized minorities, youth and older residents whose neighborhoods are being gentrified. It offers a novel, in-depth and comparative analysis of the potential pathways between gentrification and health impacts.

Gentrification is characterized by widespread neighborhood transformation through new capital targeting previously under-invested areas. This process tends to be illustrated by new housing developments, cultural amenities, and commercial venues that target and reflect the consumption, recreation and housing tastes of new residents (i.e., "gentrifiers," privileged residents usually from high-income and white backgrounds) – either local, national, or transnational (Brown-Saracino 2010, Lees and Ley 2008, Lees, Shin, and López-Morales 2015, Cocola-Gant and Lopez-Gay 2020). Gentrification is globalizing through a process with multiple waves, facets, and drivers, including – above all – real estate development, speculation, and increasing housing prices (Lees, Shin, and López-Morales 2015, Pattaroni, Kaufmann, and Thomas 2012). Distinct types, singularities or facets of gentrification may lead to different social impacts for residents (Mehdipanah et al. 2018) which may happen in conjunction with housing-driven displacement (Elliott-Cooper, Hubbard, and Lees 2020).

For instance, *commercial gentrification* takes place when long-time "mom and pop" stores and daily businesses are replaced by high-end and exclusive boutiques, restaurants and bars (Shaw and Hagemans 2015, Anguelovski 2015). Commercial gentrification can occur prior to or alongside *hyper-gentrification* – that is the large-scale government-driven and private investment-financed redevelopment of neighborhoods. In *tourism gentrification*, the development of mass tourism compromises housing availability, neighborhood services, existing commercial venues and prices, and public space use for existing residents (Cocola-Gant 2018, Versey et al. 2019, Sánchez-Ledesma et al. 2020, Gotham 2005, Oscilowicz et al. 2020, Degen and García 2012), and is associated with increased crime (Maldonado-Guzmán 2020). Most recently, *environmental (or green) gentrification* is defined as the targeted cleaning of derelict or contaminated land or as the creation of environmental amenities, as a contribution to increased real estate prices, entrepreneurial investments, and demographic changes – leading to the exclusion of historically marginalized groups from the benefits of urban greening (Anguelovski, Connolly, et al. 2019, Gould and Lewis 2017, Levenda and Tretter 2020, Connolly 2018, Garcia Lamarca et al. 2021).

Health effects of gentrification

Extending the study of gentrification to understand the effect of gentrification specifically on the health of historically marginalized residents, recent research reveals that, while mixed associations exist between gentrification and health outcomes for privileged residents as neighborhoods gentrify, negative associations tend to predominate for historically marginalized residents' mental and physical health (Gibbons & Barton, 2016; Huynh & Maroko, 2014; Izenberg et al., 2018a, 2018b; Smith et al., 2018) (Schnake-Mahl et al. 2020, Bhavsar, Kumar, and Richman 2020, Tulier

et al. 2019, Jelks, Jennings, and Rigolon 2021, Mehdipanah et al. 2018), except in rarer exceptions (Narita et al. 2020). For example, gentrification has been reported to be associated with increased likelihood of preterm birth and fair/poor self-rated health for Black residents when these are compared with Black residents in non-gentrifying neighborhoods or compared with white residents (Gibbons and Barton 2016, Izenberg, Mujahid, and Yen 2018b, Huynh and Maroko 2014).

As for mental health, residents in gentrifying tracts are more likely to report above-average stress, which highlights how racial loss and displacement affects the mental health of remaining racialized residents (Gibbons 2019). Similarly, living in a gentrified neighborhood is associated with an increased likelihood of serious psychological distress for historically marginalized groups (Tran et al. 2020). Displaced residents from gentrifying areas are also likely to make more emergency department visits and experience hospitalizations due to mental health concerns – in comparison with those residents who remained in place (Lim et al. 2017).

The health effects of gentrification may also vary by residents' life stages. Research in New York finds that gentrification is associated with moderate increases in diagnoses of anxiety or depression in children living in market-rate housing, a population most at risk of housing displacement (Dragan, Ellen, and Glied 2019). Meanwhile, a national study at the US metropolitan level found that both lower-income and higher-income older adults in gentrifying neighborhoods had more depression and anxiety symptoms than when those same groups live in more affluent areas (Smith, Lehning, and Kim 2018), possibly due perceived cultural shifts and increased housing concerns (Versey et al. 2019).

Gentrification and health: Pathways

Gentrification health effects may not always be direct. Gentrification might be a modifying factor impacting the potential benefits from certain neighborhood amenities such as greenspaces (Cole et al., 2019) (Triguero-Mas et al. Forthcoming). However, to elucidate the pathways by which gentrification affects health may be particularly meaningful for understanding how health inequities are created and sustained (Cole et al. In Press, Anguelovski, Triguero-Mas, et al. 2019). Explored factors and pathways include loss of social networks, social capital, and overall community cohesion (Sánchez-Ledesma et al. 2020, Weil 2019, Versey et al. 2019, Huynh and Maroko 2014, Gibbons and Barton 2016, Pérez del Pulgar, Anguelovski, and Connolly 2020, Wolch, Byrne, and Newell 2014), an eroded sense of place (Shaw and Hagemans 2015, Anguelovski 2015, Versey et al. 2019, Oscilowicz et al. 2020), an erasure of identity (Sánchez-Ledesma et al. 2020, Cocola-Gant 2018, Anguelovski 2015), and socio-cultural exclusion and physical displacement (Cole et al. Forthcoming). Further factors involve the loss of a secure home and constant threats of eviction and property speculation due to poor landlord practices (Sánchez-Ledesma et al. 2020, Versey 2018, Versey et al. 2019, Desmond and Gershenson 2017).

In a majority of studies, gentrification is also associated with increased criminal activity (Schnake-Mahl et al. 2020, Oscilowicz et al. 2020), especially violent crime (Kreager, Lyons, and Hays 2011, Williams 2014), although some find that this relationship fades away in later stages of gentrification (Kreager, Lyons, and Hays 2011) and others find that, when neighborhoods start gentrifying, they experience a decline in crime (Papachristos et al. 2011). Last, links between gentrification and substance abuse have been more recently explored, with gentrification

associated with binge drinking among new residents (Izenberg, Mujahid, and Yen 2018a) and with increased drinking and loss of social connection (Pennay, Manton, and Savic 2014). Others associate gentrification with increased policing and barriers to access overdose prevention sites for drug users, exacerbating their structural vulnerability (Collins et al. 2019).

Emerging research also points to possible pathways associated with specific types of and drivers of gentrification (Cole et al. In Press). For instance, *affordable, healthy food options* are mostly absent in gentrifying census tracts (Breyer and Voss-Andreae 2013), with working-class residents faced with so-called "food mirages" (Sullivan 2014, Anguelovski 2016) and trade-offs between paying for housing and buying food (Whittle et al. 2015). In regard to *green gentrification*, recent studies identify how greening in gentrifying neighborhoods -- and gentrification more broadly -- can create "disruptive green landscapes" for historically marginalized residents (Triguero-Mas et al. Forthcoming) while failing to resolve existing environmental risks (Cole et al. Forthcoming) or to create "relational wellbeing" (Pérez del Pulgar, Anguelovski, and Connolly 2020).

However, to our knowledge, there is only one study that has previously formally and purposefully explored these potential pathways, which did so in the context of tourism-related gentrification (Sanchez Ledesma et al. 2020). Building on this emerging literature about gentrification and health pathways, our paper addresses an empirical gap by qualitatively investigating how historically marginalized residents' health is impacted by different processes of gentrification (i.e., real estate, commercial, tourism-driven, or green) in a diversity of cities and contexts of Europe and North America. We focus on those residents since they are traditionally at higher risk of worse social and health outcomes in cities (Wallace, Nazroo, and Bécares 2016, Krieger 2011, Bakhtiari,

Olafsdottir, and Beckfield 2018). Although some of those residents have lived in their gentrifying neighborhood for decades whereas others, such as racialized immigrants, have settled more recently, their social and racial status make both groups at risk for negative health effects from gentrification. To the best of our knowledge, this study is the first at answering: (1) How does gentrification shape the health of historically marginalized groups across different gentrification processes? (2) What are the main pathways in that relationship in a variety of gentrifying neighborhoods across countries?

Methods and Materials

Study context and case sites

This paper is based on a sub-analysis of empirical data collected for a large ERC-funded research project (the "parent project"). This large study examined the social impact of redeveloped neighborhood environments through field work in a total of 24 mid-sized cities in Canada, the United States, and Western Europe. These cities encompassed a variety of urban development pathways (i.e., industrial, post-industrial, economically growing or shrinking; compact or sprawling) and included a variety of gentrification types. Building on an initial review of grey literature, media reports, analyses of demographic change, and expert discussions with collaborators in each city, we identified a specific gentrifying neighborhood in each city. Specific neighborhoods represented a diversity of site types (i.e., historic center, industrial or post-industrial site, greened site). From our initial set of cities, we selected 14 case sites to be included in this

study to reflect a rich diversity of relationships between gentrification and health, while ensuring our ability to produce a rich, detailed and valid comparative analysis with sufficient data to respond to our research question. Using triangulated information identified through diverse sources (including grey literature and city webpages), Table 1 summarizes the characteristics of those 14 case studies. The study was approved by the institutional review board at the Universitat Autònoma de Barcelona (Nº 678034).

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According to the parent project inclusion criteria, case studies shared several characteristics. All were experiencing gentrification processes characterized by urban renewal or revitalization policies, presence of so-called luxury developments, retail changes, and demographic change marked by the arrival of socially privileged residents. All were also experiencing environmental gentrification, tourism gentrification, real estate gentrification, and/or commercial gentrification. Moreover, all our cases were focused on marginalized neighborhoods which had historically suffered from under-investment, abandonment, and segregation, with the stigmatization of historically marginalized groups, that is working class, lower-income, and racialized minorities. Despite these commonalities, each case captured different urban histories, specific gentrification dynamics, and health-related outcomes in order to reflect a diversity of interrelations between gentrification and health.

Study sample, data collection, and analysis

All case sites, field data collection, and analysis followed a similar protocol. All team members pretested, modified and selected a final set of questions and probes for a semi-structured interview guide based on the overall aim of the parent project, which also covered the goal of our study. Each researcher spent approximately one month between 2018 and 2020 conducting intensive and targeted fieldwork in each neighborhood/city, after enrolling a diversity of participants to maximize the heterogeneity of perspectives on the topics of interest. Questions relevant for this paper covered the history of the neighborhood and older and recent development processes and changes; gentrification trends, pathways, and drivers; manifestations of environmental and other urban injustices; environmental interventions and improvements; and specific health outcomes and pathways in regard to marginalized groups.

The interviews with respondents analyzed for this paper included: local residents, activists, public employees, and representatives of community-based or non-profit organizations. We identified respondents from each type via expert recommendation, internet searches, relevant local media articles, and snowball sampling. After obtaining informed consent for participation, we conducted interviews until reaching saturation. For those who agreed, interviews were audio-recorded and transcribed. Interviewees responded to questions about their perception, knowledge, and work or activist experience (including collaboration or support) in reference to the lives of historically marginalized residents in each neighborhood.

The final dataset included 77 transcribed interviews across 14 cities representing, in the majority of interviews, the following neighborhoods as well as a few city-wide perceptions about gentrification and health: Barcelona (Sant Pere-Santa Caterina), Bristol (South Bristol), Dublin

(The Liberties), Glasgow (East End), Montreal (St Henri), Atlanta (Peoplestown), Austin (East Austin), Boston (East Boston), Cleveland (Detroit Shoreway), Dallas (West Dallas), Denver (Elyria-Swansea), Oakland (West Oakland), Portland (Cully), Washington DC (South East, Anacostia) (Figure 1).

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In addition to primary data, we collected relevant secondary data to complement our analysis of urban development changes and equity issues in each neighborhood: 1) documents and fact sheets, reports, or policy documents produced by a variety of local organizations, 2) media articles and 3) city planning documents concerning the specific case or that addressed health and well-being or social equity in each city. Data from these sources was used to triangulate and verify the accounts of interviewees, and to identify additional health-relevant or -related information, dates of relevant events, or results of unpublished studies which were referenced by respondents. Grey literature, along with published academic literature, also helped us build a detailed analysis of the history of each area and processes of urban change (Table 1).

In regard to data analysis, the research team created a comprehensive coding scheme drawing on the main conceptual and analytical themes of relevance for our parent study and then its subcomponents. We then coded the full content of each interview using NVivo software and conducted regular coding meetings to ensure consistent coding techniques and intercoder reliability. Upon the completion of this coding, we selected the relevant codes that best allowed us

to analyze the relationship between gentrification and health for historically marginalized groups as well as possible drivers and pathways.

Results

As our interviews reveal, gentrification is being experienced as a community and individual physical and emotional trauma for historically marginalized residents because of permanent pressure of insecurity, loss, and state of displaceability that exacerbate socio-environmental disadvantages. We visualize these results in Figure 2.

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Figure 2: Observed pathways and specific social impacts relating gentrification to health for historically marginalized residents of gentrifying neighborhoods

Housing, financial insecurity, and displacement to worse neighborhood environments

First, soaring housing prices and increased cost of living in gentrifying neighborhoods together with the displacement to poor housing alternatives are a primary pathway to poor physical and mental health outcomes for residents in gentrifying neighborhoods. Across all cities and overwhelmingly so, interviewees frequently reported accompanying mental health issues such as chronic stress, anxiety and depression, on the back of poor housing, increased poverty and financial burdens in gentrifying neighborhood. In different cities, participants cited psoriasis, hypertension, heart palpitations, chronic diseases and negative birth outcomes, all as a direct result of chronic stress in the context of gentrification.

Increased housing prices and proportion of income spent on rent

In all the case studies we analyzed, the respondents noted the excessive commodification of housing for profit in creating increased financial pressures and driving physical displacement. In Montreal, a community civic group member explained how in the southwest of the city, "4,000 households [were] paying something close to 80% of their revenue to rent." Gentrification and its associated real estate development and speculation (including apartment conversion to short term tourist or temporary rentals in Boston, Barcelona, or Cleveland) triggers increasing housing and rent prices, contributing to neighborhood unaffordability for most residents. For example, in

Glasgow, one interviewee from the city council's temporary regeneration initiative explained that in the past 10 years housing prices have increased by approximately 40-50%, whereas salaries over the same period have only increased by 1-2%.

These financial struggles also include long-term, working- to low- or middle-class homeowners confronted with higher maintenance costs or higher property taxes. For example, in cases like East Boston or Dallas, gentrification was reported to increase overall house maintenance or upgrading prices, thus making it even difficult for working-class residents to afford home improvements such as lead abatement (which can cost over $50,000), energy efficiency, climate adaptation projects, or historic preservation requirements. In other cases, when residents are working-class homeowners, they are also facing increasing financial difficulty to pay for higher property taxes, such as in Austin, Atlanta and Dallas.

Respondents suggested multiple pathways in which increased financial expenses related to housing can affect physical and mental health outcomes, by creating or worsening chronic stress and by reducing residents' ability to pay for other essential goods and services necessary to maintain good health. For instance, two participants in Denver and Austin commented that, for many, the reality was deciding between paying higher rent or paying for food, where choosing to buy healthy food often had to come second. An officer at the Maryhill housing association remarked that fuel poverty is a huge issue in Glasgow. For many families, and in Dublin in particular, rental burden also compromises parents' ability to afford sports clubs or after-school sports activities, limiting children's capacity to maintain good physical and mental health.

Likewise, the financial burden of rent can force people into working multiple jobs or overtime, undermining one's ability to practice sports and to dedicate time to care responsibilities at home. In Washington DC, a community civic group advisory neighborhood commissioner reflected on her own experience of this, feeling overworked, sometimes working 6 days a week: "Who's going to go running at the park and jogging?...because of…the rat race in the city…I don't even find time to go take care of my health." Correspondingly, a participant from a community non-profit in Boston noted that parents now have to "work even more than before, so it's three jobs rather than maybe two jobs," reflecting in-work-poverty trends. She pointed out the health and safety issue associated with this where if "they are not home…they can't take care of the kids."

Similarly, the new financial burden of increased rent can jeopardize affordable and accessible medical treatment, especially so for older residents facing increasing health issues, as mentioned in American and European cities, including XXXXX and Dublin, where treatment is not fully covered by the public health system. In Dublin, a municipality elected official described how families in The Liberties who paid up to 60-70% of their income on rent were often unable to access the health care services that they needed, including medical treatments for long term conditions and mental health support services.

Poor housing alternatives

In gentrifying neighborhoods, residents who are able to stay face increased risks of homelessness, frequent forced moves inside their neighborhood, and exposure to poor (or worse) living

conditions. Interviews showed frequent reference to the mental health burdens that accompany these processes and the multiple impacts that they can also have on physical health. This is particularly evident in African American communities in the US. In Cleveland, residents report the lead paint issue that many older, more affordable houses in Detroit Shoreway neighborhood suffer from, and which remain unabated. A community non-profit housing agency in Cleveland also explained that maps of dilapidated and poor-quality housing directly correlate with residents with the most emergency room visits being treated for asthma, which are predominantly African American. Furthermore, in Dallas, Boston, Oakland, Montreal, Bristol, and Barcelona respondents reported how living in a gentrifying neighborhood translated into increased exposure to air and noise pollution due to constant new real estate construction or remodeling and to increased car and truck traffic. In Barcelona, a nurse also reported how toddlers living in cramped apartment spaces showed higher obesity rates due to a lack of crawling and play space at home. Homelessness also compromises one's ability to keep healthy, as a health staff member in Portland explained: "A lot of folks who live outside have COPD and I wouldn't be surprised if that was because of breathing exhaust fumes, living on a sidewalk next to where cars are driving all the time." In Bristol, a community organizer shared life stories of residents "being desperate not to have to leave where they live [and] putting up with a lot of really poor conditions which are really unhealthy."

When poorer residents are gentrified out and displaced, often to locations further from the center of the city, a variety of respondents in most cities (especially so in Montreal, Oakland, Dallas, Atlanta, Austin, Boston, Bristol, Dublin, and Barcelona) indicated that residents often faced poor or poorer quality housing, with several physical and mental health impacts. For example, a municipal employee in Oakland regrets that "other groups can remove themselves from that harm.

They have the economic ability to choose to live in a cleaner place. These are choices that marginalized communities don't have." In Dublin, redevelopment of social housing translates into working-class residents being moved to temporary shelters in hotels. Respondents also referred to pests (rodents; insects), humidity, poor insulation, outdated plumbing or heating systems, mold, or asbestos as frequent causes of health issues (i.e., asthma or chronic disease) among displaced residents – issues that are also of concern for residents able to remain in place. Several respondents, especially in Boston and Oakland also associated poorer health conditions in their displaced location with climate impacts such as intense heat or flooding risks, exposing those homes and their residents to further health effects, including extreme respiratory diseases, stress, and anxiety. In Barcelona residents from Sant Pere and Santa Caterina have been gentrified out to small, poorly insulated, hot or/and humid flats in the Barceloneta.

What's more, as more central areas become gentrified and unaffordable, alternative affordable or subsidized housing options are often located in or closer to industrial areas. This is evident in Glasgow, where the most deprived areas correlate with historically industrial areas in the north and East End. The large quantity of vacant and derelict land located in these parts of the city is often highly contaminated, making the space unfit for otherwise beneficial physical activities. Furthermore, in Dallas, one activist explained how, even where a new redevelopment strategy (the Neighborhood Plus Plan) had been adopted to prohibit "dumping subsidized housing [in] the same places over and over again, away from jobs, away from grocery stores, and so on", it still failed to protect citizens from environmental contamination. The interviewee also explained how in West Dallas, a batch plant releasing particular matter and sulfur dioxide received a permit to relocate from a newly gentrified area to the center of the not-yet-gentrified area, which also overlooked the

cumulative impacts of pollution or its negative effects on the health of historically marginalized groups.

In another vein, respondents reported that being relocated further out of the city center or more urban cores can mean longer and more expensive and lengthy commutes for displaced residents, with acute health impacts such as chronic tiredness, stress, and tightened budgets for healthy life choices. Members of a community city cooperative in Denver explained the consequences of "more time on the road mean[ing] less time with your family, [which] increases stress and all of the health impacts that stress has on people". Multiple interviewees noted these impacts, including less leisure time and less time for exercise. A public health administrator also in Denver depicted how reduced mobility on account of unaffordable transportation options for longer distances also impacted people's access to food, including to healthier and affordable grocery stores. Meanwhile, in Austin, a sustainability officer described the need to work on "equity access to healthy food", especially for "people (Whole Foods Market) don't have a car and they need to get groceries."

Sociocultural displacement

Respondents also identified sociocultural displacement as a source of mental health and physical health problems. This sociocultural displacement was produced by social segregation, exclusion, and the loss of community ties and social cohesion experienced by residents living in gentrifying neighborhoods.

Social segregation, exclusion, and associated loss

Forms of social segregation were identified in most of the cities (except for Dallas or Oakland) due to the commercial changes and their related new exclusionary and elite consumption habits induced by gentrification. In Barcelona, residents noted the changing commercial landscape (closure of traditional food stores in particular) accompanying the influx of tourists and the separate shopping spaces created for and catering especially to tourists and other gentrifiers along commercial streets. In Dublin, similar dynamics were cited in the context of wealthy student housing complexes and commercial tourism venues, creating segregated student and tourism enclaves. In general, participants in Montreal, Atlanta, Austin, Cleveland, Washington DC, Boston, Bristol, or Barcelona cited the loss of local businesses that had generally changed to cater towards more middle-class or white tastes as well as increases in local prices, making necessary amenities unaffordable for original residents. Both the unaffordability of new consumption choices and socio-cultural displacement feed into broad sense of exclusion for historically marginalized groups, linking back to reports of resultant chronic stress.

Loss of daily fresh and affordable food options also impacts nutrition choices and in turn is reported as increasing obesity rates. In Atlanta, a nonprofit director described gentrifying areas as "food deserts or food swamps'' for lower-income residents, with either "no food or an abundance of junk food." Multiple other cities in the US as well as Europe echoed this trend. In Bristol, a community activist described "organic [as] a luxury," as "green is only for the rich", pointing to exclusion from new food sources beyond the affordability issues described above. In Denver, a member of a neighborhood equity and stabilization team linked these issues to high childhood obesity rates among Hispanics, an issue also mentioned by a health worker in Boston.

Social segregation and exclusion are also perceived in regard to use of public space, especially new greened public space. In Barcelona, as tourists have taken over many public spaces in the old town, residents feel unable to enjoy their streets and plazas or even rest at night due to constant noise from visitors enjoying nightlife in those spaces. One participant described how it affected her sleep; "it's very stressful, you want to rest and you can't. It drains you, emotionally, to do this every day. My partner had to sleep with ear plugs and I had to take sleeping pills." Other respondents also explain how this domination of visitors discourage families from using the space or moving through the neighborhood with their children – those now increasingly confronted with obesity, as a local nurse reports. In Boston, local youth reported feeling out of place in several sports fields and green spaces, especially those increasingly used by gentrifiers.

Relatedly, gentrification is also associated with increased experiences of police control in public spaces, especially so in spaces associated with green gentrification. On the one hand, respondents reported that gentrifying residents seem to call the police more often, as seen in the cases of Washington and Austin. In addition, one local housing organizer in Montreal also described police patrols in Montreal parks, especially the gentrifying neighborhood Saint-Henri, regretting the increased police surveillance because it limits a greater diversity of people from feeling welcomed and using the space. Similar experiences were reported in Atlanta and Oakland where African Americans feel particularly vulnerable to police control and violence in new greened public space like the Atlanta Beltline and feel afraid of socializing in public spaces or simply to use it, as reported in Atlanta: "It was just essentially wound up marginalizing a lot of people that shouldn't

have been marginalized, just teenagers and just other people that are walking through the neighborhood, you stopped and they had police out there now, you getting searched and harassed."

Loss of community ties, social cohesion, and multiple trauma

Respondents from all our case studies mapped the multiple cultural losses and erasures, and thus trauma and mental health burdens, experienced on the back of the sociocultural displacement described above, even in cases where neighborhood changes had prompted community organizing. Gentrification creates a strong sense of instability of community ties through the intensive rotation and fast substitution of residents. One advisory neighborhood commissioner in Washington D.C. described the feeling of lack of belonging and how this impacted a sense of worthiness and self-esteem. Another community nonprofit member in D.C. explained how losing a sense of place as well as watching physical displacement take place in the community made people go from "feeling deeply anxious and disempowered [to] feeling that they will potentially lose everything," whereas being able to feel a sense of ownership can be "psychologically...a very powerful tool." In Barcelona, a respondent described how exclusion from public space had impacted being able to maintain a sense of belonging or social cohesion, where social activities had become limited and community networks had diminished on account of lack of access to public spaces. In return, such loss creates social detachment and weakened trust in the future, as several respondents highlighted.

In several cities, including Boston, Denver, Washington, Austin, Atlanta and Barcelona, this loss of community ties associated with social segregation and exclusion is coupled with a loss of physically displaced families or friends and an increase in isolation. Respondents mentioned how

this decreased sense of community ties, connection, and place identity triggers mental health issues, including anxiety, suicidal behavior, or depression. One community nonprofit employee in Boston recounted teenage members reporting "our family's getting displaced, I don't know what to do, I feel suicidal". In Denver, a staff from the Division of Housing explained the recognizable impacts of family eviction or displacement on children: "Anytime a child moves from school to school they lose, with the stress of those moves they lose months of education because of anxieties". Equally, in Barcelona, one participant described how community dismemberment through displacement played out in in-class violence and the disruptive impact this had on other children. A school director also reported organizing "grieving workshops" to support teachers in their effort to accompany children losing classmates to gentrification. In many cities, these health impacts were often additional traumas as a result of drivers of gentrification that were already causing direct traumatic responses for residents impacted by increased financial insecurity, for instance. In fact, interviewees frequently highlighted the double or multiple traumas people were experiencing.

The direct impacts of the loss of community ties can also be seen where community networks and community care would normally act as a safety net to catch those vulnerable residents – the elderly, adolescents, or home-insecure people – who would otherwise fall through the cracks. As a result of gentrification, they are now further isolated and left without informal and formal networks of practical support. A civic group activist in Washington D.C. recounted the story of a woman addicted to heroin in the public housing complex Barry Farms who had been "shooting up for years" and managed to survive on account of being regularly checked in on by her community. After being forcibly displaced she was found dead a month later. Similarly, in Montreal, Dublin

and Denver, links were made in interviews between a lack of a social network and increased vulnerability to homelessness, with subsequent increasing physical and mental health risks.

Loss of public amenities, facilities and services

Gentrification is also experienced from an institutional standpoint, through the loss of public amenities and services and underfunding public services, especially so in the context of tightened municipal or state budgets.

Threats to neighborhood public amenities, facilities and services

Interviews in all the case studies reported that many of the pathways through which gentrification may impact residents' health were related to weakened institutions, most notably the commodification of and cuts to neighborhood public facilities, amenities and services. In Dublin, an elected official reported that Council land in The Liberties was made available for acquisition by developers, including school facilities, with clear health effects for school kids. She explained how the Council sold off a community football pitch used by the local school to a hotel developer in order to increase municipal revenues, meaning that "even within...schools, young people don't have access to the kind of amenities that they need to promote health and wellbeing." In Portland, respondents shared the difficulty to build green space for vulnerable groups in Cully, an area where affordable housing is much needed:" "We want to see an agreement that says after X period of time we're going to move toward providing housing or providing a community center or providing other amenities that would stabilize community members." In Austin, a community activist saw

this a an acute dynamic. She explained how families now have to pay to access sports fields and activities: " the city's saying 'no we're going to manage, you're going to have to pay', so we're seeing that that whole how money is coming in and charging us is a tool, whereas it used to be if you were in a poverty neighborhood these things were free."

The difficulty to preserve or build public, green amenities benefiting marginalized groups was reported in many other neighborhoods, including Boston and Barcelona. In some cases, community gardens were also reported by interviewees as being taken over by gentrifiers, who are perceived as imposing their rules and practices, de facto discouraging longtime residents from using them or farming there.

Some cities also reported significant budget cuts in public school funding and youth center funding, contributing to families now having to pay for sports activities and to youth disaffection. This was particular the case in Austin, Dublin, Boston, Atlanta. In Atlanta and Boston, although existing lottery system used for enrollment at new neighborhood charter schools promised new opportunities, many long-term residents were ultimately unable to enroll as they were unaware of the new process until these schools were already at capacity. At the same time, in both cities the apparent under-enrollment of the local public school caused by families being abruptly evicted at the beginning of the school year and by the closing of several subsidized housing blocks led to budget losses. Respondents worried about the long-term impact of the lack of educational opportunities for the development and health of children, particularly those from families lacking the resources to seek private or charter school education.

Health care commodification and health care gentrification

In a similar vein, there was evidence that neighborhood healthcare institutions were suffering from the pressures to commodify health care, with the increasing tendency to privatize services and decide on what services to offer based on economic revenue instead of population needs. This was described in Denver where one community member had to forsake required medical treatments for diabetes and thyroid conditions due to being unable to afford increasingly costly services, despite having private insurance, on top of increased housing costs. There were multiple reports of a reduced access to necessary health care services due to prohibitive costs, directly contributing to negative health outcomes. For example, in Glasgow a community leader highlighted the example of funding cuts to support services and rehabilitation facilities for those with severe mental health and addiction issues, where halfway houses had been eliminated and vulnerable people were moved directly into social housing or new developments. Many of these people feared slipping back into addiction on account of isolation and lack of adequate support.

In processes of gentrification, geographical accessibility to health care facilities can become an issue. In Dublin physical displacement to poorer neighborhoods of low-income residents qualifiying for government medical cards tends to spatially concentrate these users in one facility to such a level that it becomes incapacitated. Community activists and health workers in Austin, Atlanta, and Boston also explained that with gentrification, the loss of localized clinics or the displacement of residents further away from their 'health care homes" has meant further distances to travel for health care – especially difficult for older adults – which also remained unaffordable for many families. While some clinics, such as those in Atlanta and Boston, were opening up local

branches in or moving to areas where displaced residents have moved, this decision has further strained these clinics' budget. Last, some gentrifying neighborhoods, such as Sant Pere-Santa Caterina in Barcelona – which has a strong network of local public health care centers, – have suffered from budget cuts due to officially being re-classified as a less "complex" (gentrifying, no longer as socially diverse and vulnerable) neighborhood. Here local staff reported compromised services and care for the immigrant and working-class residents able to say. Overall, in UK cities (Bristol, Glasgow) and Dublin, welfare budget cuts combined with increased costs of living in gentrifying neighborhood translates into what a community organizer in Dublin reports as "knock-on effects with the local health system" as families cannot cope with basic needs and their health conditions increases pressure on local health care systems.

Crime and safety

Last, evident in cities in both Europe and the U.S, including Atlanta, Washington DC, and Barcelona was the increase in criminal behavior of residents in socially vulnerable conditions as well as experiences of street violence in areas undergoing processes of gentrification.

Increased vulnerability to falling into criminal behavior or drug consumption

Respondents identified multiple pathways by which increased financial insecurity has led to an uptick in crime and violence, acting as a threat to physical health and cause of chronic stress. In Washington, DC, an activist and lawyer explained that gentrification had "introduced an element

of chaos and instability," where an inability to pay rents and mortgage repayments had made people's life and behavior more unstable and vulnerable to criminal behaviors. A local reverend also made the link between post-traumatic stress disorders – including the trauma of being displaced from one's community – and being more vulnerable to committing criminal activity, a trend evidenced by what he reports as increase in violence and frequency of murders in the city. A community member from the nonprofit Empower D.C. confirmed that the alienation felt in areas that were gentrifying and of high inequality, such as Anacostia, contributed greatly to the increase in violence. In his accounts on gentrification impacts, a local DC activist and lawyer depicted the rise of underground economies, where, as "people are pretty much excluded from the larger mainstream stuff...they're getting pushed to areas where they wouldn't normally be." In his views of Anacostia, physical displacement from housing through direct eviction or even threats created contentious rival groups, which in turn has created more violence in an already fragile area.

Furthermore, in Washington, Cleveland, Denver, Boston, Dublin, and Barcelona housing-vulnerable residents are also reported as struggling with new or increased substance use, including "poly-substance" use in Denver as a whole. In Boston an East Boston health worker explains that, in view of rental prices doubling in less than three years, health clinics are struggling with a new type of drug epidemic: "I mean we're definitely hearing more cases of folks in distress for those issues and a range of other issues. So if folks are not finding healthy ways to cope, then I can see them relying on ways that are unhealthy." In Washington, a former Barry Farm public housing resident shares how residents "do drugs" to "cope with the feeling of being lost, […] to just coping with the conditions but also knowing that they were going to have to move and lord knows where". What's more, some respondents reported that where parents had less time to parent their children

because they have to take on additional jobs (reported for example, by a police officer and an youth arts-based organization in Boston), children became more vulnerable to organized crime, especially those recruiting adolescents, and to being exposed to drugs more generally. Overall, many respondents in US cities and Northern European cities such as Dublin, regretted the lack of affordable and accessible mental health services needed to assist residents in coping with the strains of financial and housing insecurity and working on drug prevention in a context of "increasing decimation of the state apparatus when communities most need community support" as a local city councillor reported.

Worsened exposure to crime and violent street life

In some cities such as Barcelona, Washington, and to some extent Boston, gentrification – and tourism gentrification in particular – is directly linked increased street violence and crime (especially so in places where violence had gotten better), and thus to mental health impacts. While many of the victims of crime are tourists, some residents are also directly or directly confronted to or exposed to violent theft. In Barcelona, in the historic district where Sant Pere and Santa Caterina is located, increased tourism since 2014 has encouraged more robberies and petty theft, "coffee shops" (legal and illegal marijuana shops), street drug trafficking, and violent crime. Here, local community organizations and residents report the mental drain of constantly having to be alert living in an increasingly unsafe neighborhood, surrounded by illicit activities, both for older adults and parents of young children. Parents described how visible drug consumption and crime in the local Pou de la Figuera (and the nearby Allada Vermell to some extent) green space meant they felt uncomfortable allowing their children to play and practice sports freely. They also commented

on the trauma their children had experienced in witnessing violent incidents in the neighborhood. Another parent expressed how she felt it important to move away from the area "because [her] son was getting older… [and she] didn't want him to be involved in fights".

Beyond tourism gentrification, in other intensively gentrifying neighborhoods, including those experiencing green gentrification, as Boston, Atlanta and Washington, even if crime was present before gentrification, respondents reported their fear over increased crime in the context of intensifying gentrification, inhibiting them from fully accessing the improved environment amenities of the neighborhood. In Boston, a local police officer even reported wealthy residents and students as the initiators of new drug traffic or binge drinking due to their consumption behavior both in private and public spaces. In contrast, neighborhoods with only early gentrification such as West Dallas and in economically and demographically shrinking cities like Cleveland associate crime with their long-term neighborhood history of segregation, underinvestment, or enduring gang rivalries, not with gentrification per se.

Discussion and Conclusion

This paper fills an important gap by offering a situated, complex and comparative qualitative analysis (Hyra et al. 2019; Cole 2020; Cole et al. In Press) of the relationship between macro-level political and economic processes of urban change (i.e., housing crisis; loss of public services; jeopardized access to care), community dynamics, and their overall impacts on health. Data analysis on the pathways by which the diversity of gentrification processes impacts the health of

historically marginalized residents indicates four main concurrent processes which we believe need to be exposed together and have important aspects that are best understood qualitatively: Threats to housing and financial security; Socio-cultural displacement; Loss of services and amenities through institutional gentrification; and Increased risks of criminal behavior and compromised public safety.

Consequently, we argue that the diverse gentrification processes seem to be experienced as community and individual trauma, that is a physical and emotional shock for historically marginalized groups because of living in permanent pressures of insecurity, loss, state of displaceability and the exacerbation of associated socio-environmental disadvantages. This trauma has clear physical and mental health impacts. While European cities are characterized by stronger welfare and state-led social support systems than their North American counterparts, our analysis reveals that they are not exempt from the same dynamics. In addition, our results reveal common pathways by gentrification typology and driver, showing how those are interlinked and overlap.

This argument furthers Fullilove's (2016) "root shock" argument about the social impacts of decades of disinvestment and urban renewal in American cities, but broadens it to the global geography of gentrification and its multiple types and drivers (real estate, housing, commercial, tourism, and green gentrification). Results from 14 cities reveal the imminent or/and continuous physical and mental "root shock" and trauma that gentrification brings for the urban poor and racialized minorities, placing them in what urban geographer and planner Oren Yiftachel calls a state of "displaceability" (Yiftachel 2020), which we see here as a state that becomes permanent

and circular through time. Historically marginalized groups live with constant insecurities and losses – financial, housing, food, environmental, public space, and institutional.

Specific results related to increased financial pressure, housing instability, and worse housing conditions before and after displacement echo previous research on gentrification and loss of secure home and constant threats of eviction and property speculation due to poor landlord practices (Sánchez-Ledesma et al. 2020, Versey 2018, Versey et al. 2019, Desmond and Gershenson 2017, Elliott-Cooper, Hubbard, and Lees 2020); emerging research on gentrification, affected care responsibilities, and stress (Binet et al. 2021); and nascent indications about the relationship between gentrification and increased exposure to some air or soil contamination (Sánchez-Ledesma et al. 2020, Anguelovski, Triguero-Mas, et al. 2019). However, they go more in-depth by dissecting the different financial vulnerabilities, insecurities, trade-offs and poor housing conditions that historically marginalized residents face.

In relation to socio-cultural displacement, data confirms how social segregation, losses of long-time retail or public spaces, and exclusion undermines individual and community social capital, sense of belonging, place attachment, community identity and overall community cohesion, and thus health benefits (Sánchez-Ledesma et al. 2020, Weil 2019, Versey et al. 2019, Huynh and Maroko 2014, Gibbons and Barton 2016, Pérez del Pulgar, Anguelovski, and Connolly 2020, Wolch, Byrne, and Newell 2014) (Shaw and Hagemans 2015, Anguelovski 2015, Versey et al. 2019, Oscilowicz et al. 2020). Here, as our results show, exclusion is not only felt in commercial spaces, but also, as previous research indicates, from public and green spaces occupied both by gentrifiers and/or tourists (Cole et al. Forthcoming, Triguero-Mas et al. Forthcoming). Those might

thus be unable to provide wellbeing and other benefits for historically marginalized groups (Pérez del Pulgar, Anguelovski, and Connolly 2020, Wolch, Byrne, and Newell 2014, Oscilowicz et al. 2020, Cole et al. 2019) and undermine one's sense of worthiness, trust in the future, with clear risks of substance abuse and suicidal behavior.

Our analysis also reveals previously under-researched, emerging processes by which gentrification affects the health of historically marginalized residents: public cuts to local public amenities and services together with health care gentrification (Cole et al. In Press, Anguelovski, Triguero-Mas, et al. 2019). Such processes illustrate yet another type of community and individual trauma and loss: The fear or experience that public agencies and services are leaving historically marginalized residents behind and alone – again, after previous experiences of urban renewal and public under-investment.

Last, pathways related to increased criminal activity, substance abuse, and exposure to unsafe street conditions are quite unequivocal and break away from mixed results of previous analysis on the topic (Schnake-Mahl et al. 2020, Oscilowicz et al. 2020) (Kreager, Lyons, and Hays 2011, Williams 2014) (Papachristos et al. 2011) (Pennay, Manton, and Savic 2014). What past, mostly quantitative, research has failed to uncover is the triple vulnerability of historically marginalized residents to criminal behavior, substance abuse, and, at the same time, exposure to street crime. Those results thus renew calls for de-criminalizing poverty and social vulnerability and for shedding light on some of their causes – the multiple and renewed shocks and trauma lived by a community and its residents when exposed to gentrification. They also respond to calls for understanding how gentrification maintains or exacerbates health inequalities (Cole et al. In Press).

The main strengths of our analysis include being the first to compare neighborhoods undergoing diverse gentrification processes across cities and countries to understand which gentrification-health pathways may play a role for a diversity of historically marginalized groups – by class, race, and age. This increases our results' generalizability, overcoming a common critique of single-case study based qualitative research. Indeed, our paper contributes to the broader literature on neighborhood environments as health determinants (Duncan & Kawachi, 2018) by zooming in on the gentrification-health relationships of marginalized residents. It also responds to critiques on the majority quantitative approaches and methods used to analyze the gentrification-health relationship and to calls for better accounting for the qualitative perceptions and experiences of key community stakeholders, residents and representatives who can speak from professional experience and experience of how gentrification processes unfold and shape the health of marginalized groups (Hyra et al. 2019, Shmool et al. 2015). Our paper includes multiple stakeholder groups in each city and triangulation of data with grey literature and other sources, allowing nuanced analysis of each setting.

However, some limitations deserve mention. For example, snowball methods such as those used here may exclude opposing views or experiences. Regardless, our robust sample included 77 respondents in 14 cities and neighborhoods. It was beyond the scope of our work to investigate the health impacts on other population groups that may be at high risk of social and health outcomes in cities due to other markers of vulnerability or to explore if the role of these different pathways may change over time, especially in the context of COVID-19, as some recent scholarship calls for (Cole et al. 2020). All these should be explored by future studies, bringing together quantitative

and qualitative methods. In fact, our paper provided new hypotheses and insights that quantitative research can explore when aiming to explain the impact of gentrification on health.

Concluding remarks: Gentrification as a chain of trauma and a permanent state of displaceability

In sum, this study highlights here how different gentrification processes create individual and community trauma as a result of a multiplicity of insecurities and combined losses it creates for the lives of historically marginalized groups. In a context of increasing real estate speculation and cost of living in gentrifying neighborhood and socio-cultural disruption, those residents are faced with daily forms of displaceability and vulnerability, which a loss of social networks as well as reduced public services and amenities are not able to compensate or, obviously, replace. For many of those groups, multiple chains of trauma mean a greater vulnerability to undesirable behavior as well as worsened street safety. Many residents resist those pressures and fight for a right to stay in place, but they are often impacted by structural social, economic, and political changes beyond them. They have agency, but even this agency is in a state of displaceability, especially so as social networks become dislocated as residents, services, and facilities move away. As a result, their short-term and long-term physical and mental health is compromised.

It is time for cities in North America and Europe to recognize those multiple, concurrent pathways between gentrification and poor health outcomes for historically marginalized residents. While many integrate health-centered commitments such as Health in All Policies or Healthy Communities in their urban plans, few still consider the impacts of gentrification on health and its

associated pathways. Our research thus offers new policy and planning directions for avoiding or addressing these impacts and placing equity and justice at the center of building healthier neighborhoods for all.

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Figure 1

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Figure 2

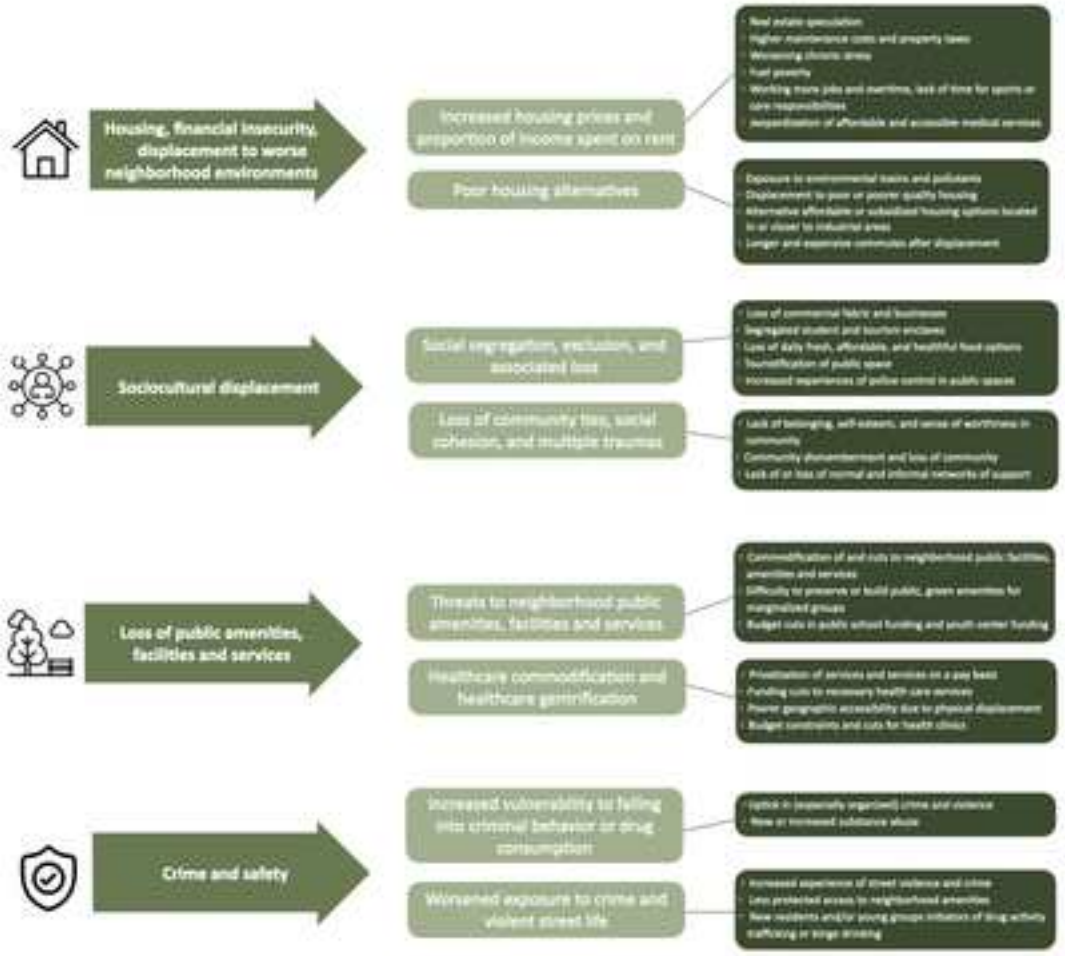

Table 1

	Neighborhood, City	**Urban development history, main characteristics**	**Gentrification type (real estate, housing, commercial, tourism, green/environmental gentrification) and stage**	**Public health trends**
Europe	Sant Pere/Santa Caterina, **Barcelona**	Since the late 1990s home to waves of immigrants including working class residents of Latino, North African and Pakistani origin. Previously a less diverse, more working-class Spanish and Catalan neighborhood. Redevelopment plans in 1990s and 2000s included demolition of several streets to create public spaces and cultural centers; restore markets; improve sewage and electricity infrastructure; pedestrianize streets; and create new social housing. Has most recently suffered from mass tourism, real estate speculation, and use of public spaces by visitors	Typology: intense touristification coupled with changing commercial landscape, green gentrification, and increasing house prices. Acute gentrification.	Individual level physical and mental health outcomes include obesity, asthma, chronic stress, and depression.
	Inner East (St. Pauls, Easton), **Bristol**	European Green Capital of the Year in 2015, yet one of most segregated cities in the UK, with the 'tale of two cities' being a common phrase for both residents and public officials. Home to large Afro-Carribean communities, with Easton also being home to large Indian, Pakistani and Bangladeshi populations. Both neighborhoods within top 10% most deprived in the UK. St. Pauls once 'dangerous' reputation, dating back to riots in 1980s, is slowly changing with highly gentrifying city centre and surrounding neighborhoods (Montpellier, Stokes Croft) beginning to spill over into St. Pauls. Poor quality green infrastructure. Some local groups have been trying to make a "Green Way" - walking/cycling path - across it, an idea that has emerged during the pandemic	Typology: Real estate gentrification (city wide), limited green gentrification at a neighborhood scale, city-wide environmental gentrification. Early-stage gentrification (for Inner East). Housing shortages	Air pollution regularly above EU legal limit largely due to m32 motorway which splits two neighborhoods. Easton well below city average on life expectancy for both males and females. Male healthy life expectancy is in the lowest 5% in England for Upper Easton. Childhood obesity has been on the rise, increasing to 39% in 2018.
	The Liberties,	Post-industrial disinvestment and urban decay, main industries- breweries and distilleries, dereliction also a	Typology: touristic and studentification, retail,	High obesity rates, lacking general mental and physical health from lack of sports

	Dublin	result of slum clearance and widening of roads late 1900s. Working-class neighborhood, one of the poorest in Dublin, heavily affected by the 2008 housing crisis. Residents reported the feeling of being the "dump" of Dublin, with high percentage of social housing and rehab centers in the wider area of Dublin 8. Rapidly growing international tech innovation. Overall least amount of green space in whole of Ireland, possesses low-quality parks and playground spaces, contains less that 1m2 of green space per resident, including 5% canopy coverage	tourism, environmental gentrification. New and large scale, high-end construction projects. Accelerated displacement of underprivileged residents Middle-stage gentrification	facilities or well-kept and publicly surveyable open green spaces. History of alcoholism and drug abuse as well as violence in the neighborhood, as well as in other central neighborhoods and the wider Dublin area, connected to dissafected youth as well as other social plights.
	East End, **Glasgow**	East End neighborhoods include Bridgeton, Calton and Dalmarnock. Suffering from post-industrial urban decay and deindustrialization; historically globally significant industrial areas (including shipbuilding, textiles and chemical production), by 1960s entered into a period of prolonged economic decline, high unemployment and population decline, contributing to largely abandoned and derelict areas. Two of the most deprived areas in Scotland, poor historically working class communities, highly stigmatized individuals and immigrants (Wilson, 2017). Poor quality green infrastructure across the city, where 60% of population live within 500m of a vacant and derelict land site, compared to aprox 8 or 9 out of 10 people in Glasgow's East End.	Typology: gentrification is instigated by large-scale state-led redevelopment and regeneration plans including mixed-income housing Early-stage gentrification Decrease in social or affordable housing options	Glasgow Effect: "excess" morbidity and mortality rates highest in majority of Western Europe, above expected levels for socioeconomic deprivation. This is due to high risk non-communicable diseases and poor mental health. Life expectancy up to 15 years less than other areas in Glasgow.
Canada	Saint-Henri **Montreal**	Prosperous industrial neighborhood until closure of the Lachine Canal in 1929. Following this were decades of deindustrialization and loss of services including local schools, clinics, shops/businesses. Poor working-class, Irish Catholic, historically stigmatized	Typology: retail and food gentrification. environmental gentrification	Residents increasingly living far away from health services and care facilities Many residents struggling with food insecurity. Closure of traditional food stores

		neighborhood for marginality, slums and poor living conditions. Neighborhood currently part of a city-wide creative growth development project. The Lachine Canal reopened in 2002 after undergoing a decontamination process, as a green and blue space including extensive bike paths.	Middle-stage gentrification Upscale restaurant and condo developments Direct or indirect privatization of canal access	and food banks. High rates of diabetes and cardiovascular disease
United States	Peoplestown, **Atlanta**	Highly segregated city along race and class lines, with further segregation by class among Black residents. Historical center of Black social and political power. In Peoplestown and other historic Black neighborhoods, multi-generational African American residents struggle with rising property taxes and inherited property for which families do not have clean titles. The Atlanta Beltline is one of the key greening projects, repurposing abandoned rail lines encircling the city into a greenbelt, connecting other green spaces as well transport lines. In Peoplestown, the beltline is seen as a threat culturally and economically, "nothing but a sidewalk to displacement". The Beltline loop connects many neighborhoods of varying racial and socioeconomic characteristics, thus struggles to adapt and adjust to the demands and interests of residents in each neighborhood.	Typology: green gentrification, real estate Early-stage gentrification Displacement due to rising housing prices Property taken from long-term residents by eminent domain to makeway for flood control infrastructure and park	Health risks associated with urban flooding due to run-off from three major highways and inadequate sewer infrastructure, especially during periods of heavy rain. Mold and poor housing conditions. Stress due to (threat of) displacement.
	East Austin, **Austin**	Long history of spatial segregation and marginalization. Much of the neighborhood was redlined in the 1930s onwards In the early 1990s, African Americans were displaced to East Austin, historically close to polluting industry	Typology: real estate, commercial and green (linked with smart growth planning)	African Americans and Latinx communities exposed to poor environmental and health conditions. High rate of obesity and diabetes (2 to 2.5

		including 6 tank farms emitting contaminating gasoline vapors. Also, home to a large number of Hispanic residents. Dramatic loss of minority residents due to gentrification since the 2000s (median income for white households reaches $90,000 a year against $55,000 for Hispanic households). Known as Texas' greenest and most ecological city, with 15% of land made up of parks and green spaces. Access to spaces is increasingly determined by privilege.	Advanced stage intense gentrification.	times the rate of white for Hispanic and African American residents respectively). Lower rate of health insurance, access to high-quality health providers, and medical treatments. Loss of local public facilities and services creating new stressors on mental health.
	East Boston, **Boston**	Neighborhood constructed on infill to facilitate industry. Key historic port for ship transportation of ships and ship-building, subway and major traffic arteries. Since 1839 has been the port of entry and employment for many immigrant groups, high Latino population. Home to a number of industrial sites making it prone to pollution and contamination. Now part of large-scale waterfront clean up development plans, as well as wider neighborhood transformation into green climate resilient district.	Typology: combination of real estate and green gentrification, food gentrification in a historic context of food desert Advanced-stage gentrification Rising house prices.	High rates of obesity and diabetes. Alcoholism and substance use. Mental health issues, especially teenagers - a rise in talking about feeling suicidal, hopeless, especially in relation to displacement stress
	Detroit Shoreway, **Cleveland**	Historically industrial neighborhood, home to transportation, machinery and iron and steel companies, followed by significant economic and pollution decline. One of the most segregated cities in the US, coupled with high crime rates. Currently undergoing large-scale development plans due	Typology: real estate and green gentrification. Early stage gentrification.	Poor health outcomes due to exposure to environmental hazards including mercury, asbestos and other heavy metals, contamination from industry, lead paint from housing and exposure to sewage and agricultural toxins in water due to waterfront location. Predominantly respiratory issues.

		to neighborhood proximity to downtown and transportation corridors.	Promoted as an arts and entertainment enclave	
	West Dallas, **Dallas**	A historically industrial neighborhood, causing heavy metal pollution. Location across the river from the economic center makes it ripe for gentrification. Was the home of the largest public housing development in the US, located across the street from a lead plant and itself segregated by race/ethnicity. Made up of many small neighborhoods, segregated along racial/ethnic lines and isolated from downtown Dallas by highway and railway infrastructure and a river. Promised economic benefits of new developments, commercial opportunity and new amenities have not benefitted long-time residents of West Dallas, instead threated by displacement and community destruction.	Typology: Real estate and commercial gentrification Early stage gentrification. Top-down "mega" development of commercial landscape Housing developments and increasing housing prices.	Poor health outcomes related to exposure to high levels of environmental hazards (especially lead, and other heavy metals) for Black and Latino communities living close to industrial sites. Respiratory issues related to elevated air pollution. Stress due to (threat of) displacement.
	(Elyria-Swansea), **Denver**	Former industrial working-class neighborhood, city-led development as new economic hub. Historically Hispanic neighborhood, also large African American population, largely segregated from each other and whites. In fact, the neighborhood has been somewhat isolated from the rest of the city Currently undergoing large scale redevelopment plans to renovate and green the street scape, addressing public health issues and increase tourism attraction to the area (e.g. the reform of the National Western Centre, i-70 highway expansion, Brighton Boulevard, and new light train stations)	Typology: real estate gentrification and green gentrification. Advanced gentrification stage Mean single-family home price has multiplied by 200 percent in the last 10 years.	The area has suffered from a legacy of air and soil pollution from factories and the highway, that has affected residents' health. Neighborhood asthma, heart disease and cancer rates are around 1.4 times those in the rest of the city. Safety is an issue for children having to cross active train tracks to commute to school. Many residents are faced with choosing between rent, food and health care.
	West Oakland, **Oakland**	Historically working-class neighborhood with a large population of low income African Americans. Currently experiencing a demographic change with an increase in Hispanics and Whites.	Typology: Real estate gentrification	Chemically contaminated soil on the back of explosion during WW2. The port and three surrounding freeways now contribute to poor air quality

		History of being an underinvested neighborhood, where new developments and greening initiatives are often hindered by the community due to displacement fears. The port is a publicly run agency in a private sector, meaning that the surrounding West Oakland area is left with the environmental impacts and not the economic benefits. As one of the five busiest ports in the US and the municipality is very dependent on its wealth, so much so that it turns a blind eye to governance.	Quite advanced gentrification and development Displacement, unaffordable housing/shortages	conditions. This has increased negative impacts on health including increased hospitalizations for causes such as congestive heart disease and asthma. Life expectancy seven years less than for residents in whiter neighborhoods (e.g. the Hills).,
	Cully, **Portland**	Historically a farming area, later the home of large polluting industries (including the nearby airport). Poor street and walking infrastructure One of the most racially diverse neighborhoods in Portland, with an extremely active community. The neighborhood has been branded as an EcoDistrict, where sustainability is used as a poverty strategy and environmentalism is a movement shaped and benefitted from by the community. City-wide strong history of environmental injustices, displacement, gentrification and institutional racism. Trauma and distrust run deep, and the population has historically been distanced from political participation due to low education and language barriers.	Typology: Real estate gentrification Very early stage gentrification	Racial/ethnic health inequities. High levels of diesel particulate matter and health concerns due to the unsafe levels of arsenic and cadmium founded in air and soil near industrial factories. Health concerns related to historically neglected housing conditions, particularly for low-income and non-white communities (i.e., mold, failing roofs, and no heat) Lack of access to green spaces known to be beneficial for health and other environmental inequalities due to uneven public and private investment across the city. Language barriers and a lack of translators a significant challenge to accessing health care. Diabetes, high blood pressure, stress, dental problems, alcohol and drug abuse, unhealthy housing and aging among racialized minority groups
	South East, Anacostia,	Neighborhood long suffered from housing segregation and different urban regeneration interventions. Now undergoing development as part of the economically diversified city growth.	Typology: Real estate, retail and food gentrification	Long-term deprived residents impacted greatly by river pollution, resulting in poor health outcomes

	Washington DC	High correlation between high poverty rates and area with the most African American residents. Highly polluted Anacostia river from car parts, toxins, polychlorinated biphenyls (PCBs) and pesticides, previously used for fishing. Goal to be clean and safe by 2025. 11th Street Bridge 'equitable' development plans project green, inclusive and healthy spaces, protecting housing rights and African American arts, culture and environmental education.	Early to middle-stage gentrification. Rapid and ongoing increase in housing prices, Businesses now catering to artists and wealthier residents.	