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Vertical segregation of apartment building dwellers during late state socialism in Bucharest, Romania

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ABSTRACT

This article examines patterns of within-building vertical segregation in Bucharest, Romania under late socialism using micro-data (individual/household level information) from the 1992 Romanian national census. The data allows examination of separation of households according to the floor on which a household is located and according to the residential sector/district of Bucharest. Findings suggest that common social and demographic factors are related to the location of households in both horizontal and vertical dimensions of urban space. We also find that a freely functioning real estate market is not necessary to produce vertical segregation. Consequently, since vertical segregation existed in early and modern capitalist cities – and bearing in mind that the phenomenon existed under socialism too – we conclude that, like horizontal socio-spatial separation, vertical segregation is an intrinsic characteristic of modern cities and a feature of urban space that did not diminish when pre-industrial cities disappeared.

Introduction

We lead our daily lives through both horizontal and vertical engagement with urban space, and cityscapes grow and change in three dimensions. Hierarchical positions in society are reflected in our use of space (Kandylis, Maloutas, & Sayas, 2012); however, most scholarship considers cities in only two-dimensional planes. Studies of segregation generally focus on separation (into neighborhoods and districts) across horizontal space but seldom explore social hierarchies found in vertical arrangements in city space. In preindustrial cities (Sjoberg, 1961), but also in cities during the epoch of the early industrial revolution (Vance, 1971), vertical spatial separation of social classes within particular residential or mixed-use buildings was as pronounced as horizontal socio-spatial division. At the time, a three-dimensional "dome" (or "arc") shape was advocated to illustrate class-based residential disparities in urban space (Kohl, 1841).

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With the development of Fordism in the early 20th century, automobile ownership and use rapidly increased and exacerbated the physical expansion of cities, resulting in a dampening of the vertical aspect of residential differentiation. Consequently, the horizontal dimension of social segregation took center stage for almost a century (cf. Graham, 2015), epitomized by the Chicago School's zonal model (Park & Burgess, 1925) and other "classical" models of urban structure (Harris & Ullman, 1945; Hoyt, 1939). The social and spatial development of cities in the 20th century, however, did not completely erase vertical divisions, at least not in Europe. Surprisingly, however, there are few studies of vertical social division in the late 20th century or later except for select works (Bater, 2006; Leontidou, 1990, 1996; Maloutas, 2007; Maloutas & Karadimitriou, 2001; Maloutas & Spyrellis, 2016), and the most comprehensive studies of vertical segregation in Europe are generally confined to the specific context of Athens, Greece.

In recent years, the rates of high-rise housing development and vertical extensions (both upward and downward) of urban space have been unprecedented and have inspired scholars to call for critical research about vertical separation (Graham, 2015; Graham & Hewitt, 2012; Harris, 2015; Nethercote & Horne, 2016). Essentially, the vertical turn in human geography has its roots in critical urban and/or political studies highlighting vertical perspectives of power, sovereignty, and space. Contemporary studies about the verticality of cities emphasize the skyscraper as an expression of the consumer city (Rosen & Walks, 2013), urban towers as receptors of globalized population flows (McNeill, 2015), the centrality of skyscrapers in urban property development markets (Graham & Hewitt, 2012; McNeill, 2015), global power amassed in skyscrapers (Graham & Hewitt, 2012), and militarization-driven urban development (Graham & Hewitt, 2012; Harker, 2014). Put differently, the concept of vertical urbanism was put forward to capture the multitude of different forms, landscapes, and experiences of vertical urban development in the new millennium (Harris, 2015). While space limitations preclude a more nuanced review of potential methodological approaches and geographical and historical perspectives used to explore the vertical aspects of modern urban development (for reviews, see Graham & Hewitt, 2012; Harris, 2015), we observe that inequality and segregation (splintering) have been at the heart of studies on vertical urban development. Segregation usually relates to wealthy enclaves in expensive and protected skyscrapers living in "luxury condominiums" in the sky.

Where high density housing dominates central urban locations, new residential towers house socio-economic elites, and the stage is set for vertical separation of inhabitants. Here, housing is expensive and exclusionary, and many luxury apartments and penthouses are purchased as investment property. The appearance of luxury towers for elites in fashionable global cities [New York, Dubai, Mumbai, Toronto (Bernstein, 2005; McNeill, 2015)] is argued to trigger the division of urban space into new vertical enclaves and residualized surface space. Nonetheless, it seems that the available research on vertical urbanism is still geographically and methodologically selective (Nethercote & Horne, 2016), which raises the question whether patterns discerned in "iconic" contexts are truly universal (Harris, 2015).

Answering a recent call to refocus scholarly attention on the vertical dimension of urbanization (Graham, 2015) – especially the call to shift scholarly attention to "ordinary" cities (Nethercote & Horne, 2016) and to investigate other threads in vertical urbanism than those of verticalized territorial violence (Harris, 2015) – this article investigates the

patterns of vertical segregation in Bucharest, Romania during socialism. Vertical segregation – in contrast to horizontal segregation – refers to the social and/or ethnic stratification by floor of residence within apartment buildings (Maloutas & Spyrellis, 2016). Although the class (social) dimension of vertical differentiation has been at the core of inquiry since the mid-19th century (Kohl, 1841; Maloutas & Karadimitriou, 2001), the very rare accounts of vertical divisions in socialist-era apartment buildings – prefabricated blocks of flats – emphasize the important role of demographic factors in differentiating vertical locations of residents. Put differently, alongside social status, the age structure of residents (Jerzy, 1986) and/or stages in family life cycle (Musil, 1985) appear to codetermine the location of individuals and households within high rises of the "red" epoch.

We choose Bucharest for two reasons. First, appropriate data are available in Romania (it is difficult to find household-based demographic data in which floor of residence is reported). Statistical information included in national censuses or population registers – data sources commonly used in (horizontal) segregation studies – is usually not suitable for studying vertical differentiation. We use publicly available statistical microdata, including information about individuals and households, from the 1992 National Romanian Census (available from the Minnesota Population Center), which permits comprehensive and robust analysis of the patterns of vertical segregation in the modern (industrial) city (in its socialist incarnation). The data also allows us to link households to corresponding sectors (districts) of Bucharest. Interestingly, horizontal patterns of social segregation were detectable at the macro scale of sectors (districts) in the city in 1992 (Szymon, Gentile, Samuel, & Liviuet al., 2014) and also in the first decade of the 21st century (Armaş, Dragos, Ionescu, & Gavriş, 2017). Regarding our second motive for choosing Bucharest as the study site: a great majority of empirical studies illustrating vertical social differentiation revolve around capitalist cities at various stages of urbanization and economic development.

By focusing on the vertical aspect of social and demographic differentiation in a socialist city, we hope to further contribute to the thin body of knowledge on verticality and segregation. Since scholars often assume that vertical social differentiation is bound to be present wherever apartments within one building have dissimilar quality and are accessed by residents through market mechanisms (Maloutas & Karadimitriou, 2001), we are compelled to test if vertical segregation could be sustained in older housing stock and develop in standardized post–World War II housing in a system without freely functioning real estate and private rental markets. Consequently, we seek in this article to address the following questions:

- What are the effects[1] of demographic and social characteristics of individuals on their vertical location within buildings (floor of residence)?
- Is the effect of socio-demographic factors constant among different types of apartment buildings (presocialist tenements and socialist blocks of flats)?
- Is the relationship between socio-demographic factors and location similar for the vertical (floor of residence) and horizontal (sector) divisions?

This article is organized as follows. The following section presents an overview of probable links between apartment building structure and socio-demographic separation of residents. Then, we introduce the context, data, and methods for our empirical inquiry

of vertical separation of apartment building dwellers at the conclusion of a unique political period and economic system. The penultimate section presents the results of a multiple variable analysis exploring the separation of residents across horizontal and vertical planes in urban space. Our conclusions, presented in the final section, confirm that vertical separation is related to predictable socio-demographic characteristics.

Background: vertical separation in European apartments

Vertical spatial separation in the precapitalist city

Small multistory apartment buildings were introduced in the late Medieval period in the cities of northern Italy to simultaneously house elites and lower social classes (Allum, 1973; Brunn, Williams, & Zeigler, 2003). In preindustrial cities, vertical separation of social groups was argued to be more significant than horizontal segregation (Kohl, 1841; Sjoberg, 1961) and class cohabitation in vertically separated systems was common throughout the mid-19th century in European centers (Vance, 1971). Employment status [and, to a smaller degree, family wealth] determined a family's rung on the vertical hierarchy ladder (Hall, 2014), and people from varied social backgrounds experienced continual opportunities for contact. Vertical segregation – in which proximate coexistence (White, 1984) was economically advantageous for all classes, especially members of the middle class who preferred to remain in city centers rather than relocating to new suburban districts – proliferated in preindustrial trade-based cities.

In the 18th and 19th centuries, residential buildings of various sizes and shapes lined warrens of medieval streets in Paris and other European cities. Larger and more luxurious apartments were situated on lower floors. The second floor, one level higher than the noise and traffic of city streets, was the most-prized location. On higher floors, basic apartments housed middle-class working families. Beneath the eaves on the top floor and in the attic (and sometimes also in the basement) were rooms rented by low-income people, mostly servants and day laborers. Exterior building facades architecturally reflected the vertical separation that could be found inside (in terms of apartment size, ceiling heights, and amenities), and second story apartments, usually where the wealthiest resided, were adorned with exterior columns, tall windows, and elaborate window decorations. Price differentiation of apartments within these buildings is consequently easily explained. Most of these walk-up apartment buildings lacked elevators, doormen, and grand lobbies with entryways.

The Haussmanization of Paris (between 1853 and 1870) created new physical space for urban reconstruction and expansion, complete with grand new apartment buildings lining majestic boulevards. Similarly, in Vienna, the demolition of the medieval city wall and its replacement with the *Ringstrasse* produced new opportunities for establishing important institutions, and the *bourgeoisie* and elites desired new nearby grand apartments. These 20th century urban reconstruction efforts helped maintain the attractiveness of the center of European cities for the middle class and wealthy people, who consequently remained in cities rather than relocating peripherally. However, certain social groups were restricted by their purchasing power to particular districts and neighborhoods rather than levels within apartment buildings. Rebuilt urban quarters contained luxury apartment buildings and attracted the well-to-do, and unrenovated

districts became neglected and were home to low-income groups (Conklin, Fishman, & Zaretsky, 2014). Social distancing appeared in cities on a horizontal plane as working-class neighborhoods became physically separated from middle-class districts.

The addition of elevators to existing apartment buildings throughout Vienna in the late 19th century, especially in central locations, further supported income-based vertical segregation; members of the middle class could occupy an entire apartment building with little or no integration of social classes. The highest floors, only reachable by climbing stairs prior to the elevator age, were now attractive to everyone. Over time, pronounced vertical within-building separation in Paris was replaced with neighborhood-based segregation in horizontal urban space. Vertical separation lingers today, however, because districts containing apartment buildings that form comfortable homes for social integration remain due to inertia in urban built environments. In short, two key changes – the advent of elevator buildings and coordinated and comprehensive urban expansion (solidifying horizontal segregation) – set the stage for declining within-building vertical segregation, however the phenomenon lingers today, especially where existing housing stocks enable it. We thus concur with Kesteloot (2003) that vertical segregation occurs in both over-densified and predictable places.

Vertical separation in apartment buildings

It has been often assumed that urban height is closely related to power/status and authority and that the internal social differences of verticality correspond directly with hierarchical class relations (Harris, 2015). According to Max Horkheimer (ibid. p. 607), with the "feuding tycoons of the various capitalist power constellations" at the top and "the unskilled and permanently unemployed" at the bottom, North American skyscrapers reflected – by the early 20th century – the social hierarchy of the capitalist society. While this assumption can be partially supported by recent evidence of vertical rent curve patterns in high-rise apartment buildings (Jayson & Himbert, 2018), a positive and linear link between height and social status may not always the case, as Yuen et al. (2006) explicitly demonstrate in a recent study of stacked public housing in Singapore.

In Europe, within-building vertical separation (White, 1984) has been studied in recent decades in significant detail, especially in Southern Europe through the work of Thomas Maloutas and coauthors in Athens (Maloutas & Karadimitriou, 2001). In defining the long-term phenomenon, scholars have characterized "vertical social differentiation" as a voluntary process (Maloutas & Karadimitriou, 2001) and "vertical segregation" as a social distancing process (Maloutas & Karadimitriou, 2001) or deliberate choice (Flint, 2016). Both vertical social differentiation and vertical segregation describe hierarchical positions in society as reflected in residential urban space (Kandylis et al., 2012).

Vertical separation was detectable in the second half of the 20th century in Greek cities and other Southern European locales, where affluent people lived in flats on the top floors of six- or seven-story apartment buildings. On the floors below lived middle- and low-income families, while low-income workers and migrants rented rooms on the ground floor or basement.[2] Higher-floor apartments were the most attractive since they offered views and larger balconies coupled with less noise and more light. As a visitor climbed the levels of an apartment building from lower floors to higher floors, he or she encountered occupants in reverse social ascent.

Contemporary vertical segregation in southern Europe is attributed to a theory advanced by Leontidou (1990) enumerating the spatial distribution of the working class; however, subsequent research attributed vertical segregation more to the suburbanization of people from higher occupational categories. There is less spatial concentration of lower social strata, and vertical separation within apartment buildings plays a more significant role. The body of research explores stratification based on social status and ethnicity and race within apartment buildings in dense center city parts of Athens – during late 20th century immigration, including a 1990s immigration wave to Greece (Kandylis et al., 2012) – especially after apartments in the lower stories lost value beginning in the 1970s (Maloutas & Karadimitriou, 2001).[3] In Athens, vertical social differentiation did not come about as result of spatial redistribution of working class people (Leontidou, 1989) but mainly because people in upper professional categories relocated to peripheries when opportunities arose (Maloutas & Karadimitriou, 2001).[4]

Social mixing in apartment buildings in Athens was interpreted by some (Leontidou, 1996) to be suggestive of democratized and desegregated urban centers. However, Maloutas and Karadimitriou (2001) demonstrate that this type of vertical segregation is characteristic to Greek cities owing to dense city centers (stemming from a lack of suburbanization) and the filtering-down process of a city center which upper and upper middle social groups dominated and progressively abandoned since the late 1970s. Occupants, including immigrants, are more likely to live singly on first floors and in basements, while two-person households, usually middle-age or older couples, live on higher floors. Households with more people are somewhat evenly distributed throughout the stories (Maloutas & Karadimitriou, 2001). Tenure structure also reflects vertical separation, with homeowners overrepresented on higher floors (Maloutas & Karadimitriou, 2001). In Athens, immigrants are integrated with middle and higher occupational groups (Maloutas, 2007), and the segregation of immigrants is not pronounced because many live in vertically integrated space. Maloutas and Karadimitriou (2001) point out that most mid-20th century apartment buildings in Athens offer older (ungentrified) living space. People who live here are seldom attracted by the housing units themselves or nearby amenities, but live there because they have few, if any, other choices (Maloutas & Karadimitriou, 2001). Finally, results of a study using 2011 data from Athens (Maloutas & Spyrellis, 2016) reveal a surprisingly regular pattern of socio-economic vertical segregation: the social status of residents increases with a higher floor of residence. Moreover, apartments located on higher floors appear to be more spacious and more often occupied by owners rather than renters (ibid.).

Housing inequalities and vertical segregation under socialism

Equal rights to housing was one of the defining features of the socialist system (Andrusz, 1984). Cities were even thought to be rather featureless planes, so that housing assigned in one district could be perceived to be comparable to housing in another district (Hess, 2011; Hess & Hiob, 2014). Consequently, the presocialist housing stock was nationalized in the early years of regime formation (Chelcea, 2012) while the production of new housing was carefully controlled by the state and apartments were allocated through strict administrative channels (Gentile & Sjöberg, 2013). However, even if according to socialist principles everyone was given equal access to collective resources and no

housing or amenities should be better for anyone (or in any neighborhood) than in other places (Hess, 2018), the socialist city was horizontally segregated, albeit less than the capitalist city, and the distribution of housing was far from equitable (Szelenyi, 1987). Voluminous scholarly literature exists about housing inequalities under socialism (Gentile & Sjöberg, 2013; Morton, 1984; Szelenyi, 1983), and we therefore highlight only issues relevant to the study at hand. Despite the shared ideology of socialism, its implementation in housing policy and distribution of housing produced country-specific variations. While direct state-ownership dominated in the former Soviet Union (Gentile & Sjöberg, 2010), state-controlled cooperative ownership became more prominent in Poland in the late socialist stage. Bulgaria and the former Yugoslavia opted for larger shares of controlled private ownership; the housing system in Romania, dominated by the public rental sector, also had a sizable cooperative housing segment (Gentile & Marcińczak, 2014).

Similar to circumstances throughout the former socialist bloc, existing housing inequality in Bucharest under socialism is attributed by Gentile and Marcińczak (2014) to three, not mutually exclusive, causal mechanisms: (1) social merit-based rather than need-based housing allocation; (2) persistent shortages of resources and labor; and (3) widespread abuse of the housing allocation system. The first explanation emphasizes the fact that a purely need-based allocation system was ultimately an impossible goal to achieve, and that social merit determined access to housing. In effect, even in the early socialist phase, high-quality nationalized housing was primarily allocated to the *nomenklatura* (socialist upper-class), military and political officials, police officers, and other individuals important to the socialist regime (Chelcea, 2012). From the 1960s onwards, along with a rapid increase in prefabricated housing production and development of large housing estates, young specialists employed in priority economic sectors (military and defense, energy production, heavy industry, etc.) and their families joined the ranks of those who enjoyed preferential access to new apartments (Bodnár & Böröcz 1988; Gentile & Sjöberg, 2013; Szelenyi, 1983).

How did certain people in socialist cities acquire better housing than the housing allocation process should have allowed them? One explanation relates to the economics of shortages (Kornai, 1992): priority economic sectors had better access to limited resources (funds, materials, machinery, and labor) (Gentile & Sjöberg, 2010). Industrial development was naturally given priority over other sectors, including housing. State-owned enterprises were often involved in housing production for their employees. Accordingly, enterprises belonging to priority sectors were able to attract skilled workers by offering them higher quality housing. And housing, constantly in short supply, was the most desired good under state socialism. Housing inequality most affected the less privileged or those working in nonpriority sectors (Gentile & Sjöberg, 2013). Another explanation for housing inequality exposes the manipulation of housing waiting lists (and even disregard for housing waiting lists) by privileged or well-connected individuals (Chelcea, 2012).

Unlike housing inequality under state socialism, vertical segregation under state socialism has been virtually unexplored in scholarly literature. While structural and institutional processes contributed to unequal access to housing, the quality of apartments in both presocialist tenement buildings (Bater, 2006) and socialist-era multistory residential buildings (French, 1995) differed in the vertical dimension. "Inherited" apartment buildings, including former *bourgeoise* tenements, possessed (by design)

vertically diversified apartments, but differences in quality of apartments in vast standardized blocks of flats had different roots. Prefabricated components and later entire panels and walls were commonly used to hastily construct large estates of multistory apartment buildings of generally poor quality (French, 1995). Irrespective of the number of floors, the common deficiencies of prefabricated blocks of flats included frequent water leakages on the top floor and poor thermo-insulation of corner apartments. The ground floor tended to be avoided due to street noise and the fact that it was the "busiest" floor in a building (elevator lobbies were usually located there). Consequently, a social-merit based housing allocation system, combined with persistent economic and housing shortages, set the stage for the formation of vertical segregation [similar to horizontal socioeconomic spatial divisions under socialism (Szelenyi, 1983)].

Surprisingly, however, the few existing accounts of vertical differentiation patterns in socialist cities are largely anecdotal. Evidence from Bucharest suggests that, under housing nationalization occurring in the late 1940s, better quality apartments in prewar tenements were accessed by the new socialist elite, and former (capitalist) owners, if they did not relocate to urban peripheries, were removed to basement and attic apartments (Chelcea, 2012). Observations from St. Petersburg in the 1980s suggest that czarist-era vertical differentiation was to some degree replicated under state socialism; even if they lived in communal apartments shared by two or more families, members of the social elite were overrepresented in the mid-floors of former bourgeois tenements (Bater, 2006). Vertical demographic differentiation can also be detected in socialist-era mass-produced housing, specifically in large apartment buildings in the former Czechoslovakia (Musil, 1985). Young families with children were overrepresented on higher floors, and smaller households more often occupied lower floors. A study of a prestigious high-rise housing estate from the late 1970s in the center of Łódz, Poland further suggests that socio-demographic factors and migration history codetermine the distribution of residents among floors (Jerzy, 1986). The elderly and those who migrate from rural areas are overrepresented on the ground floor and lower floors. Households with younger members dominate higher floors. Lower-income groups are generally found on the ground-floor and the top floor(s). Finally, a recent study of the location of the poor in Luhansk, Ukraine, almost two decades after the collapse of socialism, provides further evidence of the separation of lower social groups on the top floors and corner apartments of socialist-era apartment blocks (Gentile, 2015).

In summary, limited and fragmented evidence from Eastern Europe suggests that vertical segregation was present in socialist cities, it was the product of socialist housing allocation, and social and demographic differences were reflected in segregation patterns. However, available empirical studies portray selected neighborhoods (Jerzy, 1986), or a specific type of housing (Gentile, 2015; Musil, 1985), rather than draw a comprehensive picture of vertical segregation in urban contexts. With this in mind, to investigate the legacy of within-building segregation in two apartment building types – pre– and post–World War II multistory apartment buildings – we explore demographic and socio-economic characteristics of residents of apartment buildings in Bucharest in 1992. By situating our study of microsegregation at the building/floor level, we answer a call for more critical research about the social aspects of vertical inequality (Graham, 2015) and research on this topic in locales other than Mediterranean cities (Saitluanga, 2017), where

underdeveloped peripheries have poor infrastructure and inconvenient transport connections to the center, encouraging people to remain in city centers in mixed buildings.

Research design and methods

Setting the scene

Unlike other East European socialist countries that remained under the supervision of the former Soviet Union, Romania under Nicolae Ceausescu – who ruled the country from the late 1960s until 1989 – embarked on a unique path of development that mixed totalitarian (*Stalinist* in character) socialism with Western European finance, investments, and technology (Marin & Chelcea, 2018). In this political system, urban development and planning were perceived as key forces in the creation of a socialist state (Church, 1979; Ronnås, 1982; Sampson, 1979). Although housing policy in Romania under socialism resembled the typical socialist model (cf. Chelcea, 2012; Ronnås, 1982) – with cooperative and privatized housing stock gradually supplementing state housing – the scale and character of urban development is exceptional (Turnock, 1990). The notion of "systematization" was enforced to achieve the socialist modernization of society, economy, and space through homogenization of architecture (prefabricated blocks of flats) and massive urbanization, which required razing villages and resettling their inhabitants in cities (Ronnås, 1982).

The effects of systematization in Romania are the most visible in Bucharest. In the 1980s, the city became the site of large-scale redevelopment in its historic core (Danta, 1993). More than 20 percent of the historic core was demolished and more than 40,000 people were evicted and relocated elsewhere to accommodate Ceausescu's vision for a socialist capital (Cavalcanti, 1997). Apart from the monolithic House of the Republic, the new main boulevard and smaller avenues were lined with apartment buildings for the socialist elite (Behr, 1991). Due to large-scale industrialization during the 1960s and 1970s; however, the majority of residents found dwellings in blocks of flats (usually five story or higher) organized in large residential complexes constructed in the outer zone (Turnock, 1990). With regard to the patterns of horizontal social segregation under socialism, although the neighborhoods of the higher social groups were generally mixed with tracts inhabited by other social categories, spatial divisions between the lower and higher social categories was also clearly manifested at the scale of sectors/districts (Szymon et al., 2014). Sector 1, where high social status tracts formed a contiguous cluster, was considered the most prestigious, while lower social groups concentrated in several adjacent neighborhoods in Sector 5.

Data

This study relies on the 10% sample from the 1992 National Romanian Census that is publicly available from IPUMS (Minnesota Population Center, 2018). This data set provides detailed statistical information on more than 74,000 households that resided in Bucharest in 1992. The data describes the social, economic, and demographic characteristics of individuals and households and their housing conditions. Most important, the data distinguish the floor on which a household is located, the number of floors in

apartment buildings, the age structure of apartment buildings, and the sector/district of Bucharest.

This rich data enables us to investigate vertical socio-spatial divisions in various types of residential buildings, including pre–World War II tenements and post–World War II apartment buildings. Since the results of previous studies suggest that vertical differentiation under socialism was present in older housing of a certain building height (Bater, 2006), only those pre–World War II apartment buildings consisting of four floors (including the ground floor) or more were selected for analysis; for socialist era blocks of flats, the "height" limit was set to six[5] or more floors. Consequently, our analysis of the patterns of vertical segregation relies on a sample of more than 58,000 households. The microdata available from IPUMS (Minnesota Population Center, 2018) contains information on small spatial units (the *strata* variable); there were more than 7,000 *strata* units in Bucharest in 1992. Even though we are not able to identify those units in the space of Bucharest, we use them to control for the microgeography of residential differentiation in the regression analysis of vertical segregation.

Methods

To illuminate the patterns of vertical segregation in Bucharest, we specify a multinominal logistic regression with clustered standard errors [which controls for the fact that individuals group themselves into spatial or other type of units (households, schools, etc.) (Cameron & Miller, 2015)]. In other words, people living in the same neighborhood may be more "similar" to each other than to residents living in other areas. If this similarity is not considered in a regression model, and if clustering occurs, estimated results will be biased (in other words, observations are in fact not independent). In this analysis, clustering by *strata* units provides robust geographical locations of buildings in neighborhoods of varying social status, estimates of the relationship between socio-demographic characteristics of individuals, and patterns of vertical socio-spatial divisions. To avoid additional clustering by households, we limit our analysis to household heads. Since patterns of vertical segregation can be estimated from the form and age of apartments buildings, we specify separate models for pre–World War II apartment buildings, 5- to 9-story socialist apartment blocks, and 10 or more story socialist tower blocks. To shed more light on the possible effect of housing allocation and provision processes under state socialism on vertical segregation, we estimate models for the housing stock constructed and inhabited after 1979 (between 1980 and 1992). Additionally, since the effect of residents' age may simply become blurred over time, and bearing in mind that the variable has not been considered in research about capitalist cities (Maloutas & Karadimitriou, 2001; Maloutas & Spyrellis, 2016), we then separately estimate models with and without this characteristic. In each model, the dependent variable is the floor where the dwelling is located. But for pre–World War II buildings, the "floor" variable also includes the basement and attic (there were no apartments in basements and attics in socialist-era apartment houses). Finally, we perform an analysis of macro patterns of horizontal social segregation; here, the dependent variable is Bucharest sectors (1 through 6) in which households reside. We estimate two models predicting the macro patterns of horizontal socio-spatial divisions in Bucharest – one encompassing the entire population of

household heads (regardless of the building type and number of floors) and the other confined to the residents of apartment buildings.

In constructing an appropriate set of independent variables, we isolate the socio-demographic and housing factors that were reported to significantly shape the patterns of vertical segregation in previous studies of Athens (Maloutas, 2007; Maloutas & Spyrellis, 2016) and socialist cities (Bater, 2006; Jerzy, 1986). We consequently select the following characteristics for individuals (household heads) and households: level of educational attainment, age structure, economic activity status, and degree of residential overcrowding (number of persons per room). We believe that these socioeconomic, demographic and housing variables reflect the main source of socio-spatial divisions in both dimensions – horizontal (cf. Marcińczak & Sagan, 2011; Sykora, 1998) and vertical.

Limitations

Due to limited information on the spatial locations of apartment buildings, we are unable to fully explore the intersection between horizontal and vertical segregation (cf. Maloutas & Spyrellis, 2016). Similarly, our technique for controlling for spatial heterogeneity in this analysis offers "population-averaged" results. Like the "classical" zonal or sectoral models of socio-spatial disparity, the models we produce depict a somewhat simplified picture of vertical socioeconomic divisions within various types of apartment buildings. However, we believe that the large sample used in this study provides a firm foundation for drawing useful conclusions about vertical segregation in socialist cities. Finally, we cannot control for the presence of elevators in apartment buildings, potentially an important predictor of vertical segregation patterns.

Findings

Explanatory variables included in the regression models and descriptive statistics (mean values) for the main sample (all types of buildings) and subsamples (different types of apartment buildings) are presented in Table 1. Almost 80% of Bucharest's population was housed in four-story (or higher) apartment buildings, and almost 60% of all households occupied apartments in socialist-era high-rise blocks of flats. As in other cities in Eastern Europe under socialism, the demographic structure of various types of buildings in Bucharest reflects the general logic of housing allocation under the socialist regime: new apartments were generally provided to young families, usually with better education (Gentile & Sjöberg, 2013; Węcławowicz, 1979). Residential migration related to the family life-cycle virtually did not exist, and residents aged along with the apartments they were provided by the system. Nonetheless, pre–World War II apartment buildings seem to have higher social status than the other types of buildings; while 20% of household heads in Bucharest in 1992 attained higher education, in pre–World War II multistory housing, individuals with higher education amounted to one-third of all household heads. Interestingly, an overrepresentation of higher social groups in pre–World War II apartment buildings (especially those located in Sectors 1 and 2) is actually reflected in the horizontal patterns of social segregation; a majority of higher social status neighborhoods was found in these two sectors in 1992, especially in the inner-city (Szymon et al., 2014).

Table 1. Descriptive statistics.

	All residences	Apartment Buildings					
		All	Prewar	Postwar, 5–9 stories (all)	Postwar, 5–9 stories (constructed after 1979)	Postwar, 10 or more stories (all)	Postwar, 10 or more stories (constructed after 1979)
Age structure							
15–29 years	8.1	8.3	8.3	8.3	10.2	7.2	8.1
30–44 years	35.4	38.7	30.1	43.3	55.9	36.4	51
45–59 years	25.8	26.6	21.8	22.4	20.3	29.3	21.8
60–74 years	22.5	20.3	25.5	20.2	10.3	20.4	13.7
75 years or more	8.1	6.2	14.3	5.7	3.4	6.7	5.4
Labor force participation							
Not active	42.4	38.4	47.7	34.9	21.0	38.4	26.9
Active	57.6	61.6	52.3	65.1	79.0	61.6	73.1
Educational attainment							
Less than primary or primary	31.9	28.2	21.5	27.3	26.6	27.9	24.4
Secondary	47.4	50.1	43.6	50.8	54.3	49.8	51.4
Higher	20.7	21.7	34.9	22.0	19.1	22.4	23.4
Persons per room							
Fewer than one	22.9	20.2	31.0	17.1	11.8	22.0	16.2
One	35.7	37	43.8	38.0	35.1	37.9	39.2
More than one and less than two	26.0	27.7	20.8	31.8	38.9	25.0	28.0
Two or more	15.4	15.1	4.4	13.1	14.2	15.1	16.5
N	74,260	58,576	2,308	18,848	11,530	23,803	5,263

Bearing in mind the principles of housing policy under socialism, it is unsurprising that newer apartment buildings, especially those constructed in the 1980s, house younger people (young families and young working people). Although apartments in post–World War II buildings were equipped with higher-level conveniences, they were more crowded.

Regarding the relationship between residents' socio-demographic characteristics and spatial distribution of residences, our results explicitly illustrate that educational attainment, age structure, labor force participation,[6] and housing conditions are all statistically significant in codetermining the (macro) horizontal patterns of segregation in 1992 (Table 2). The general patterns of land use in Bucharest and the division of the city into administrative sectors is depicted in Figure 1. Essentially, the variables in our model were statistically significant predictors of people's housing location for both the entire sample (model 1A) and for those living in apartment buildings (model 1B). The negelkerke pseudo R^2 (pseudo R^2 hereafter) values are 0.049 and 0.052 for model 1A and model 1B respectively, and the models are statistically significant. The relatively low pseudo R^2 values should not be alarming, especially since the dependent variable is categorical/multinominal and our models rely on microdata (King, 1986).

Even if a mosaic socio-spatial structure was the salient feature of the socialist city (Richard & Hamilton, 1979), our findings further confirm the observation that macro spatial patterns (zones and/or sectors) also reflected social divisions under state socialism (cf. Marcińczak & Sagan, 2011; Richard & Hamilton, 1979; Sykora, 1998). With Sector 5 as the reference category, an area that concentrated the lower social status population in 1992 (Szymon et al., 2014), Sector 1 seems to be the most prestigious. Compared to those with primary education only, residents with higher education had four times higher odds of living in Sector 1 than in Sector 5 [and for residents of apartment buildings, the odds were six times higher (Table 2)]. Although all other districts appear to have higher social status than Sector 5, the difference is less evident. Moreover, compared to the other five districts, Sector 5 was the least overcrowded and was home to the youngest people and migrants from rural areas. To summarize, our results clearly suggest that, in the horizontal dimension, there were pronounced differences in the social composition of residents between the most and the least prestigious districts. It then appears that pre–World War II apartment buildings in the historical core of Bucharest, along with small-scale socialist housing estates and special projects (including areas redeveloped in the late 1980s) had the highest social status. Large housing estates outside the city center were more socially heterogenous (Szymon et al., 2014). However, similar to Poland (Marcińczak et al., 2013) and Hungary (Szelenyi, 1983), housing complexes constructed in the mid-1970s and later had somewhat higher social status than housing from the early socialist epoch. We assume that the horizontal macropatterns of socioeconomic residential intermixing set the preconditions for vertical differentiation (cf. Maloutas & Spyrellis, 2016). We use this finding as a point of reference in the analysis of vertical segregation that follows.

Table 3 depicts the relationship between socio-demographic factors and the vertical location of household heads in older (presocialist) housing. The models are significant with pseudo R^2 values of 0.021 for model 2A (without the effect of age structure) and of 0.033 for model 2B (with the effect of age structure). With the ground floor as reference category, floors three and four seem to be the most prestigious: residents with higher education have 1.8 times higher odds of living on upper floors. The age structure of

Table 2. Multinominal logistic regression models on district (sector) location of households in Bucharest in 1992.

Ref: Sector 5	Sector 1		Sector 2		Sector 3		Sector 4		Sector 6	
Buildings	All	Multistory	All	Multistory	All	Multistory	All	Multistory	All	Multistory
Model	1A	1B	1A	1B	1A	1B	1A	1B	1A	1B
Age categories (ref: 75 and more)										
15–29	1.339***	1.511***	1.484***	1.601***	1.333***	1.329***	1.203**	1.198**	1.401***	1.498***
30–44	1.969***	2.358***	1.690***	2.030***	1.734***	2.047***	1.468***	1.686***	1.876***	2.372***
45–59	3.060***	4.403***	1.947***	2.389***	1.658***	2.197***	1.235**	1.555***	1.652***	2.390***
60–74	3.138***	3.762***	1.913***	2.180***	1327**	1.904***			1.386***	2.223***
Activity status (ref: not active)										
Active	0.894*									
Educational attainment (ref: primary and/or less)										
Secondary	1.784***	2.315***	1.323***	1.306***	1.400***	1.328***	1.365***	1.229***	1.672***	1.475***
Higher	3.891***	6.014***	2.283***	2.200***	1.617***	1.508***	1.381***	1.213**	2.248***	1.939***
Persons per room (ref: less than one)										
One	1.100*	0.783***	1.121*		1.541***	1.177**	1.242***		1.234***	0.894*
More than one less than two				0.813**	1.480***	1.165**	1.206***		1.285***	
Two and more	1.260***		1.278***		1.852***	1.519***	1.194**		1.463***	
Constant	0.409***	0.194***	0.867*	0.819*	0.849*	1.044*	0.779**	1.017*	0.711***	0.926*
N	73,201	57,761								
Clusters	7424	6428								
R²	0,049	0,052								

Figure 1. The spatial structure of Bucharest in 1992.

residents has virtually no effect on their vertical location. Similar to the capitalist city of the late 19th century (Vance, 1971), the basement and the attic were the stronghold of lower social groups in Bucharest's tenements. Compared with the ground floor, higher social categories (people with higher and secondary education completed) have significantly lower odds to live at the very bottom or the very top of older apartment buildings than residents who completed primary education only. Nonetheless, the socio-spatial divisions within presocialist buildings noted in Bucharest under late socialism are not as striking and regular as those typical of Haussmann's Paris or Victorian London (Vance, 1971). The ground floor appears to be the most overcrowded, even more than the basement and the attic. Like elsewhere in Europe in the 19th and the early 20th century, apartments in the basement and attic had the lowest standard by design, and flats on the ground floor were planned for lower social classes; the nationalization and subsequent redistribution of housing replicated these patterns to some degree (cf. Chelcea, 2012). Moreover, due to street noise and other inconveniences (e.g. dust in summer), the ground floor was generally not the most desired location.

Table 3. Multinominal logistic regression models on floor location of households, prewar tenement buildings of four and more stories.

Ref: Sector 5	Floors 1 and 2		Floors 3 and 4		Floors 5 and more		Basement and attic	
Model	2A	2B	2A	2B	2A	2B	2A	2B
Age categories (ref: 75 and more)								
15–29								
30–44		0.466*						
45–59								
60–74								
Activity status (ref: not active)								
Active		1.591*			1.561*			
Educational attainment (ref: primary and/or less)								
Secondary			1.530*	1.521*			0.476*	0.481*
Higher	1.591*		1.871**	1.759*			0.220**	0.224**
Persons per room (ref: less than one)								
One		0.462**						
More than one less than two	0.511**	0.383*		0.415*		0.582*	0.183**	0.198**
Two and more								
Constant	2.597**	2.893***	2.127**	3.483***	2.842**	2.582**	0.674	0.425*
N	2061	2061						
Clusters	527	527						
R²	0.026	0.033						

Socialist-era modern apartment buildings of five to nine stories reveal somewhat different patterns of vertical separation. For both older and newer socialist apartment buildings, socioeconomic, and demographic characteristics where significant predictors of vertical (floor) location (Table 4). Within the two groups of models, those that include the effect of age perform significantly better (models 3B and 4B). As showed by pseudo R^2 results, the models' explanatory power rises significantly from 0.011 to 0.052 and from 0.018 to 0.084 for older and newer buildings, respectively. However, even if the effect of age is omitted (models 3A and 4A), the ground floor and top floors seem to house lower social status residents (Table 4), which is consistent with previous findings (Bater, 2006; Gentile, 2015). Essentially, there is no difference in the educational attainment between those living on the ground floor and the top floors. Compared to the population without education or possessing primary education, wealthier people have two times higher odds to live on floors one to four than on the ground floor. The effect of education is much stronger in the new socialist housing stock. The same applies to the effect of the age structure of residents on vertical location within buildings. In fact, in all five- to nine-story buildings, demographic characteristics are the strongest predictor of vertical differentiation. It is clear that higher floors house younger residents; this is especially evident in the new housing stock where residents younger than 44 years have 10 times higher odds than the elderly to live on the top floors. Furthermore, compared with other floors, the ground floor is the most overcrowded and concentrates more single-person households. Consequently, it appears that the largely socially heterogeneous blocks of flats housing estates under socialism (cf. Kährik & Tammaru, 2010; Marcińczak, 2012) were in fact significantly differentiated in the vertical dimension.

Similar to low-rise apartment buildings, various socio-demographic measures are significant predictors of residents' vertical location in tower blocks (10 or more stories) (Table 5). Again, as illustrated by the pseudo R^2 results, models that include the age effect have noticeably higher explanatory power than those that do not: 0.053 (model 5B) vs. 0.013 (model 5A) and 0.099 (model 6B) vs. 0.021 (model 6A) for pre- and post-1979 apartment blocks, respectively. Tower blocks of 10 or more stories generally replicate vertical separation patterns known from lower apartment buildings, and the observed patterns are more legible in the late-socialist housing stock. However, there are some differences in the distribution of social and age groups (Table 5). While the ground floor and top floors of tower blocks appear to be overrepresented by less-educated residents, the section in which higher social groups have higher odds to live (twice the odds of the lower social groups) extends to the seventh floor. Regarding age structure, the elderly appear more likely to reside on higher floors (up to the fourth floor) than in lower apartment buildings. Differences in residential overcrowding appear to be less pronounced in tower blocks; in the new socialist housing stock in particular, there is virtually no difference in the degree of overcrowding between the ground floor and level higher than the fifth floor.

Discussion and conclusion

Since "a notable *horizontalism* tends to still dominate analyses of contemporary urban space" (Graham & Hewitt, 2012), the aim of this article is to shed light on the vertical patterns of socio-demographic segregation in Bucharest in 1992. Empirical studies on vertical segregation (within-building separation of socioeconomic population groups)

Table 4. Multinominal logistic regression models on floor location of households, postwar apartment buildings of five to nine stories.

Ref: ground floor	Floors 1 and 2				Floors 3 and 4				Floors 5–7				Floors 8 and 9			
Buildings	All		Constructed after 1979		All		Constructed after 1979		All		Constructed after 1979		All		Constructed after 1979	
Models	3A	3B	4A	4B	3A	3B	4A	4B	3A	3B	4A	4B	3A	3B	4A	4B
Age categories (ref: 75 and more)																
15–29				0.645*		1.539**				1.691**		2.554***		3.288***		12.263***
30–44		1.472**								2.807***		4.243***		4.677***		16.780***
45–59						1.822***		2.032**		3.001***		4.769***		3.642***		11.746***
60–74						1.494***		1.553*		2.058***		2.531***		2.366***		4.113***
Activity status (ref: not active)																
Active	0.868*		0.812*		1.265***						1.594***		1.522***		2.491***	
Educational attainment (ref: primary and/or less)																
Secondary	1.375***	1.313***	1.584***	1.574***	1.415***	1.321***	1.564***	1.525***	1.237***	1.161**	1.324***	1.251***				
Higher	2.591***	2.269***	3.817***	3.441***	2.581***	2.190***	3.928***	3.469***	2.048***	1.777***	2.717***	2.330***			1.242*	
Persons per room (ref: less than one)																
One	0.754***	0.597***	0.767*	0.593***		0.741**	0.555*	0.687*		0.708***		0.736*	1.292*	0.753*		
More than one less than two	0.811*	0.519***		0.479***		0.683***				0.746***		0.742*			1.585**	
Two and more	0.422***	0.291***	0.427***	0.275***	0.528***	0.364***		0.357***	0.605***	0.435***	0.656**	0.425***	0.766*	0.587***		
Constant	2.756***	2.200***	2.697***	2.306***	2.174***	1.416**	1.798**	1.436**	2.784***	1.334*	2.029***	1.671**	0.876	0.587***	0.439***	0.079***
N	18,652		11,369													
Clusters	2685		1642													
R^2	0.019	0.052	0.026	0.062												

Table 5. Multinominal logistic regression models on floor location of households, postwar apartment buildings of 10 and more stories.

Ref: ground floor	Floors 1 and 2				Floors 3 and 4				Floors 5–7				Floors 8 and 9				Floors 10 and more			
Buildings	All		Constructed after 1979		All		Constructed after 1979		All		Constructed after 1979		All		Constructed after 1979		All		Constructed after 1979	
Models	5A	5B	6A	6B	5A	5B	6A	6B	5A	5B	6A	6B	5A	5B	6A	6B	5A	5B	6A	6B
Age categories (ref: 75 and more)																				
15–29						1.441**				1.413*		2.408*		3.629***		10.809***		2.810***		8.511**
30–44						1.707***				2.171***		2.665**		4.848***		10.845***		4.451***		8.544***
45–59						1.438***				2.355***		3.171**		4.712***		9.501***		3.395***		8.013***
60–74										1.869***		2.228**		2.903***		4.372***		2.348***		3.227*
Activity status (ref: not active)																				
Active	1.437***	1.368***			1.258**				1.659***	1.324**	1.725***		2.259***	1.393***	2.913***		2.600***	1.563***	3.659***	1.806*
Educational attainment (ref: primary and/or less)																				
Secondary					1.370***	1.306***			1.271***	1.204**			1.210**				1.277***			
Higher	2.299***	1.994***	3.239***	2.786***	2.240***	1.994***	3.465***	3.019***	1.781***	1.619***	2.263***	2.244***	1.472***	1.329**	1.924**					
Persons per room (ref: less than one)																				
One	0.855*	0.739***			0.821*	0.710***				0.774**				0.797**				0.783**		
More than one less than two		0.715***				0.690***		0.579*		0.764**										
Two and more	0.635***	0.469***	0.420***	0.339***	0.627***	0.456***	0.504**	0.389***	0.715***	0.537***			0.816*	0.609***						
Constant	2.140***	1.823***	3.597***	0.396***	2.100***	1.407***	3.387***	2.412**	2.684***	1.486***	3.369***	2.875***	1.437***	0.503***	1.426*	0.293***	0.688***	0.316***	0.713	0.197**
N	23,478		5193																	
Clusters	3108		858																	
R²	0.018	0.053	0.031	0.099																

are seldom conducted because of data limitations; the information on the floor on which an apartment is located is included only in select social data sets or national censuses. The available works – apart from those on early capitalist cities (Vance, 1971) – are virtually confined to the context of Athens, Greece. Socialist cities achieved high levels of economic integration, and we use the "late" socialist city and a large data set on population and housing to fill the gap in the thin body of research on vertical segregation.

Our study confirms that, as much as cities are socially and demographically segregated by sectors (cf. Armaş et al., 2017; Szymon et al., 2014), presocialist- and socialist-era apartment buildings were socially and demographically segregated by floor of residence. Although differing sample sizes preclude direct comparisons of effect sizes from various regression analyses (though positive/negative signs can be compared for directionality), we find it impossible to ignore the fact that virtually identical social and demographic characteristics of individuals are significant predictors of both horizontal (sectoral) and vertical (within building) location of households. Put differently, there were higher- and lower-social status districts (or sectors) in Bucharest in 1992, and there were more and less prestigious floors within apartment buildings. One hundred years after Kohl (1841) introduced a "dome"/'arch' model of socio-spatial divisions in early capitalist cities, a type of "3D" arrangement of socio-spatial disparities were still readily apparent in the social, economic and political context of the socialist regime, a system that, at least in theory, was established to eradicate socioeconomic inequalities of 19th century industrial capitalism.

Patterns of vertical socioeconomic segregation are not universal but rather sensitive to local economic and institutional contexts and urban morphological structure. The distribution of socioeconomic groups among floors in apartment buildings in the early capitalist city (Sjoberg, 1961; Vance, 1971) was different than the patterns of vertical segregation in the industrial (Leontidou, 1990) or postindustrial capitalist city (Maloutas & Spyrellis, 2016). In the same way, and similar to the structure of horizontal socio-spatial disparities (cf. Szelenyi, 1983), within-building patterns of segregation in socialist cities appear to diverge from vertical segregation patterns known from the capitalist city at similar stages of economic development. In other words, the socialist system, which relied upon mass produced housing but did not possess a properly functioning real estate market (French, 1995), produced its own brand of vertical segregation. Interestingly, within-building patterns of segregation in presocialist tenements were generally reproduced under socialism; apartments formerly owned/rented by *bourgeoisie* were allocated to *nomenklatura* members, and basements and attics continued to be occupied by lower social classes.

Past research results from Athens clearly demonstrate that higher floors attract higher social status residents (Maloutas, 2007). In Bucharest, however, mid-level floors of socialist-era apartment buildings appear to have concentrated better-off residents. Even without a commercial housing market, more privileged residents were successful in seizing the best-quality housing (Bodnár & Böröcz, 1988; Gentile & Sjöberg, 2013; Szelenyi, 1983). We believe that differences in vertical-social segregation patterns between the two political systems may have roots in the system of housing production and quality of apartment buildings. Unlike apartment buildings in capitalist cities that usually have more spacious and consequently more expensive flats (e.g. penthouses) on

the highest levels (Graham, 2015), the largely homogenous blocks of flats in socialist cities consisted of uniform apartments that were designed according to strict norms (Hess & Tammaru, 2019; Hess, Tammaru, & van Ham, 2018). Moreover, while ground floor apartments usually house the lowest social groups, irrespective of political systems, the poor quality of prefabricated housing (especially leaking roofs and faulty elevators) discouraged higher social groups from living on upper floors (cf. Gentile, 2015). Finally, our findings support the suggestion advanced by Harris (2015): that researchers should disrupt the theories and imaginations of the relationship between the height and social status that are dominated by observation from the very specific context of mega-cities. In the same vein, it seems that neo-liberal capitalism and profit-seeking (global) investors (Graham & Hewitt, 2012) are not requisite for the development of vertical segregation, and that vertical level of residence may not necessarily go hand in hand with social status.

Interestingly, our findings also suggest the important role of demography in vertical sorting of households, especially in new socialist housing that reflects the more recent effects of housing allocation. The dominance of elderly people on lower floors and younger residents on higher floors in Bucharest in 1992 virtually mirrors results from Łódź (Jerzy, 1986) and to some degree the former Czechoslovakia (Musil, 1985). This demographic pattern may be explained by divergent preferences of various age groups, especially the fact that the elderly first and foremost valued easy access to apartments, at least in the specific context of socialist cities (cf. Jerzy, 1986). But this particular pattern of "demographic" vertical segregation under socialism could also be an implicit effect of housing allocation. Since ground floor apartments were among the least desired, and since the socialist regime generally supported young families with children, we presume that the elderly had not only more limited access to housing (especially to "new" socialist apartment buildings) but also noticeably fewer choices regarding the floor of residence. Future studies in contexts where residential mobility is more closely related to family life cycles can help gain more insights into the relationship between vertical residential preferences of individuals and their age.

Assuming that vertical segregation, although in different forms, was present in feudal cities (Sjoberg, 1961), 19th century capitalist cities (Vance, 1971), modern capitalist cities (Maloutas, 2007), and socialist cities, there is evidence to suggest that vertical social and demographic divisions are important dimensions of spatial inequalities in first- and second-tier European cities – urban areas that have higher shares of pre– and post–World War II apartment buildings. The results of our work confirm the argument advanced by Maloutas and Karadimitriou (2001) that vertically differentiated quality of apartments in multistory buildings is a necessary condition for the continuation of vertical segregation; however, a key finding of our study is that the existence of a market-based allocation system is not crucial, and vertical differentiation can develop in any allocation system that contributes to housing inequality. In other words, despite indisputable (and often pronounced) horizontal ethnic/racial and/or socioeconomic segregation, urban residents in Europe were (and still are) separated in the vertical dimension. Moreover, there is evidence to suggest that vertical social segregation will not fade away in the new millennium, at least in Europe.

Urban science fiction novels can potentially offer us insight about the future of cities (cf. Graham, 2016): with a projected world population in 2050 of 11 billion people, three-quarters of whom will reside in cities, urban housing challenges that are currently severe –

including a lack of affordable housing, inadequate housing quality, an insufficient number of housing units – could become crises. Given increasing urbanization and competition for scarce and costly urban space, vertical separation and its effects will become greater issues as cities grow vertically out of necessity more than they spread horizontally. To accommodate growing urban populations, more stacked housing will be built, allowing more intense use of urban space through vertical densification. Accordingly, with increasing commodification of housing (Madden & Marcuse, 2016), income inequality and spatial differentiation of housing prices in combination contribute to horizontal socioeconomic segregation (Musterd et al., 2017). In the same vein, the presence of "residential vertical rent curves" in apartment buildings (Jayson & Himbert, 2018), especially a premium on higher floors, should drive the development of vertical differentiation. It therefore seems that the flattening of discourses that still dominate urban research (Graham & Hewitt, 2012) generally obscures the complexity of socio-spatial divisions.

We close with an important recommendation: that more national censuses and other large-scale social data sets collect floor of residence in apartment buildings among survey subjects. Large data sets such as national censuses permit researchers to study within-building phenomena and cross-metropolitan area comparisons. Without collecting information about the vertical location of residents' dwellings, an entire axis of potential inequity is ignored, and disparity may persevere and propagate.

Notes

1. This reference to the effects of demographic and social features suggests the direction and strength of relationship between those characteristics and floor location within buildings.
2. Basement and ground floor rooms were the least attractive, and many were empty and neglected or had been converted to workshops before migrant demand pressed them into service for housing (Kokkali, 2010).
3. Residential segregation of immigrants in Athens is low by international standards (Kandylis et al., 2012).
4. A large wave of relocation toward newly built modern apartment housing by intermediate professional workers (Maloutas & Karadimitriou, 2001) combined with more cars in city centers has devalued city center property.
5. We chose apartment buildings with six or more floors for two reasons. First, buildings of this height were usually equipped with elevators. Second, we performed analyses (not shown in this article) for the "typical" socialist-era, low-rise blocks of flats (up to five stories), but the effects of social and demographic variables are negligible.
6. The "not active" category in our labor force participation measure includes unemployed people as well as those not looking for work.

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