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Remote Working and Using the Services of the 15-Minute City. An Analytical Model Based on Data Collected in Milan

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Abstract

The essay aims to explore the extent to which remote work fosters the 15-Minute City by increasing the use of local services. It proposes a model of analysis to study the impact of remote work on the use of services that focuses on two variables: a) the use of services in the neighbourhood; and b) the frequency with which workers perform their job remotely. Then, the contribution tests the model by referring to empirical data collected in the Milan area that consisted of a Survey developed in 2022, after the pandemic, with 285 remote workers of the quaternary sector. Our analysis highlights that remote work is mainly being performed at home and fosters the use of supply and leisure services in the neighbourhood, which ultimately encourages the development of the 15-Minute City. Although a high frequency of remote work relates to a higher propensity to use neighbourhood services, a significant group of full-time remote workers do not use services closer to their homes, which underlines the need to take into account other variables to understand the choice to use proximity services or not.

Keywords: 15-Minute City; convenience services; neighbourhood; proximity; remote work.

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Introduction

In the last decade, and especially since the Covid-19 pandemic, the *15-Minute City model* developed by the Franco-Colombian urbanist Carlos Moreno and his research group at the Sorbonne University (Moreno et al., 2021; Moreno, 2024) has seen growing academic, media and institutional recognition. In June 2020, the United Nations agency UN-Habitat (2020) promoted the 15-Minute City among its main guidelines for the development of sustainable cities in the post-pandemic. Meanwhile, several global metropolises such as Paris, Ottawa, and Milan, have started to adopt programs that aim to develop Moreno's model.

The 15-Minute City proposes to develop polycentric urbanization that allows its inhabitants to reach the services considered essential in a quarter of an hour from their homes, all with zero-emission mobility (therefore carried out walking or by bicycle). The model aims to promote a better quality of life, reducing emissions, recreating social bonds and countering the social inequalities created by the center-periphery dynamic. Moreno (2024) distinguishes essential needs that must be available nearby, which include, among others, four dimensions that will be explored in this essay: *living*, *work*, *supply*, and *leisure*.

In terms of *work*, the pandemic period has accelerated the process of remote work, leading millions of individuals to carry out their duties outside of their company headquarters for the first time, and mainly moving their jobs to their home. In Italy, remote workers have gone from being around 500,000 people before the pandemic period to over 7 million in 2021 (INAPP, 2022). At the end of 2023, it was estimated that around 2.8 million workers continued to carry out their duties remotely, many of whom worked at home (ISTAT, 2024).

Some authors, such as the geographer Richard Florida and colleagues (2023, p. 1519), estimate that remote work is a "key aspect of the pandemic shock" as it could affect the economic geography of work in the long run and have a significant impact on urban contexts, especially on mobility, transport and the real estate sector. In Italy, widespread remote working has implied for many people a *re-contextualization* of their work (Donnelly & Johns, 2021) that has moved from the company headquarters to their home or other spaces close to their place of living. From this point of view, remote work participates in relocalizing labour closer to the living areas and could therefore contribute to the development of the 15-Minute City. However, we can wonder whether this shift regarding the place where work is performed is also accompanied by a greater use of services that are closer to workers' homes. To what extent does remote work incentivize the mobility of work towards home and enhance the use of the services of the 15-Minute City, contributing to a better quality of life?

In their projections, Florida et al. (2023) estimate that global cities are the ones experiencing these transformations, as they include a greater number of remote workers, compared to smaller cities and rural areas. The article therefore proposes to analyse this issue by focusing on the Italian global city of Milan. This urban context is particularly pertinent to study the phenomenon for two reasons: on the one hand, the Municipality of Milan has included the 15-Minute City model as a central element of its urban development strategies, especially following the pandemic (Municipality of Milan, 2020); on the other hand, Milan concentrates a large part of the workforce employed in the quaternary sector, which includes jobs in ICTs, research and development, consultancy and other positions in which tasks can more easily be carried out remotely (ISTAT, 2022). There is no doubt that remote workers represent a privileged group of workers in terms of income and level of education (Cetrulo et al., 2020). However, their number is far from being residual. It is estimated that in Lombardy 15.6% of employees work at home, compared to 12% at the national level (ISTAT, 2024).

Among the various dimensions considered essential by Moreno (2024), we intend to focus here on three of them, namely on *work*, *supply*, and *leisure*, and analyse whether remote work encourages citizens to perform these needs closer to their homes, within the 15-Minutes City. To what extent does the fact that they work remotely, closer or even at home, lead these workers to use commercial, leisure and cultural services closer to the place where they live? Our contribution proposes to develop a model of analysis of the phenomenon that we test starting from empirical data collected through a survey conducted in Milan in 2022 and involving 285 remote workers of the quaternary sector.

The essay is divided into five sections. The first two focus on a literature review, in particular relating to the quality of life and its connection with the 15-Minute City (1), and to the relocalization of work through remote work (2). The subsequent section develops a theoretical model to analyse the use of the 15-Minute City proximity services by *remote workers* (3). After the presentation of the methodology used to collect the empirical data (4), the last section proposes to test the model using the data gathered in Milan (5). Finally, the discussion and conclusions highlight the contribution of the essay to the debate and its limits, suggesting paths for future research to develop the analytical model.

1 Quality of Life and the 15-Minute City

The theme of quality of life (QOL) has been the subject of seventy years of studies and research, originating in the United States between the 1950s and 1960s, when the country's overall economic development was accompanied by social unrest, environmental degradation and rising crime — factors that created the need to collect new data on well-being (Nuvolati, 2022). Since then, the diffusion of the debate on the meaning and methods for measuring the concept of quality of life has spread throughout the world and has been formalised at an international level through the birth in 1974 of the magazine SIR, *Social Indicators Research. An International and Interdisciplinary Journal for Quality-of-Life Measurement*, followed by the establishment in 1995 of ISQOLS, *International Society for Quality of Life Studies*, heir of the so-called *Social Indicators Movement*, and subsequently in 2006 by the foundation of another periodical, ARQOL, *Applied Research in Quality of Life*.

Over the decades, much of the research developed in this academic field has concerned the definition and study of the primary and secondary material and immaterial needs of human beings, the objective and subjective dimension of well-being, at the individual and collective level, configured depending on individual variables — such as gender, age, education, profession, social class, place of living and work, etc. — and on exogenous phenomena — such as climate crises, wars, political systems, etc. Of the various approaches present in the literature, that of Amartya Sen (1993), based on the idea of quality of life as the outcome of the transition from commodities to *functionings* and *capabilities*, is still considered the most suitable today, when applied to an urban context. Sen departs from the assumption that well-being is not only given by what is available in terms of goods, services and resources, but by their effective use in terms of functioning and capabilities.

Recent literature has emphasized various issues related to exclusion and accessibility to services, particularly from social, economic, and physical perspectives (Nuvolati, 2009; Colleoni, 2024). Numerous studies have examined how transportation disadvantages contribute to growing concerns about the social exclusion of low-income individuals and communities, who often face limited access to essential services (Lucas, 2012 & 2019). In this context, living and working remotely within a 15-Minute neighbourhood equipped with high-quality proximity

services can be seen as an ideal condition for improving quality of life. However, neighbourhoods differ in the quality and availability of services they offer, and a range of obstacles can prevent individuals from fully taking advantage of these opportunities. For example, physical and environmental barriers — such as steps, staircases, gates, exterior surfaces and pavement, internal and external doors — can prevent people with disabilities from fully using certain services, even when those services might be accessible to other inhabitants (Crippi, 2024). In addition, social and economic barriers, such as entry fees or unclear information on how to access amenities, can particularly hinder access for more vulnerable or precarious groups (Council of Europe, 2013).

As Biagi et al. (2018) observe:

> Amenities can be pure, such as natural resources, climate, and so forth, or man-made, such as various types of services supplied by cities. However, it is important to highlight that the presence of such amenities is not necessarily positive for QoL [Quality of Life] perception if these amenities are not accessible for personal reasons (lack of time because of personal reasons) or external reasons (external accessibility). Thus, considering only the presence of amenities without including aspects of accessibility might produce biased results of the actual perception. Therefore, studying the accessibility (functionings) of amenities implies measuring how much people are able to enjoy them. The frequency of use can be seen as indicator of functionings in this sense. As seen in the literature review, studies on QoL agree also on the role of social interactions. The same reasoning applied for amenities can be used for social interactions: for QoL perceptions, the actual possibility to socialize is important. It can be measured by the frequency with which people socialize in their everyday lives (Biagi et al., 2018, pp. 139–140).

Since the 15-Minute City is based on the principle of a *friendly city*, easy to use for a large part of the population, in safe conditions, it is therefore described as a model capable of effectively increasing the quality of urban life (Manzini, 2021; Whittle, 2021). This essay aims to reflect on remote working as a condition capable of generating new ways of using urban spaces close to the home, with a view to implementing daily well-being and quality of life. At the same time, it intends to highlight the critical aspects of this hypothesis, looking at the variables that determine counter-trend phenomena, of rejection of the model proposed by the 15-Minute City, also taking into account the various countries in which this experience has found full implementation or criticisms concerning, for instance, the limitation of citizens' freedom (Chiaradia et al., 2023). Much literature has concerned the relationship between quality of life and characteristics of neighbourhoods (Gocer et al., 2023); another part of it, that especially developed following the pandemic but that was already consistent before the Covid-19 outbreak, has focused on the relationship between remote working and quality of life in terms of *work-life balance* (Sullivan, 2012; Zarboa et al., 2021). What we aim to investigate here is to what extent remote work favours the use of the neighbourhood, also with a view to improving quality of life.

2 Re-Contextualizing Labour through Remote Work

Remote work, particularly when performed from home, is not a recent practice. Since the Industrial Revolution, a substantial portion of the workforce, mostly women, has been working at home under what has been called *industrial homeworking*, a phenomenon still common

across both the Global South and the Global North (Felstead, 2022; Piro, 2024). With the advent of digitalization, the possibility of relocating work from centralized company headquarters to third-party sites, including private homes, has increasingly extended to other desk-based jobs within the service sector, especially in the quaternary sector (Pratt, 1984; Huws et al., 1990).

Remote work has contributed to the spatial fragmentation and reconfiguration of the workplace, which is no longer confined to the physical premises of the company but now connects geographically distant workers through virtual spaces (Verbeke et al., 2008). While some scholars argue that remote work results in a decontextualization of labour (Fried & Hannson, 2013), others suggest it instead entails a recontextualization of work (Donnelly & Johns, 2020). The geography of the workplace thus becomes relational, and workers simultaneously inhabit both digital and physical spaces, often moving to places closer to home, or even integrating work directly into their place of residence.

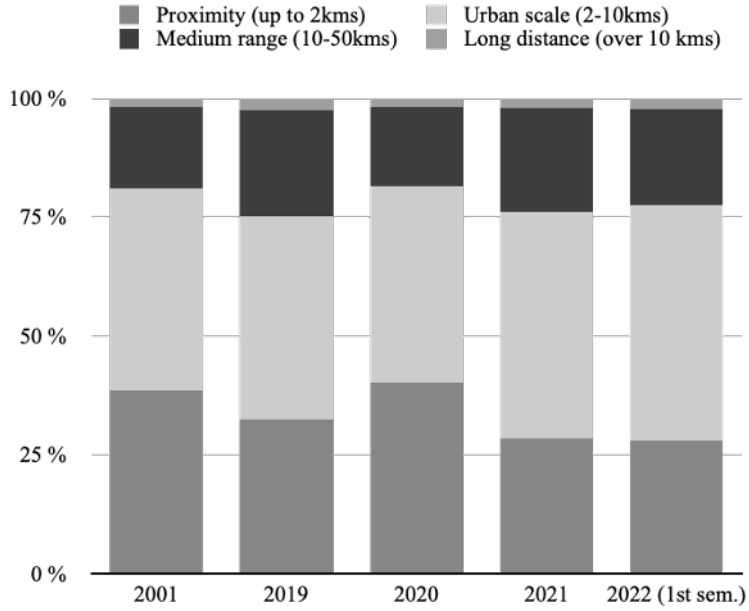
The literature has highlighted the multiple effects of remote working on the labour process, including the emergence of new forms of managerial control (Sewell & Taskin, 2015; Chung, 2022; Iannuzzi & Campolongo, 2023), the promotion of the externalization and precarisation of employment relationships (Irani, 2015), and the blurring of boundaries between working time and other dimensions of life, such as household and family care, community engagement, and self-care (Sullivan, 2012; Romens et al., 2024). It has also been associated with increased labour market polarization (Cetrulo et al., 2020). In recent years, academic discussions have increasingly addressed the implications of remote work for industrial relations. This shift has raised critical questions about the relevance and effectiveness of traditional forms of collective representation, as noted by Weiss (2016) and Dedden et al. (2023). On the one hand, spatial segmentation and workforce fragmentation challenge established modes of representation. On the other hand, these changes have prompted new forms of resistance and workers' organising, with unions increasingly mobilizing online and attracting greater worker attendance to their meetings, although this participation often remains passive (Piro et al., 2021). Empirical studies further reveal that this working arrangement places union representatives in a difficult position. They are caught between employees' request to retain remote work options at all costs and the need to safeguard existing rights and social interactions that are foundational to union activities (Romens, 2024).

Despite the growing interest in remote work, the literature has so far paid limited attention to its territorial implications and the ways in which it reshapes services usage patterns, eventually fostering the 15-Minute City model. During the pandemic, Florida and colleagues (2023) tried to imagine the possible long-term impact of the crisis on urban geography, identifying remote work as a key aspect of potential transformation. According to their perspective, the widespread adoption of remote work could lead to territorial shifts in two opposing directions: on the one hand, they estimated that some privileged remote workers, particularly those with young children, might relocate to affluent suburbs or small towns near global cities; on the other hand, the continued concentration of services such as restaurants, bars, clubs, museums and concert halls could encourage these same groups to move even closer to urban centres, giving rise to "work-life neighbourhoods" where people move around by bicycle or on foot, and that closely resemble the concept of the 15-Minute City (Florida et al., 2023, p. 1521).

Since then, the few empirical studies examining the territorial dimension of remote work have primarily focused on its impact on the real estate market (Gokan et al., 2022) and on individuals' satisfaction with their neighbourhoods (Kim & Shimizu, 2022). This article seeks to contribute to this emerging body of literature by exploring how remote work alters the use of proximity services, thereby promoting the development of the 15-Minute City model.

3 An Analytical Model to Study the Impact of Remote Work on the 15-Minute City

We propose to analyse the extent to which remote work encourages the use of the 15-Minute City. What variables influence the use of proximity services in the context of remote working? In this regard, data from the 19th ISFORT *Report on the Mobility of Italians* (2022) reveal that, although still substantial (around 30% of total mobility), proximity mobility (within 2 km) has declined in Italy between 2001 and 2022, in favour of urban-scale trips (2–10 km), which now account for around 50%, and medium-range trips (10–50 km), which represent approximately 20% (see Graph 1).



Graph 1. Distribution of movements by lenght bands – Source: Elaboration on ISFORT (2023), "Audiomob" Observatory on the Mobility Behaviour of Italians

At the same time, the 20th ISFORT *Report on the Mobility of Italians* (2023) highlights differences in mobility patterns depending on the intensity of remote working, particularly in terms of travel motivations. According to ISFORT, remote work is associated with a notable increase in trips related to family management reasons and leisure, while travel for work and study purposes decreases. Proximity mobility also tends to rise among remote workers. However, in this context, proximity mobility is calibrated as movement within a 10 km radius, which does not allow us to appropriately verify the hypothesis of the 15-Minute City — typically understood as trips within a 2 km distance, made on foot or by bicycle. In addition, differences in transportation modes emerge among various worker types, with remote workers showing a slightly higher reliance on walking and cycling. Based on this data, remote work does not appear to be definitively influencing individual mobility behaviours. Nonetheless, remote workers seem to privilege less systematic and more time-distributed forms of mobility — what could be described as a more "fluid" or "easier" use of the city (see Table 1).

Evaluating the impact of proximity mobility (characterized by short-range, short-duration travel) on citizens' movement patterns is arguably the most effective indicator for assessing the potential for a concentrated use of the 15-Minute City. However, to complete this picture, it

is also essential to examine the extent to which remoteness stimulates the use of local proximity services, as we propose to investigate in this contribution.

Table 1. Reasons, timing, and systematic nature of mobility among remote and non-remote workers
Source: Elaboration on ISFORT data (2023), "Audiomob" Observatory on the Mobility Behaviour of Italians

	Work remotely every day	Work remotely a few days a month	Never work remotely
Work and study	17.6%	42.1%	52.4%
Family management	37.2%	23.5%	21.0%
Free time	45.3%	34.4%	26.6%
Total	*100%*	*100%*	*100%*
Proximity movements (<10km)	77.5%	64.6%	69.1%
Medium and long-range travel (>10 km)	22.5%	35.4%	30.9%
Total	*100%*	*100%*	*100%*
Peak times	38.1%	47.2%	64.0%
Soft hours	61.9%	52.8%	36.0%
Total	*100%*	*100%*	*100%*
Systematic	40.2%	53.4%	74.8%
Not systematic	59.8%	46.6%	25.2%
Total	*100%*	*100%*	*100%*

Based on the findings of the previous reports (ISFORT, 2022 & 2023), we propose to analyse how remote working practices affect the use of the 15-Minute City services, focusing on the following two variables:

- a) the level of actual use of services in the neighbourhood;
- b) the frequency of remote work (how many days per week do individuals work remotely).

According to the ISFORT Report (2023) mentioned above, a higher frequency of remote work is associated with an increase in proximity mobility. It is therefore reasonable to expect that the practice of this working modality also encourages the use of proximity services. Starting from these variables, we propose constructing a table to identify four distinct types of behaviour:

Table 2. Analytical model

	Use neighbourhood services	
	Yes	*No*
Work remotely frequently	1	2
Work remotely infrequently	3	4

Based on the analysis of the table and the reasoning developed above regarding the use of the 15-Minute City and the frequency of remote work, we can hypothesize that the most predictable attitudes are those of Type 1 (individuals who often practice remote work and make

frequent use of neighbourhood services) and Type 4 (individuals who rarely work remotely and rely on services located elsewhere). Conversely, the least predictable attitudes are represented by Type 2 (individuals who do not use neighbourhood services even though they frequently work remotely) and Type 3 (individuals who engage with neighbourhood services, despite rarely working remotely).

In this article, we focus on the use of two types of proximity services: first, *supply* services, namely whether individuals tend to do their grocery shopping closer to home when working remotely; second, *leisure* services, namely whether they make use of cultural or sports facilities (such as swimming pools) closer to home when working remotely. In addition, we analyse the extent to which remote working encourages the use of food services, such as restaurants and bars, located closer to home. By examining the use of these services while working remotely, we assess the extent to which individuals meet four of Moreno's key urban needs — e.g., *living*, *work*, *supply*, and *leisure* — within the same neighbourhood, in line with the 15-Minute City logic.

4 Methodology

4.1 Collected Data

The article aims to test the model described above using empirical data collected in the metropolitan area of Milan. As mentioned, this context is particularly relevant because, on the one hand, local public authorities promote the 15-Minute City in their urban development strategies (Municipality of Milan, 2020); and on the other hand, Milan has a high concentration of workers in the quaternary sector — such as ICT, consultancy, and research and development — whose roles are well suited to remote work (ISTAT, 2022).

The empirical material consists of a survey conducted between November and December 2022 with 285 remote workers employed in six quaternary sector companies based in Milan. Data were collected via an online questionnaire administered through *Google Forms*, which participants completed independently. Participants were recruited through union representatives and subsequent snowball sampling.

Over half of the respondents in the survey were women (53%) and more than a third lived with at least one minor child (37%). All contractual levels were represented, although there was an overrepresentation of managers and first-level employees (62%). These findings align with the literature indicating that remote workers tend to belong to a relatively privileged social group (Cetrulo et al., 2020). The vast majority of respondents worked remotely at least three days a week (91%), and over a third (40%) worked almost entirely or exclusively remotely, commuting to their employer's premises less than once a week. In terms of distance between home and employer's premises, only 3% lived within 15 minutes of their in-person workplace, approximately one-quarter commuted between 15 and 30 minutes, while the majority (76%) reported a commute of over 30 minutes. For more details, see Table 3.

Although not representative of all workers in the quaternary sector, during a feedback meeting held in October 2023 — where we presented the preliminary results of the survey to union officials and shop stewards — the delegates indicated that the sample was sociodemographically representative (in terms of gender, age, contractual level, and presence of minor children at home) of the workforce within their respective companies.

Table 3. Characteristics of the Survey participants

Contractual level		
	Executive or manager	37.2%
	1st level	25.3%
	2nd level	14.0%
	3rd level	7.4%
	4th level	6.3%
	5th level	4.2%
	6th level	0.4%
	Internship	0.4%
	ND	4.9%
Age		
	Less than 30	13.0%
	30-40 y.o.	18.9%
	40-50 y.o.	34.0%
	50-60 y.o.	29.1%
	More than 60	4.9%
Type		
	Women	53.3%
	Men	46.0%
	Prefers not to specify	0.7%
Children at home		
	With minor children	37.2%
	Without minor children	62.8%
Frequency of remote work		
	Never or very rarely	2.1%
	1-2 days a week	6.7%
	3-4 days a week	50.9%
	Almost exclusively remotely	40.4%
Commuting distance to employer's premises		
	Less than 15 minutes	3.2%
	Between 15 and 30 minutes	20.7%
	Between 30 minutes and 1 hour	41.1%
	More than 1 hour	35.1%

4.2 Data Analysis

To analyse the collected data, we conducted two types of statistical analyses using SPSS: descriptive analysis and regression analysis. The descriptive analysis, on the one hand, provides an overview of work locations and explores the extent to which housing and working spaces overlap, particularly when individuals work at home. It also offers an initial insight into whether increased remote working correlates with greater use of nearby services.

On the other hand, the regression analysis delves deeper into how the frequency of remote work influences the use of proximity services. For this analysis, the *dependent variable* is the use of proximity services while working remotely. In our dataset, this is operationalised through four dummy variables: (1) using restaurant and bar services closer to home while working remotely; (2) doing grocery shopping nearby during remote work; (3) using cultural and sports services nearer to home during remote work; and (4) maintaining the same patterns of service use regardless of work location. The *independent variable* is the frequency with which individuals do remote work, which is divided into eight categories: (0.2) working remotely only a few

times per year; (0.5) working remotely a few times per month; the number of days per week in which individuals work remotely varies from (1) to (4) days per week; (4.5) primarily remote work with rare in-person presence, only a few times per month; and finally, (5) fully remote workers.

In addition, four control variables were included in the regression analysis. The first is the distance and commuting time from home to the office, grouped into four categories: (1) less than 15 minutes; (2) between 15 and 30 minutes; (3) 30 minutes to 1 hour; and (4) more than 1 hour. The second variable captures gender, coded as (0) female, (1) male, and (2) other. The third is a dummy variable indicating whether the respondent has underage children. The fourth control variable is age, divided into five groups: (1) under 30; (2) 30 to 40 years old; (3) 40 to 50 years old; (4) 50 to 60 years old; and (5) over 60.

5 Testing the Model Using Empirical Data Collected in Milan

In this section, we test the analytical model using the empirical data collected in the Milan area. The first two subsections explore the extent to which remote working fosters the implementation of the 15-Minute City, focusing on four dimensions identified as essential by Moreno (2024). Specifically, we examine how remote work facilitates the rapprochement of *work* to *housing* (5.1.), as well as the increased use of proximity services related to *supply* and *leisure* (5.2.). The final subsection (5.3.) investigates the impact of specific socio-demographic characteristics — namely gender, family composition and age — on the use of proximity services.

5.1 The Place from Which to Work Remotely

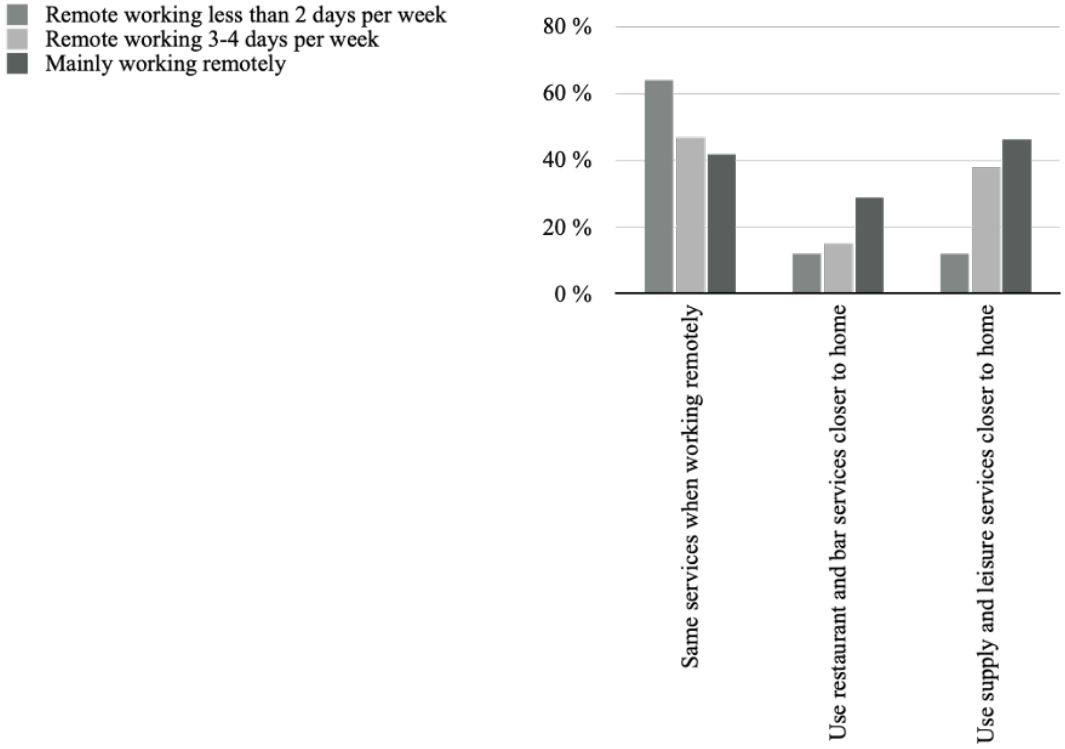
The 2022 survey highlights the locations to which *work* is transferred when performed remotely, underlining how this brings work closer to home. Among the 285 remote workers surveyed, the vast majority (99%) reported working mainly from home, while only a small fraction (1%) indicated carrying out their job from a third space, such as co-working facilities. For most respondents, remote work therefore results into a shift of work to their home, leading to an overlap between the spaces dedicated to *living* and *work* — two of the six needs identified by Moreno (2024). This spatial overlap is frequently discussed in the literature as potentially problematic, as it may contribute to overtime work (Romens, 2024), increased work-related stress (Redaelli et al., 2022), and heightened gender inequalities within couples at households (Hilbrecht et al., 2008; Sullivan, 2012). At the same time, however, this convergence determines a rapprochement of work to the home, reflecting a key principle of the 15-Minute City, in which the dimension of *work* overlaps with *living*, thus enabling workers to save the commuting time needed to travel to the workplace.

After this look at the places from which people work remotely, we now turn to testing the model outlined in Section 3 of this essay. In particular, we analyse how remote working leads to changes in the use of proximity services, focusing on the dimensions of *supply* and *leisure*.

5.2 Use of Proximity Services

Our survey highlights how remote working encourages the use of proximity services. In the questionnaire, participants were asked whether, "compared to working in person, when working remotely", they tend to eat, shop or use cultural and leisure services closer to home. The descriptive analysis reveals that the intensity of remote work affects individuals' propensity to

engage with services aligned with the 15-Minute City model: the more frequently people work remotely, the more likely they are to use nearby services, close to their home, especially for supply and leisure, including restaurant services (see Graph 2). These findings support the scenarios most anticipated in the model presented in Section 3: Scenario 1 — individuals who frequently work remotely and make greater use of neighbourhood services — and Scenario 4 — individuals who work remotely only occasionally and do not significantly change their habits with respect to the use of neighbourhood services — are both empirically confirmed.



Graph 2. Use of proximity services based on the frequency of remote working

However, a significant percentage of participants who work almost or entirely remotely (i.e., go to the office less than once a week) continue to use services in the same way as before (42%). For this group, remote working does not translate into greater use of local services. This finding suggests that remote work does not necessarily strengthen the use of local services for all workers. Additional variables must be taken into account to explain cases such as Scenario 2 in the model — individuals who frequently work remotely but do not utilise local services. Moreover, even in this case, the data indicates that remote working may instead strengthen the use of online services (rather than local ones), and that this tendency appears to be independent of how often one works remotely.

Our regression analysis provides further insight into the impact of remote work on the use of proximity services (Table 4), confirming the trends identified in the descriptive analysis. We found that the frequency of remote work positively influences the use of services located near one's residence. Specifically, the more frequently an individual works remotely, the more likely they are to use nearby services. However, this effect is statistically significant primarily for food-related services, such as restaurants, bars, and grocery shopping (Sig. <.05). By contrast, the effect of remote work on the use of cultural and sports facilities appears less robust, sug-

gesting that remote workers tend to maintain pre-existing service usage habits for these types of amenities, similar to when they work on-site.

The distance between home and the employers' premises also plays a role in shaping service usage patterns, particularly when working remotely. Individuals living farther from their workplace are more inclined to rely on local services closer to their home, when working remotely. Conversely, those living closer to the office are more likely to continue accessing the same services, even while working from home. Notably, this behavioural shift is statistically significant only in relation to cultural and sports services (Sig. = 0.001), indicating that it is mainly the location of these types of services that changes when remote workers reside far from their physical workplace.

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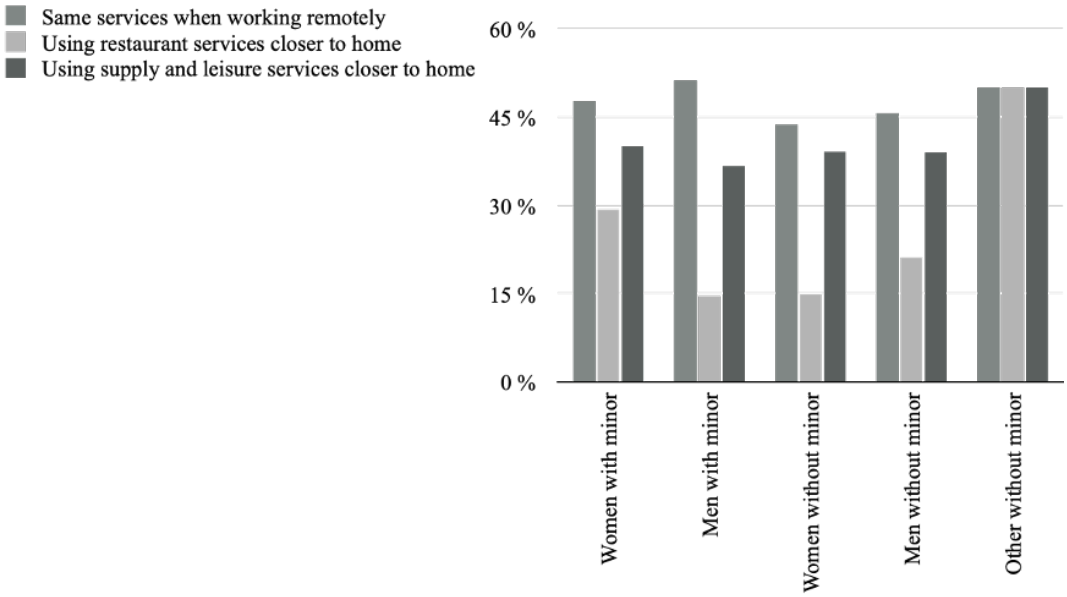
Table 4. Impact of remote work frequency and control variables on the use of proximity services Note: (*) Sig.<.05; (**) Sig.<.01; (***) Sig.<.001

Dependent variable	Independent & control variables	Unstandardized Coefficients		Stand. Coef.	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1. Use RESTAURANT and BAR services closer to home when remote working	(Constant)	-.076	.135		-.561	.575	-.343	.191
	Frequency of remote work	.050	.023	.128	2.121	**.035***	.004	.096
	Home-office distance	.048	.030	.097	1.618	.107	-.010	.107
	Gender	.002	.048	.002	.040	.968	-.092	.096
	Underage children	.042	.050	.050	.833	.406	-.057	.141
	Age	-.021	.022	-.057	-.954	.341	-.065	.023
2. Do the GROCERY SHOPPING closer to home when remote working	(Constant)	.037	.152		.244	.807	-.262	.336
	Frequency of remote work	.061	.026	.140	2.344	**.020***	.010	.113
	Home-office distance	.063	.033	.113	1.900	.059	-.002	.129
	Gender	-4,621E-02	.053	.000	-.001	.999	-.105	.105
	Underage children	.030	.056	.032	.538	.591	-.081	.142
	Age	-.057	.025	-.134	-2.268	**.024***	-.106	-.007
3. Use CULTURAL & SPORT SERVICES (e.g. swimming pool) closer to home when remote working	(Constant)	.092	.134		.685	.494	-.173	.357
	Frequency of remote work	.038	.023	.096	1.648	.100	-.007	.084
	Home-office distance	.095	.029	.186	3.215	**.001****	.037	.153
	Gender	-.028	.047	-.035	-.601	.548	-.121	.065
	Underage children	-.080	.050	-.092	-1.593	.112	-.178	.019
	Age	-.086	.022	-.225	-3.904	**<.001*****	-.130	-.043
4. Use the SAME SERVICES when remote working	(Constant)	.785	.165		4.749	<.001	.460	1.111
	Frequency of remote work	-.035	.029	-.073	-1.220	.224	-.091	.021
	Home-office distance	-.107	.036	-.176	-2.948	**.003****	-.178	-.035
	Gender	.033	.058	.034	.570	.569	-.081	.148
	Underage children	.052	.062	.050	.845	.399	-.069	.173
	Age	.043	.027	.093	1.564	.119	-.011	.096

5.3 The Impact of Socio-Demographic Characteristics on the Use of Proximity Services

To complete our analysis, we examine the impact of selected socio-demographic variables on the use of 15-Minute City services when working remotely, highlighting how these factors do or not contribute to deviations from the most predictable scenarios outlined in the model. First, our descriptive analysis shows that workers with minor children, regardless of gender (see Graph 3), are slightly more likely to maintain their usual service usage patterns when working remotely, compared to those without children (49% versus 44%). This suggests that the impact of working remotely on the use of proximity services seems slightly dampened when there are minors in the household. For this group, frequent remote work does not necessarily lead to greater engagement with local amenities associated with the 15-Minute City model. As a result, compared to those who do not have minor children, these individuals are slightly more likely to fall into the less expected behavioural scenarios described in the model, namely Scenario 2 (frequent remote work without increased use of local services) and Scenario 3 (in which they use local services despite rarely working remotely).

Our regression analysis (Table 3) stresses that having underage children tends to be associated with maintaining the same service usage patterns, in the same place, particularly with regard to cultural and sports services. However, the impact of underage children does not show a statistically significant effect on any of the dependent variables (Sig. >.05). This suggests that the findings from the descriptive analysis are not fully supported by the regression results, highlighting the limited explanatory power of this socio-demographic factor when controlling for other variables.



Graph 3. Use of proximity services when working remotely by gender and family composition

Furthermore, age also appears to influence individuals' propensity to change or not their service usage habits when working remotely. Descriptive analysis shows that the older people are, the more they tend to maintain the same practices: 54% of over-50s tend to maintain the same service usage practices while working remotely, compared to 44% of those aged 30–50 and only 35% of respondents under 30. Remote working therefore has a more limited impact on the propensity to carry out activities for *supply* and *leisure* close to home among older individuals,

compared to younger ones (only 14% of respondents over 60 reported doing their shopping and leisure activities closer to their home when working remotely, compared to 54% of respondents under 30). These findings are corroborated by our regression analysis (Table 3), which shows that age has a statistically significant negative impact on the use of proximity services when working remotely. This effect is particularly marked for cultural and sports services and for grocery shopping, suggesting that older workers tend to maintain the use of the same services, regardless of their remote work frequency. As a result, older individuals in our sample are more frequently found in the least expected scenarios of our model, namely Scenario 2 (in which people frequently work remotely but do not use proximity services) and Scenario 3 (in which they use neighbourhood services despite rarely working remotely), compared to their younger counterparts. This finding underscores how age affects the propensity to adopt 15-Minute City practices when working remotely. Further research is needed to uncover the underlying mechanisms that lead older workers to maintain the same service usage practices, even when they work remotely.

6 Discussion and Conclusions

In this contribution, we have analysed the extent to which remote work generates a greater use of neighbourhood-based services and, consequently, supports the development of the 15-Minute City. The findings seem to confirm the relevance of this relationship, suggesting that the analytical model we have proposed above can serve as a valuable starting point for the design of further studies on this topic.

The empirical analysis allowed us to test the model's two key variables — frequency of remote work and use of proximity services — highlighting how frequent remote working leads to an increase in the use of proximity services, in particular in the domains of *supply* and *leisure*. In line with the model developed in Section 3 of the article, the empirical material confirms that the frequency with which one works remotely affects the propensity to use the services of the 15-Minute City, resulting in performing four of the six essential urban needs identified by Moreno (2024) — namely *living*, *work*, *supply* and *leisure* — within the same neighbourhood. However, the two variables of the model do not allow us to explain all the behaviours, as a significant group of people maintain the same practices in their use of proximity services, even when they frequently work remotely. This suggests that other factors must be considered to further test the model.

Among these, our research shows that specific socio-demographic variables affect the practices of using services when working remotely. Especially age seems to influence the propensity to change habits, as older people tend to maintain their practices even when they work remotely instead of making more significant use of the 15-Minute City.

The trends we have identified are of a general nature and do not allow us to reconstruct the variety of motivations (in addition to working at home) that determine the propensity to use or not use the proximity services. In this regard, it should be stressed that the post-modern society in which we live is characterised by increasingly individualised and changeable lifestyles, forms of differentiated social capital with highly variable geometry, relationships of empathy or distancing in relation to the social context of the neighbourhood, presence in the area of different amenities both in terms of provision and of real accessibility (physical and economic), that impact environmental quality. These aspects underscore the need to think about more targeted research capable of reconstructing the mechanisms underlying individuals' behaviour and connecting the configuration of work activity with the living context.

To complete the model, future research could include in the analysis a variable related to the level of provision and completeness of services in the neighbourhood (in terms of quality and quantity of services). We can hypothesise that where the neighbourhood is sufficiently equipped with services in the perspective of the 15-Minute City, the individuals who work at home could be more inclined to take advantage of the benefits that proximity offers and increase their quality of life in terms of *functionings* (Sen, 1993). The scenario at the opposite extreme, where individuals live in a neighbourhood poorly equipped with services, could push these people to carry out a series of activities of consumption, leisure, care, education, etc. in other parts of the city, including when they frequently work at home. With this new variable, the model would include 8 scenarios, as illustrated in Table 5.

Table 5. Analytical model of the use of services in the neighbourhood by remote workers, including the variable regarding the completeness of the proximity services

	Completeness of the services offered in the neighbourhood			
	Yes		*No*	
	Use neighbourhood services		**Use neighbourhood services**	
	Yes	*No*	*Yes*	*No*
Work remotely frequently	1	2	5	6
Work remotely infrequently	3	4	7	8

By adding this variable, it becomes possible to also explore territorial inequalities in terms of service provision and therefore analyse how remote workers behave in relation to heterogeneous neighbourhoods. In this regard, it is worth remembering that although the workforce involved in remote working has been larger since the pandemic, the social group concerned by the phenomenon continues to be relatively privileged in terms of income and social position (Cetrulo et al., 2020; Florida et al., 2023), which invites us to reflect on the territorial distribution of remote workers. What type of neighbourhood do they live in, how well equipped are these areas in terms of proximity services, and to what extent do remote workers contribute to the gentrification of Milanese neighbourhoods, as digital nomads have done in several countries (Cocola-Gant & Lopez-Gay, 2020; Bahri & Widhyharto, 2021)? Further research is needed to answer these questions.

The implications for urban planning and local policymaking are also evident in terms of reorganising public and private spaces, particularly by understanding the balance between service supply and demand. More specifically, systems related to housing, welfare, and mobility require a deeper insight into everyday life, where remote work allows for *living*, *work*, *services*, and *leisure* activities to occur within the same neighbourhoods. This approach necessitates rethinking how services are distributed and decentralising functional assets, taking into account the social and demographic characteristics of the residents.

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