

Time use and city size

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Abstract

We study how time use varies with city size. Residents of larger cities spend more time traveling and less time on leisure and home chores, and there is heterogeneity by gender, marital status, presence of children, income, and education. These differences are accounted for by city size rather than sorting on observables. We find that time allocation in larger cities is associated with different experienced well-being and that accounting for time use differences implies a reduction in the city-size wage premium of one-quarter. We also show that time use differences narrowed early in the COVID-19 pandemic but reemerged by 2022.

Keywords: time use; cities; urban; inequality; well-being.

JEL classifications: JEL Codes: D13, J22, R20.

1. Introduction

Large cities offer many benefits, but at the same time have various disadvantages. Even though benefits and costs associated with city size have long been a primary topic of research in urban economics and related fields, less is known about how large city dwellers spend their time compared to those who live in smaller cities, and how these differences contribute to the benefits and costs of city size.

The first contribution of our paper is to offer the first comprehensive descriptive study of time use differences by city size. While the existing literature has examined selected activities, such as travel and work, we study the full allocation of time across daily activities to understand how the costs and benefits of city size are spread across daily life.

We use the American Time Use Survey (ATUS) and, after controlling for individual characteristics, find that for an average person a 10-fold increase in the population of a metropolitan area is associated with nearly 10 minutes more time spent on travel to work and non-work destinations and nearly 12 minutes less time spent on leisure and home chores per day. Residents of larger cities also spend more time eating and shopping.

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The extra amount of time spent on traveling does not differ much across socioeconomic types, but there are sizable differences in how individuals substitute for the time lost to traveling. In big cities, men spend less time on home chores, while women socialize less. Unmarried individuals sleep less, while individuals with children, and especially women, spend more time on childcare in big cities than their counterparts in smaller cities. Women with children who live in big cities also work less and spend more time on home chores. High-income individuals work less in big cities, whereas the low-income work more, have less leisure, and sleep less.

The second contribution of our paper is to provide an alternative view on welfare differences across cities. While much of the literature has focused on incomes, prices, or amenities as determinants of well-being, we focus on differences in how individuals spend their time.

Because some activities may bring more satisfaction than others, time use differences may also lead to differences in well-being across cities. To learn more, we turn to the well-being module of the ATUS, which asks respondents how they felt during each of the time-use activities in terms of happiness, meaningfulness, pain, sadness, stressfulness, and tiredness. For example, commuting is associated with less happiness and greater stress, while leisure and socializing are among the least stressful activities. While we find that time allocation in large cities is associated with different well-being, the picture is mixed and it is not clear whether well-being rises or falls with city size.

The time-use differences between large and small cities that we find allow us to put in perspective the well-established relationship between city size and income. Using existing estimates of the value of time, we find that accounting for more time spent on travel and less time on leisure and socializing in big cities (in addition to differences in eating and home chores) is equivalent to a reduction in the city-size wage premium of 27%.

Finally, we examine how the relationship between time use and city size has changed since the onset of the COVID-19 pandemic. Before 2020, an important distinguishing feature of big cities was longer commute time. However, as many individuals started working from home, and especially so in big cities, the relationship between commute time and city size weakened in 2020–2021. Similarly, differences in most other time use categories between large and small cities have become smaller. However, these effects were temporary, and time-use differences by city size reemerged in 2022.

1.1 Related literature

While there is a sizable literature on time use in the United States (Aguilar et al., 2012), to the best of our knowledge, ours is the first systematic study of how time use depends on city size.

Our paper is related to the literature that studied differences in travel time across cities. Glaeser (1998), Kahn (2010), Angel and Blei (2016), and numerous other studies document that residents of larger cities spend more time on commuting. Duranton and Turner (2018) and Couture et al. (2018) investigate the determinants of travel speed across cities and show that larger cities tend to be slower. While these papers focused on travel time, they did not study how time spent on other activities differs across cities.

Several other studies focused on a subset of other time use activities but did not conduct a comprehensive analysis of all activities. Rosenthal and Strange (2008) study differences in working time across cities and find that, with the exception of those with advanced degrees in high-paid jobs, workers in big cities do not work longer hours. Murphy (2018) studies home production, expenditures, and time use across residential locations that differ in density: central-city versus suburban areas. Those results are relevant to mechanisms that may underlie differences by city size, since larger metropolitan areas contain a larger share of dense neighborhoods, but the paper does not study time-use differences by metropolitan area population. Morris (2019) examines time use differences between central cities and suburbs (i.e. the largest municipality versus other municipalities in a metropolitan area) and finds no significant

differences between the two types of locations.¹ However, that paper does not study differences *across* metropolitan areas, which is the focus of our paper.

Our paper also contributes to the vast literature on the costs and benefits of large cities. This literature is surveyed by [Ahlfeldt and Pietrostefani \(2019\)](#) and [Duranton and Puga \(2020\)](#), and typically finds net benefits associated with city size. To our knowledge, ours is the first paper that looks at the costs and benefits of size from the point of view of time use. Our finding that accounting for time use differences substantially lowers the real city-size wage premium resonates with that of [Diamond and Moretti \(2021\)](#) who estimate that consumption does not necessarily increase with city size for all U.S. households.

Our paper also adds to the literature that uses the ATUS to study cities. [Su \(2022\)](#) uses it to examine differences in access to amenities due to socioeconomic segregation within cities. [Albouy and Faberman \(2025\)](#) study location choices of different types of households over the life cycle. One pattern that emerges from their analysis is that time spent on leisure activities in cities with high estimated quality of life, which tend to be large cities, varies with education, age, and especially with the presence of children.

The remainder of the paper is organized as follows. In Section 2, we describe the data. In Section 3, we estimate the relationship between city size and time use, examine the implied differences in well-being, look at the implications for the city-size wage premium, and investigate how time use patterns have changed after 2020. We present our conclusions in Section 4.

2. Data

We use the data from 2005 to 2019 annual samples of the ATUS.² The ATUS is the first ongoing federally administered survey on time use in the United States. Each respondent provides detailed information on their activities during a designated 24-hour period. We aggregate reported activities into 12 time use categories: (1) working, (2) childcare, (3) home chores, (4) shopping, (5) leisure, (6) socializing, (7) sleeping, (8) eating, (9) personal care, (10) other activities, (11) work-related travel, and (12) other travel.³ [Appendix Section A.1.1](#) provides more details about activities within each of these categories.

We aggregate the duration of each activity into minutes per day at the person level. In the survey, about half of respondents answered on weekdays and another half on weekends. In our calculation of the average time use per day, we use multi-year weights that are provided by the ATUS to reduce the bias in estimates from sampling across subgroups and days of the week. We also look separately at time use patterns during workdays and non-workdays. We define workday as a day when a respondent spent at least one minute on work-related activities, regardless of the actual day of the week. Other days are non-workdays.

[Table 1](#) reports the weighted average hours per day spent on each time use category in the full sample, the workday sample, and the non-workday sample. Sleeping, working, leisure, and home chores are the most time-consuming activities. On an average day, an average individual sleeps 8.3 hours, works 5.5 hours, spends 3.2 hours on leisure, and 1.5 hours on home chores. We separate travel for work and travel for other purposes. Jointly they account for 84 minutes a day on a workday, or 5.8% of time. Looking at the workday and non-workday sample separately, the main difference is that individuals do not spend time on working and commuting in the non-workday sample and this time gets distributed among other activities.

The final sample has 66,891 observations across 306 metropolitan areas that are defined as Core-Based Statistical Areas (CBSA).⁴ We link the ATUS to the current population survey (CPS) in order to obtain

1. We have revisited this analysis using our ATUS sample and found the same result.

2. In Section 3.6, we add the 2020–2023 samples to study how the time use patterns that we study changed since the onset of the COVID-19 pandemic

3. Note that “working” includes actual work, other work-related and income-generating activities except commuting, as well as job search. “Home chores” includes care for other adults, in the household or not, in addition to household management. “Shopping” includes both shopping for goods and services and their consumption (excluding food consumption).

4. We use the terms “metropolitan area,” “CBSA,” and “city” interchangeably. We use the 2013 definition of Core-Based Statistical Area (CBSA) by the Office of Management and Budget.

Table 1. Time use in the sample (hours a day).

	Total		Workday		Non-workday	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Sleeping	8.3	2.1	7.8	1.7	9.5	2.2
Working	5.5	4.3	7.8	2.9	0.0	0.0
Leisure	3.2	2.7	2.6	2.0	4.8	3.3
Home chores	1.5	2.0	1.0	1.3	2.6	2.7
Eating	1.1	0.8	1.0	0.7	1.2	1.0
Other travel	0.9	1.2	0.7	0.9	1.4	1.7
Socializing	0.8	1.5	0.6	1.1	1.4	2.1
Personal care	0.7	0.6	0.8	0.6	0.6	0.6
Childcare	0.5	1.2	0.4	1.0	0.7	1.6
Shopping	0.4	0.8	0.3	0.6	0.8	1.2
Work-related travel	0.5	0.7	0.7	0.7	0.0	0.2
Other activities	0.6	1.4	0.4	1.0	0.9	2.0
N	66,891		39,335		27,556	

Note: The table reports average time spent on each of the 12 time use categories in hours per day for the entire sample, workday sample, and non-workday sample. The standard deviation of work-related travel is observed as positive, as there are 31 observations with positive values of work-related travel on non-working days. We regard those as measurement errors. See the text for more details.

information about the socioeconomic and geographic characteristics of respondents. Our sample only includes employed individuals of prime working age (25–64 years old). The CPS provides the geographic location of respondents at the CBSA level. In some cases, it only provides the state and the county of residence, and we use this information to infer the CBSA. We exclude observations for which the CBSA of residence cannot be identified.

To measure CBSA population in each year, we aggregate the total population estimates of each county in the CBSA, as reported by the Census Bureau. Since sample sizes for each medium and small CBSA are too small to be representative, we cannot look at time use patterns separately for each individual CBSA.⁵ However, we can still examine the relationship between time use and city size by using the CBSA population as an explanatory variable.

3. Results

In order to study the relationship between city size and time use, we estimate

$$T_{imy}^u = \alpha^u + \beta^u \ln N_{my} + \gamma^u X_i + \varphi_y + e_{imy}^u, \quad (1)$$

where T_{imy}^u is time spent on time use category u , in minutes a day, by individual i in metropolitan area m and year y ; N_{my} is the metropolitan area population in year y ; and X_i is a vector of individual characteristics which includes age, gender, race, education, marital status, number of children in the household, number of adults in the household, industry of work, and occupation of work. Since we estimate the relationship using the data for years 2005 to 2019, we also include year fixed effects φ_y .

Our main coefficient of interest is β^u , the semi-elasticity of time spent on a certain activity with respect to city size. For greater interpretability, instead of reporting the values of β^u , we report the values of $2.3\beta^u$. These values represent the relationship between a 10-fold increase in city size and minutes per

5. Among 306 metropolitan areas, 179 have fewer than 100 observations between 2005 and 2019.

day spent on an activity.⁶ The 10-fold difference in city size is equivalent to the difference between the largest CBSA in the United States (New York with 18.9 million residents in 2010) and a medium-sized CBSA (Columbus or Indianapolis, each with about 1.9 million), or the difference between a large CBSA such as Philadelphia (6 million) and small CBSA such as Madison, Wisconsin (0.6 million).

3.1 Time use and city size

First, we estimate regression (1) without individual controls X_i for all days, working and non-working. The results are shown in Fig. 1a, where each row reports the estimated value of $2.3\beta^u$ for activity u . The standard errors are clustered at the CBSA level and used to calculate 95% confidence intervals. For coefficients that are statistically different from zero, we also report the percentage difference between the change in time use in response to a 10-fold increase in city size and the average time spent on this category from Table 1.

Residents of larger cities spend more time traveling and eating, and also a bit more time on shopping. This time is carved from leisure and home chores. There is no statistically significant relationship between city size and the time spent on sleeping, working, socializing, childcare, and other activities.

The time use differences by city size reported in panel a can arise because the size of a city determines time use patterns of individuals living there (the city-size effect), or because individuals who live in larger cities differ in observable characteristics that affect time use (sorting). To distinguish the city-size effect from sorting on observables, we now run regression (1) with individual controls X_i . The results are displayed in Fig. 1b. The coefficients do not change much when we add controls, which suggests that the observed differences in time use by city size are largely the result of the city-size effect, and not sorting. In panels c and d, we also report results separately for working days and non-working days. Moreover, in Fig. A.1, we show that our results do not change significantly if instead of the CBSA's population we use its population density.

A 10-fold increase in city size is associated with 7.1 more minutes a day spent on commuting to work and 2.9 more minutes spent on other travel, which are equivalent to a 24.3% and 5.4% difference relative to the average. As can be seen in panel c, these numbers are even greater on workdays: 9.9 and 2.9 minutes per day. These numbers are economically significant and imply that a resident of a city with about 10 million inhabitants (e.g. Chicago) will spend 12.8 minutes more per day, or over one hour more per week, on traveling than a resident of a city with 1 million inhabitants (e.g. Tulsa). The positive relationship between the length of the work commute and city size has been previously documented (Glaeser 1998), but it is less obvious that non-work trips take more time in large cities. On the one hand, the average distance between residences and non-work destinations in big cities is larger. On the other hand, big cities have larger population density (Duranton and Puga 2020) and are likely to have greater density of non-work destinations too, although traveling in large cities is slower (Duranton and Turner 2018).

Longer travel times in big cities eat into leisure and, on workdays, socializing. We find that a 10-fold increase in city size is associated with 4.9 and 7.1 minutes per day less time spent on leisure on workdays and on non-working days, respectively, which is a 2.5%–3.1% reduction relative to the average. On workdays, residents of ten-times larger cities spend 2.5 minutes less time on socializing, a 7.5% reduction relative to the average. This finding resonates with Putnam (2000)'s argument that longer commutes reduce community participation.⁷ At the same time, residents of 10-times larger cities spend almost 6 minutes a day less on home chores (a 6.5% reduction relative to the mean), which may reflect the fact that homes in

6. If time spent on activity u in a city of size N is $T^u = \beta^u \ln N$ and time spent on this activity in a ten times larger city is $\tilde{T}^u = \beta^u \ln(10N)$, then $\tilde{T}^u - T^u = \beta^u \ln(10)$, and $\ln(10) \approx 2.3$.

7. More recent work by Atalay (2024) documents that time spent alone has increased since 2003, and our results suggest that this increase may have been more pronounced in big cities

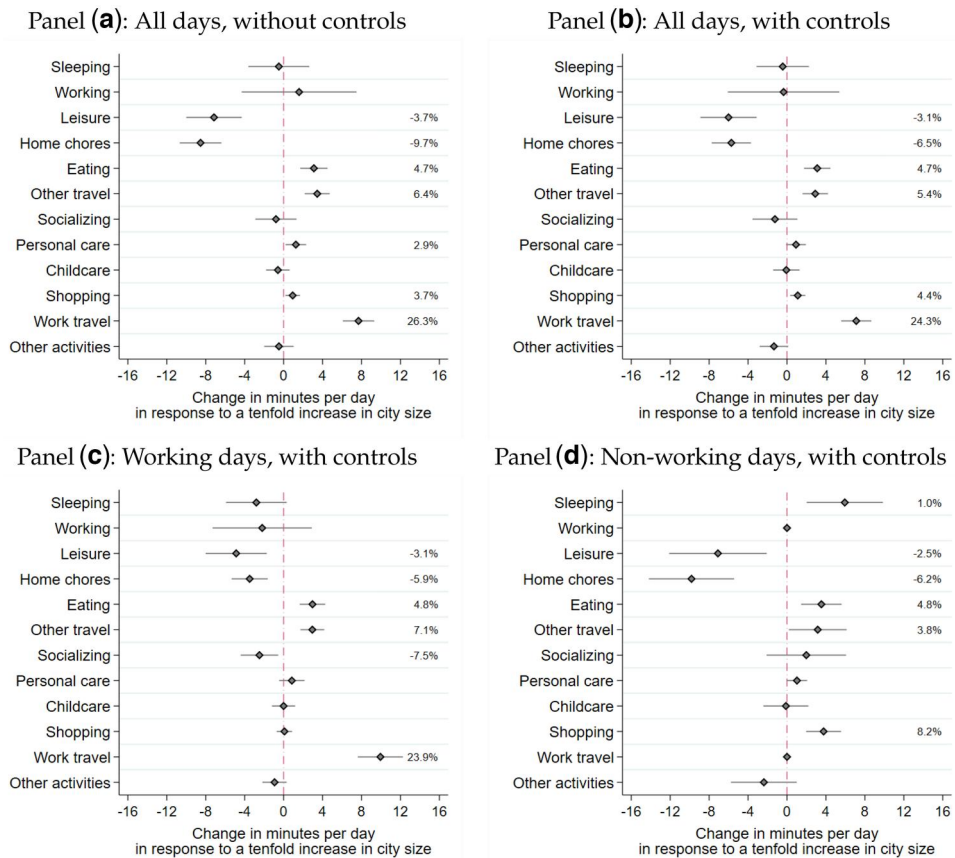


Figure 1. City size and time use. *Note:* The figure reports coefficients β^u from regression (1) multiplied by 2.3. Panel (a) reports coefficients from the regression where individual controls are not included. Panel (b) reports coefficients from the regression with individual controls. Panels (c) and (d) repeat the analysis separately for working days and non-working days. Horizontal bars represent 95% confidence intervals. Standard errors are clustered at the CBSA level. Percentages to the right of each bar represent the value of the coefficient relative to average time spent on a given activity from Table 1, and are only reported for activities where the estimated coefficient β^u is statistically significant. See the text for more details.

large cities tend to be smaller and, therefore, require less maintenance. Those who live in ten-times larger cities also allocated 3 more minutes a day to eating, which is a 4.8% increase relative to the mean.⁸

A growing body of research studies sleep patterns in the United States.⁹ We do not find significant difference in the total amount of sleeping hours in big versus small cities. At the same time, it seems that residents of large cities distribute their sleeping time more unevenly: the amount of sleep in big cities is a bit shorter on working days and longer on non-working days.

8. It is not entirely clear why time spent on eating goes up with city size. [Bencsik et al. \(2025\)](#) use smartphone foot traffic data and find a positive relationship between traffic congestion, which is more common in big cities, and the propensity to eat out, which may take more time than eating at home.

9. For example, [Liu et al. \(2016\)](#) document high prevalence of sleep deprivation in the Appalachia and the Southeastern states.

Despite the popular perception that people in big cities work long hours, we find no statistically significant relationship between city size and working time. How robust is this finding? While the ATUS is arguably the most precise source of time use data, it has a relatively small sample. Thus, we turn to the 2012–2016 5-year sample of the American Community Survey (ACS), which is a 5% sample of population and has millions of observations. We then estimate the relationship between log hours worked for full-time employed individuals aged 25–64 and log population of a metropolitan area.¹⁰ In Table A.1, we demonstrate that there is no statistically significant relationship between metro area size and working hours, whether we include individual controls or not.¹¹

3.2 Differences across types of individuals

Do any of the time use differences reported above vary across types of individuals? In what follows, we look at differences by gender, marital status, presence of children, education, and income. We estimate (1) separately for each category and continue controlling for individual characteristics.

3.2.1 Gender

Fig. 2a shows that there are no significant differences in the amount of time that both men and women spend on sleeping, working, leisure, and many other activities between large and small cities. At the same time, we can see that the lower time expenditure on home chores in big cities that we found before is driven entirely by men. While men spend 10.4 minutes a day less on home chores in 10-times larger cities, women do not experience any time savings. Moreover, while women socialize 2.7 minutes a day less, the effect for men is zero. At the same time, the city-size effect on commute times is less pronounced for women than for men.

3.2.2 Marital status

Differences by marital status are shown in panel b. Though the effect on sleeping is not significant for each type, the coefficients are different from each other so that unmarried individuals sleep less in big cities. They also spend more time on personal care in big cities. These patterns are consistent with empirical findings by Gauthier et al. (2010) that suggest that one of the reasons why the singles locate in big cities is to find a marriage partner.

3.2.3 Presence of children

Differences between those with and without children are shown in Fig. 2c. Individuals without children experience a sizable reduction in time spent on home chores in big cities, while the effect of city size is much smaller for those with children. However, as panel d shows, the city-size differences are more pronounced specifically for women with children. Employed women with children in 10-times larger cities work a full 8.9 minutes less per day than their counterparts in smaller cities.¹² They also spend 8.9 minutes less on leisure and 9.2 minutes more on home chores and childcare combined. These results suggest that women with children who live in large cities face a non-trivial tradeoff: they sacrifice work and leisure time in order to protect childcare and home production.

10. While the ACS has a much larger sample than the ATUS, its measurement of working hours is less precise. In the ACS, respondents are asked about the *usual* hours they work per week and many of them report their hours approximately. For example, about 45% of respondents report working *exactly* 40 hours.

11. Our findings are also consistent with Rosenthal and Strange (2008). Using the Census data, they show that while workers who have a master's, professional, or PhD degree and work in "professional" or "technical" occupation work longer hours in denser cities, other workers do not.

12. While this result is conditional on being employed, it aligns with Moreno-Maldonado (2022)'s finding that women with children in big cities have lower labor force participation.

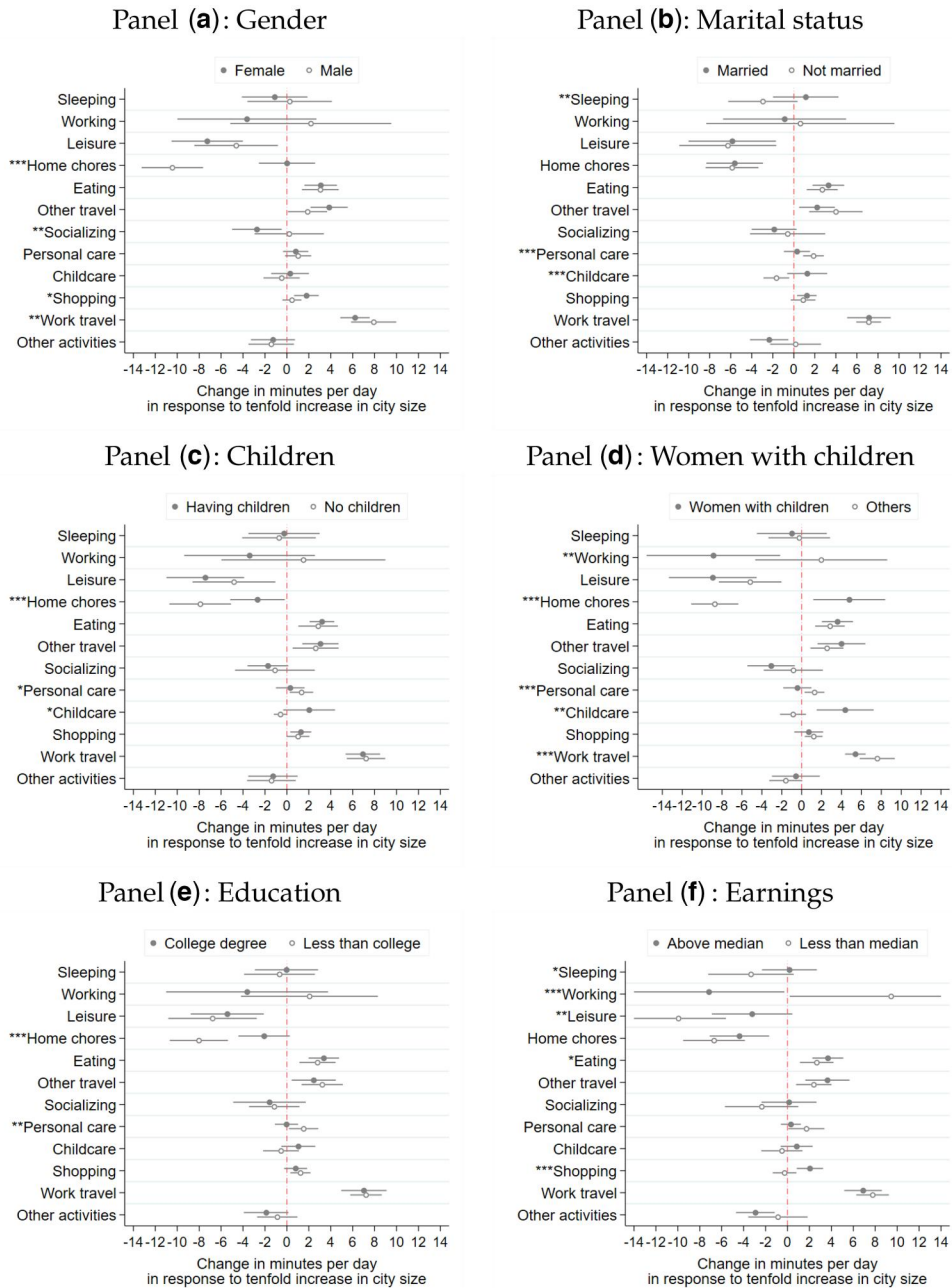


Figure 2. City size and time use, heterogeneity. *Note:* The figure reports coefficients β^u from regression (1) multiplied by 2.3, by gender (a), by marital status (b), by presence of children (c), separately for women with children and others (d), by education (e), and by earnings (f). Horizontal bars represent 95% confidence intervals. Standard errors are clustered at the CBSA level. Statistical differences in β^u between subgroups are tested using a pooled regression with the interaction of city size with the subgroup. Statistical significance of the difference between two types is denoted by: *** $P < .01$, ** $P < .05$, and * $P < .10$.

3.2.4 Education and income

Differences by education are reported in panel e. The relationship between city size and time use is quite similar for individuals with and without a college degree. One noticeable difference is that the relationship between city size and time spent on home chores is much less pronounced for college graduates. Since education is correlated with income, many of these effects remain when we split our sample into those with above and below the median CBSA hourly earnings. However, as panel f suggests, income differences result in a non-trivial leisure-working tradeoff. While high-income individuals work less in big cities than their counterparts in small cities, the low-income work more, have less leisure, and sleep a bit less.¹³

Taken together, these results suggest that larger cities impose a common increase in travel time, but the margins of adjustment differ markedly across groups. For some, the adjustment occurs primarily through leisure or home chores; for others, it occurs through work, sleep, or socializing. Household structure appears particularly important in shaping these responses. Thus, the time burden of large cities is not borne uniformly, but depends on family roles and economic circumstances.

3.3 Mechanism

One way to interpret the results presented above is through differences in substitution elasticities across time-use categories. Larger cities increase the time devoted to travel, tightening the overall time budget available for other activities. Individuals respond by reallocating time across activities that differ in their degree of substitution. The categories that fall most in large cities—leisure, home chores, and socializing on workdays—may be those with relatively high substitution elasticities. By contrast, sleep time changes little with city size, consistent with the idea that it is a more essential use of time and has a lower substitution elasticity. Activities may also differ in how adjustable they are. For example, work time may depend more on employers' practices (e.g. a 40-hour workweek), limiting individuals' ability to adjust it in response to higher travel costs.¹⁴

The heterogeneity patterns in Fig. 2 also fit this interpretation. If substitution elasticities and adjustment constraints differ across types, the same increase in travel times can produce different reallocations across time uses. For example, the decline in home chores associated with city size holds for men only, possibly because gender norms make home chores less adjustable for women. Likewise, women with children in large cities may be unable or unwilling to reduce childcare and home production, and instead cut work and leisure.

3.4 Time use and well-being

The results discussed above highlight many differences in time use between large and small cities. Because activities differ in the satisfaction they provide while people are engaged in them, these differences may have important implications for experienced well-being. Our goal in this section is not to measure overall welfare differences, but rather to assess whether the differences in time use associated with city size move individuals toward activities that are experienced as more or less enjoyable.

To learn more, we turn to the Well-being Module of the ATUS that was administered in 2010, 2012, and 2013. All ATUS respondents were selected for the Module. Three activities from the diary of each

13. Needless to say, earnings may be endogenous to time use, and the direction of causality is unclear.

14. Developing a formal theory of time use and estimating time use preferences is beyond the scope of this paper. However, one can imagine that an individual's utility function is given by $u(\mathbf{T}) = \delta_0 + \sum_u \delta_u \ln T^u + \frac{1}{2} \sum_{u,u'} \sum_{u''} \delta_{uu'} \ln T^u \ln T^{u'}$, where T^u is time spent on activity u , δ_u is the importance of u , and $\delta_{uu'}$ determines the elasticity of substitution between activities u and u' . A translog utility function such as this one is commonly used to estimate preferences with flexible substitution elasticities. The optimal time allocation will be the vector of time uses $\mathbf{T}$ that maximizes the utility function subject to constraints. If $\delta_{uu'}$ is low, then changes in time spent on u (e.g. increase in travel time in big cities) will have a small effect on time spent on u' (e.g. sleeping or working).

Table 2. Well-being by type of time use.

	Happy	Meaning.	Painful	Sad	Stressful	Tired
Working	3.75	4.38	1.73	1.02	3.14	2.43
Leisure	4.25	4.01	1.62	0.83	1.55	2.71
Home chores	3.96	4.20	1.71	0.83	1.91	2.32
Eating	4.55	4.62	1.54	0.74	1.71	2.15
Other travel	4.27	4.08	1.54	0.88	2.03	2.39
Socializing	4.76	4.87	1.51	0.73	1.53	2.12
Childcare	4.77	5.38	1.53	0.70	1.82	2.59
Shopping	4.20	4.09	1.53	0.76	2.07	1.91
Work-related travel	3.92	3.62	1.60	0.91	2.37	2.49
Other activities	4.03	4.84	2.06	1.08	2.30	2.51
Average	4.09	4.33	1.66	0.89	2.28	2.43

Note: The table reports conditional average responses for each well-being aspect and time use category. Responses were given on a scale from 0 to 6. For each well-being measure, we estimate episode-level regressions of the form $WB_{ui} = \sum_u \alpha_u \mathbf{1}\{\text{activity} = u\} + X_i' \gamma + e_{ui}$, where WB_{ui} is the reported well-being for activity u of individual i , $\mathbf{1}\{\text{activity} = u\}$ are indicators for time use categories, and X_i includes individual characteristics (age, gender, race, education, marital status, number of children, number of adults, occupation, and industry). The regression is estimated without an intercept so that each coefficient α_u corresponds to the conditional mean well-being for activity u . All estimates use the ATUS well-being module weights and standard errors are clustered at the individual level. The bottom row reports the overall conditional mean, calculated as the time-weighted average of fitted values from the regression.

respondent were randomly selected, and respondents were asked to report how they felt during each activity in terms of happiness, meaningfulness, pain, sadness, stressfulness, and tiredness, on a scale from 0 to 6. Sleeping and most activities that belong to the personal care category were excluded.

We estimate average responses on each of these aspects for each of our time use categories (except sleeping and personal care) controlling for individual characteristics, and then report them in Table 2. This average self-reported assessment for a given activity is computed using the ATUS well-being activity weights, which reflect the average affect experienced per minute spent in the activity.¹⁵ For example, childcare and socializing are the activities that bring the most happiness, while working and traveling for work are among the most stressful ones. Importantly, this does not imply that individuals who engage more in childcare and socializing are necessarily happier overall. Rather, these measures capture the *experienced* affect during each activity, which may differ from individuals' overall well-being.

Then, for each activity u and each feeling f , we calculate

$$\Omega_f^u \equiv \beta^u (\omega_f^u - \bar{\omega}_f), \quad (2)$$

where β^u is activity u 's coefficient on city size from regression (1) with individual controls, ω_f^u is the average self-reported assessment of feeling f during activity u from Table 2, and $\bar{\omega}_f$ is the time-share-weighted average assessment of feeling f across all activities.

The value of Ω_f^u is positive if activity u takes more time in large cities and feeling f is relatively positive, or if it takes less time and is perceived more negatively. The value of Ω_f^u is negative if activity u takes more time in large cities and feeling f is relatively negative, or if it takes less time and is perceived more positively. The magnitude of Ω_f^u is larger when either the time spent on activity u differs more between big and small cities (large β^u) or when the feeling f for this activity differs more from the average feeling (large $\omega_f^u - \bar{\omega}_f$).

15. The activity weights are constructed to recover population-level averages of experienced affect during time spent in activities, but they cannot be used to estimate how the average person feels while engaging in a specific activity, because individual participation frequencies are unobserved.

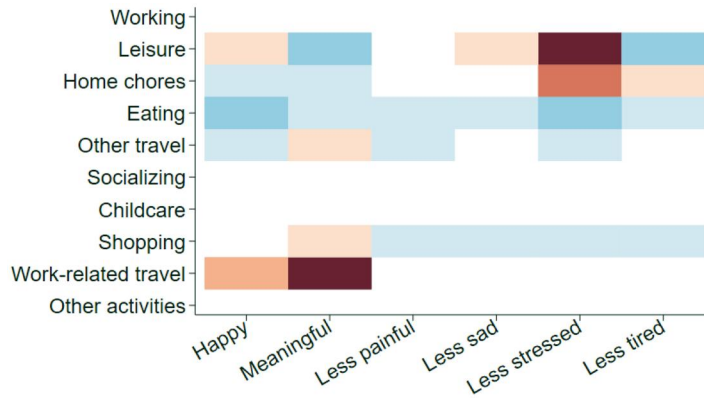


Figure 3. Well-Being Heatmap. *Note:* The figure shows the values of Ω for the six feelings in the Well-being module. Ω is rescaled to be from -1 to 1 . Blue and red colors represent positive and negative values of Ω_f^u , respectively, and darker shades of each color represent larger absolute values of Ω_f^u . We only show Ω_f^u for which both β^u and $\omega_f^u - \bar{\omega}_f$ are statistically different from zero. See the text for more details.

Figure 3 displays the values of Ω_f^u , rescaled to range from -1 to 1 , using a heatmap. We only report the values of Ω_f^u for activities u and feelings f for which both β^u and $\omega_f^u - \bar{\omega}_f$ are statistically different from zero. For interpretability, we reverse the sign of negative affect measures (pain, sadness, stress, and tiredness), so that higher values uniformly correspond to more favorable experiences. The picture is mixed. Eating is associated with an above-average score for each feeling and residents of larger cities spend more time eating. Home chores rank below the average in terms of meaningfulness, but people in big cities spend less time on this activity. Interestingly, while time spent on leisure goes down with city size, respondents actually rank leisure as an activity that has less meaning and is more tiring. Thus, lower time expenditure on leisure in large cities does not necessarily have to reduce well-being. At the same time, work-related travel takes more time in large cities and respondents associate this activity with less happiness, less meaning, and more stress. Home chores, as well as leisure, are less stressful than an average activity but time spent on them is lower in big cities. In Figs A.2 and A.3, we look at how Ω_f^u differs across different types of individuals. While there are some differences, the overall picture is mixed for all types.

Given the multitude of activities and types of feelings, it is difficult to say conclusively whether big cities provide higher or lower overall well-being. The way that people spend time on leisure, home chores, and eating in big cities may be more enjoyable than in small cities. But work-related travel is among the least enjoyable activities and people spend much more time commuting in large cities. At the same time, longer commutes in larger cities may partly reflect access to a broader set of opportunities, which are not directly captured in well-being responses.¹⁶

Our results, which infer experienced well-being from time allocation and affect for activities, are broadly consistent with previous research. Glaeser et al. (2016) study differences in happiness across U.S. cities and find no statistically significant relationship between self-reported happiness and city size, which is consistent with the possibility that positive and negative differences in time allocation may offset each other. At the same time, Loschiavo (2021) finds that residents of large cities report lower happiness, primarily due to longer commutes.

16. Similarly, wider economic opportunities in big cities affect how people spend time on other activities. For example, Yamagishi (2025) shows that residents of denser cities spend more time on learning activities.

Table 3. Time use and city-size wage premium.

	VOT, frac. wages	$\beta \times \ln(1.01)$	Share of wage prem., %
Leisure	1.19	-0.021	-11.6
Home chores	-0.38	-0.015	2.6
Eating	1.19	0.013	7.0
Other travel	-0.75	0.013	-4.4
Socializing	1.19	-0.011	-5.9
Work-related travel	-0.75	0.043	-14.9
TOTAL			-27.1
Sensitivity			
Higher travel VOT (1.0)			-33.6
Lower travel VOT (0.5)			-20.7
Higher leisure VOT (1.5)			-29.8
Lower leisure VOT (0.9)			-24.6
Same VOT for all activities			-27.5

Note: The table reports calculations of the relationship between time use differences and the city-size wage premium. The first column in the upper panel reports assumed value of time. The second column shows the values of β coefficients from regression (1) on the workday sample multiplied by $\ln(1.01)$. The third column divides the values in the second column by 8×60 minutes, then divides the result by the estimated city-size wage premium of 0.0451, and then multiplies it by the assumed value of time from the first column. The value in row "TOTAL" is the sum of values in the third column. In the "Sensitivity" panel we repeat the calculation for alternative assumptions. See the text for more details.

3.5 Time use and the city-size wage premium

Another way to assess time use differences across cities and their well-being implications is to put them in the context of the monetary benefit of large cities. A large literature documents that large cities offer higher wages.¹⁷ At the same time, this wage premium is partly offset by the higher cost of living. However, if residents of large cities also have a less satisfactory time allocation, the benefit of living in a large city could be even lower.

To evaluate the importance of time, use differences by city size in a way that is comparable with existing estimates of net benefits of city size, we perform the following back-of-the-envelope calculation, presented in Table 3. First, we take the estimate of the city-size wage premium from Duranton and Puga (2023). They estimate the elasticity of income with respect to city size of 0.0451.¹⁸

Second, we take the estimates of value of time. Goldszmidt et al. (2020) estimate the value of travel time equal to 75% of the average wage using the data on Lyft trips. Using the ATUS data, Aguiar et al. (2021) estimate the elasticity of leisure time with respect to wage equal to 1.19, which can be interpreted as the value of leisure time equal to 119% of average wage. Given the absence of available estimates of the value of time spent socializing and eating, we assume that they are equal to the value of leisure time. Considering the fact that, according to Table 2, home chores are among the least satisfactory activities but not as unsatisfactory as commuting, we assume that the value of time spent on home chores is half of the value of travel time.

Third, we use our estimates of time use differences from Section 3.1. We focus on statistically significant coefficients and, since our reference point is the wage premium of big cities, we focus on the workday sample. We convert the coefficients associated with a 10-fold increase in city size into those that describe an increase of city size by 1%, which is more consistent with the interpretation of the estimate

17. See reviews by Ahlfeldt and Pietrostefani (2019) and Duranton and Puga (2020).

18. We re-estimate this elasticity using our ATUS sample and the same controls we use in the rest of our analysis, and obtain the value of 0.045. See Table A.2 for details.

of the elasticity of income with respect to city size that we will use in this exercise.¹⁹ The second column of Table 3 reports these converted coefficients.

Then, we combine these estimates and calculate the implied effect of city size in terms of a workday. For example, increasing city size by 1% is associated with 0.021 fewer minutes spent on leisure, which is equivalent to $1.19 \times 0.021 / (8 \times 60) = 0.0052\%$ of an eight-hour workday.

Finally, we compare these effects of city size to the 0.0451 wage premium discussed above. These numbers are reported in the third column of Table 3. For example, the lower time expenditure on leisure is equivalent to $0.0052 / 0.0451 = 11.6\%$ of the wage premium. Summing up these results, we obtain that the observed differences in time spent on leisure, home chores, eating, travel, and socializing are equivalent to a reduction in the city-size wage premium by about 27%.²⁰

Of course, this finding depends on the estimates of the city-size wage premium, as well as the estimates of the value of time. The literature that estimates the city-size wage premium is well-developed and the numbers we use are consistent with the estimates from numerous other studies. The literature on the value of time is much thinner.²¹ Thus, in the bottom panel of Table 3, we report how our result would change if we used higher (100% of wage) and lower (50%) value of travel time, as well as higher (150%) and lower (90%) value of leisure time. With the lower value of travel time, our result falls to 20.7%, a smaller but still sizable effect. However, with higher values of leisure and travel time, our result increases to 29.8% and 33.6%, respectively. Another possibility is that the marginal value of time is equal for all activities.²² We examine this case by assigning the VOT of 1 to leisure, eating, and socializing, and -1 to home chores and travel. As the last line of Table 3 demonstrates, our headline result barely changes.

3.6 Time use during Covid-19 and work from home

The results reported in Figs 1 and 2 show that one of the main channels through which city size affects time use is longer travel time. The COVID-19 pandemic provides a useful setting in which to revisit this mechanism, because the rise of working from home sharply reduced commuting.²³ In addition, large cities have more people who work in occupations that allow working from home (Dingel and Neiman 2020), and large cities have experienced a greater drop in commuting to the central business district since 2020 (Monte et al., 2026), which may have happened because longer commutes create stronger incentives to work from home (Delventhal and Parkhomenko 2026). As working from home has become much more common and commuting less frequent, especially in big cities, how has the relationship between city size and time use changed?

We re-run the regression (1) using the ATUS samples from 2020 to 2021 (Fig. 4a) and 2022 to 2023 (panel b).²⁴ The comparison of panels a and b suggests that in the first couple of years of the pandemic, the relationship between city size and time use changed, but since 2022 it was by and large the same as before 2020. One notable difference is that in the 2022–2023 period residents of big cities spend more

19. In Section 3.1, we multiplied coefficients β^u from regression (1) by $\ln(10) \approx 2.3$ so that they can be interpreted as describing the effect of a *tenfold* increase in city size, as explained in footnote 8. To describe the effect of increasing city size by 1%, we multiply the coefficients by $\ln(1.01) \approx 0.01$.

20. This exercise is necessarily a back-of-the-envelope calculation rather than a full welfare analysis: it does not recover compensating differentials or revealed preferences, but instead provides a transparent benchmark for the quantitative importance of the time-use patterns we document.

21. According to a survey of earlier literature by Small (2012), the value of time for commute trips is around 50% of the gross wage rate. At the same time, Kreindler (2024) estimates the value of time equal to 370% of hourly wage in a developing country setting.

22. This would be a result from an unconstrained optimal time allocation problem where an individual decides to shift time from activity u to activity u' only when the marginal benefit (net of costs) of time spent on u exceeds the marginal net benefit of time spent on u' .

23. Barrero et al. (2021) report that the fraction of full paid days worked from home jumped from less than 10% before the pandemic to 60% in May 2020. Then it went down to about 25%–30% by mid-2022 and has stayed around this level throughout 2025.

24. Because COVID-19 restrictions started in March 2020, in the 2020 sample we drop observations from January to April.

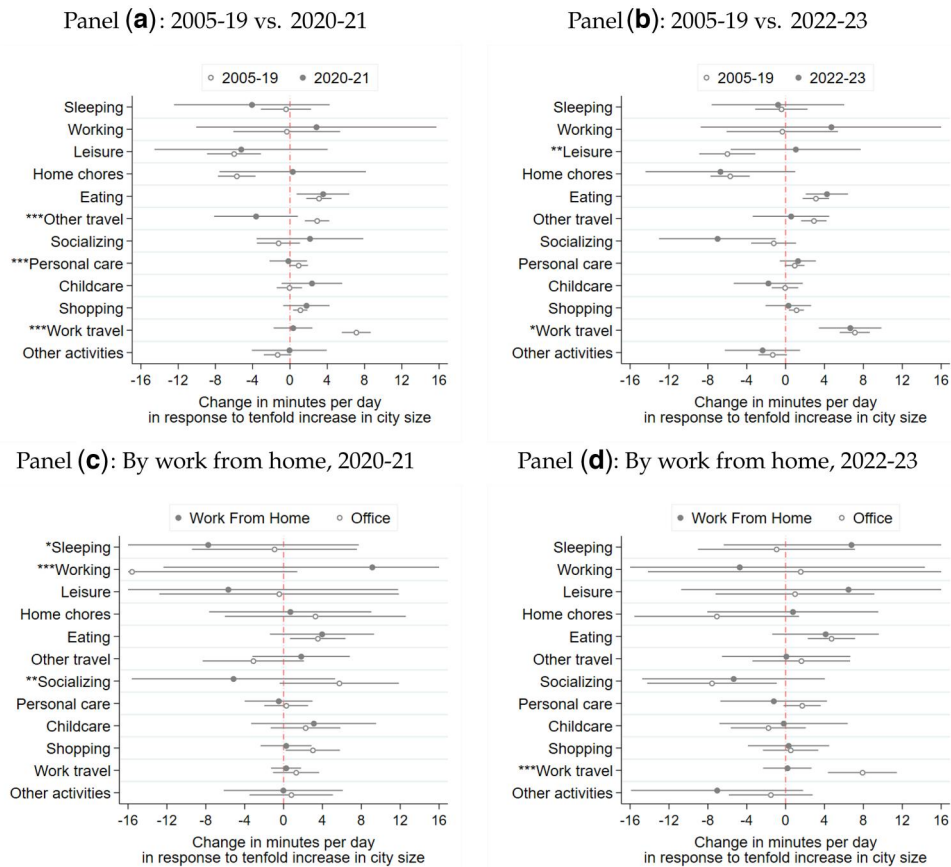


Figure 4. City size and time use by different time periods. *Note:* The figure reports coefficients β^u from regression (1) multiplied by 2.3. Horizontal bars represent 95% confidence intervals. Standard errors are clustered at the CBSA level. Panel (a) compares the coefficients by before and during COVID-19. Panel (b) compares the coefficients by before and after COVID-19. Panel (c) reports the coefficients by place of work during COVID-19. Panel (d) reports the coefficients by place of work after COVID-19. Statistical significance of the difference between two groups is denoted by: *** $P < .01$, ** $P < .05$, and * $P < .10$. See the text for more details.

time on leisure, while in pre-COVID years they were spending less. At the same time, despite the surge in working from home, the relationship between work travel time and city size recovered by 2022, but remained below its pre-pandemic level.

To understand if working from home played any role in how the relationship between city size and time use was changing since 2020, we split the post-2020 sample into those who commuted to worksite and those who worked from home at least 4 hours on a given day and did not commute to worksite. The results are shown in Fig. 4c,d. The main difference between those who work from home and those who do not is that remote workers do not spend more time on commuting in big cities. Another interesting result is that in 2020–2021 there was a sizable gap in the effect of city size on working and socializing between those who did and did not work from home.²⁵ However, in 2022–2023 these differences

25. Makridis (2025) also finds that since 2020 time saved on commuting was partly used to work longer.

disappeared. These results suggest that, while work from home affects the time allocation of individuals who can work remotely, it has a similar effect in cities of all sizes.²⁶

4. Conclusions

In this paper, we study how time use varies with city size in the United States. Using the ATUS, we find that residents of larger cities spend more time traveling and less time on leisure and home chores, and that there are significant differences in how they make up for the time lost to traveling across demographic groups. We also find that large cities offer a time allocation that may change the level of well-being, although the results are mixed and it is not clear if well-being goes up or down with city size. We also show that the observed differences in travel, leisure, socializing, eating, and home chores are equivalent to a reduction in the city-size wage premium by about one-quarter.

Overall, our results suggest that the costs and benefits of cities should be understood not only through wages, prices, and amenities, but also through how cities shape the allocation of time across daily activities. We hope that our analysis will draw more attention to time use as an important dimension of urban life and stimulate further research on the topic.

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Appendix A

A.1 Data

A.1.1 Time use categories

We aggregate activities reported in ATUS into 12 time use categories as follows:

1. Sleeping:
 - Sleeping
2. Working:
 - Work-related activities
 - Other income-generating activities
 - Job search and interviewing
 - Work and work-related activities, n.e.c.
3. Leisure:
 - Animals and pets
 - HH personal mail, messages, and e-mail
 - Relaxing and leisure (except playing games)

26. Changes in time use due to work from home have been studied in [Dam et al. \(2022\)](#), [Aksoy et al. \(2023\)](#), and [Pabilonia and Vernon \(2023\)](#), among others.

- Arts and entertainment (other than sports)
 - Waiting associated with relaxing and leisure
 - Sports, exercise, and recreation
 - Socializing, relaxing, and leisure, n.e.c.
4. Home chores:
 - Housework
 - Food drink preparation, presentation, clean-up
 - Interior maintenance, repair decoration
 - Exterior maintenance, repair decoration
 - Lawn, garden, and houseplants
 - Household management (except HH personal mail, messages, and e-mail)
 - Caring for household adults
 - Helping household adults
 - Caring for helping non-HH members
 - Caring for non-HH adults
 - Helping non-HH adults
 - Caring for helping non-HH adults, n.e.c.
 5. Eating:
 - Eating and drinking
 - Waiting associated with eating and drinking
 - Eating and drinking, n.e.c.
 6. Other travel:
 - Travel related to personal care
 - Travel related to household activities
 - Travel related to caring for helping HH members
 - Travel related to caring for helping Non-HH members
 - Travel related to education
 - Travel related to consumer purchases
 - Travel related to using professional and personal care services
 - Travel related to using HH services
 - Travel related to government services civic obligations
 - Travel related to eating and drinking
 - Travel related to socializing, relaxing, and leisure
 - Travel related to sports, exercise, and recreation
 - Travel related to religious/spiritual activities
 - Travel related to volunteer activities
 - Travel related to telephone calls
 - Security procedures related to traveling
 - Traveling, n.e.c.
 7. Socializing:
 - Socializing and communicating
 - Attending or hosting social events
 - Playing games
 - Waiting associated with socializing communicating
 - Waiting associated with attending/hosting social events
 - Telephone calls (to of from)
 - Telephone calls, n.e.c.
 8. Personal care:
 - Grooming
 - Personal activities
 - Personal care emergencies
 - Personal care, n.e.c.

9. Childcare:
 - Caring for helping HH children
 - Activities related to HH children's education
 - Activities related to HH children's health
 - Caring for helping non-HH children
 - Activities related to non-HH children's education
 - Activities related to non-HH children's health
10. Shopping:
 - Shopping (store, telephone, internet)
 - Researching purchases
 - Security procedures related to consumer purchases
 - Consumer purchases, n.e.c.
 - Professional personal care services
 - Financial services and banking
 - Legal services
 - Personal care services
 - Real estate
 - Veterinary services (excluding grooming)
 - Security procedures related to professional/personal services
 - Professional personal care services, n.e.c.
 - HH services (not done by self)
 - Home maintenance/repair/decor/construction (not done by self)
 - Using government services
 - Civic obligations participation
 - Waiting associated with government services or civic obligations
 - Security procedures related to government services or civic obligations
 - Government services, n.e.c.
11. Work-related travel:
 - Travel related to work
12. Other activities:
 - Taking class
 - Extracurricular school activities (except sports)
 - Research/homework
 - Registration/administrative activities
 - Education, n.e.c.
 - Religious/spiritual practices
 - Religious and spiritual practices, n.e.c.
 - Administrative support activities
 - Social service care activities (except medical)
 - Indoor outdoor maintenance, building, clean-up activities
 - Participating in performance cultural activities
 - Attending meetings, conferences, training
 - Public health safety activities
 - Volunteer activities, n.e.c.
 - Medical and care services
 - Health-related self-care
 - Unable to code
 - Data codes, n.e.c.

A.2 Additional figures and tables

Table A.1. Relationship between hours worked and city size in the ACS.

	(1)	(2)
Log population	0.000205 (0.00122)	−0.0000608 (0.000970)
Observations	3740842	3740842
R-squared	0.00000192	0.0794

Note: The table reports regression coefficients and standard errors from regressions of log hours worked per week on log metropolitan area population from the ACS. Column (1) reports the coefficient from a regression without controls. Column (2) reports the coefficient from a regression that controls for gender, race, education, age, age squared, occupation, and industry. Standard errors are clustered by metropolitan area. See the text for more details.

Table A.2. Relationship between wage and city size in the ATUS sample.

	(1)
Log population	0.045 (0.005)
Observations	64,117
R-squared	0.369

Note: The table reports regression coefficients and standard errors from regressions of log hourly wages on log metropolitan area population from the ATUS. The regression includes the same set of control variables from the main regression [Equation \(1\)](#). Standard errors are clustered by metropolitan area. See the text for more details.

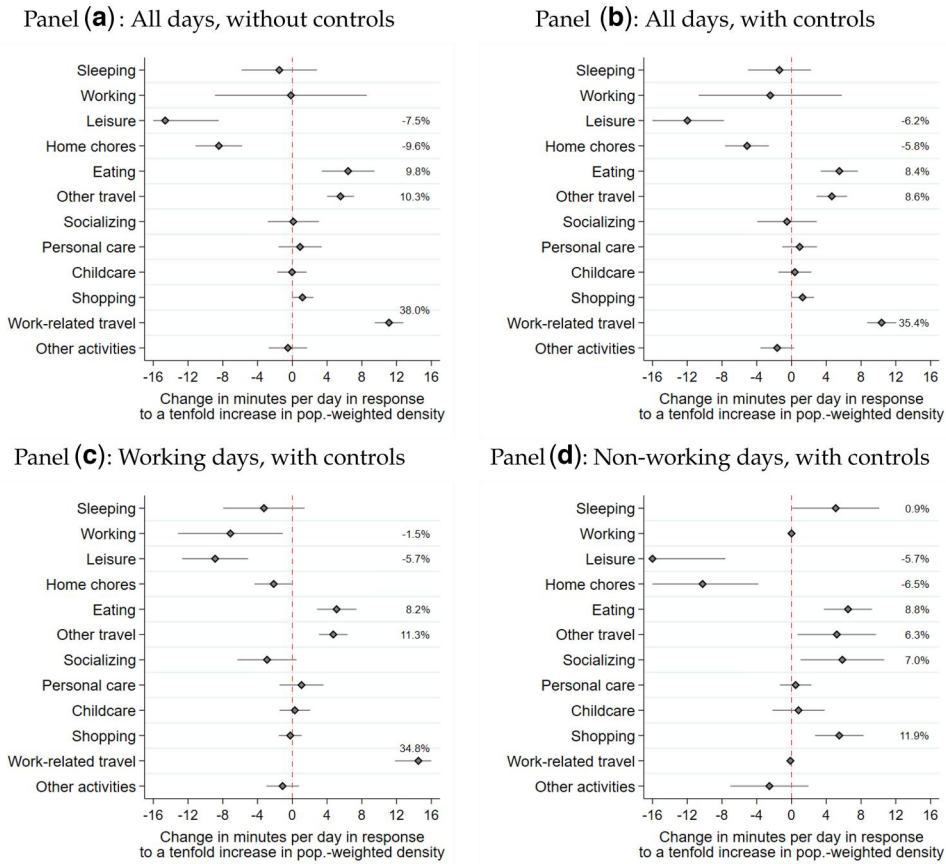


Figure A.1 Urban density and time use. *Note:* The figure reports coefficients β^u from regression (1) using population-weighted residential density instead of population, multiplied by 2.3. Panel (a) reports coefficients from the regression where individual controls are not included. Panel (b) reports coefficients from the regression with individual controls. Panels (c) and (d) repeat the analysis separately for working days and non-working days. Horizontal bars represent 95% confidence intervals. Standard errors are clustered at the CBSA level. Percentages to the right of each bar represent the value of the coefficient relative to average time spent on a given activity from Table 1, and are only reported for activities where the estimated coefficient β^u is statistically significant. See the text for more details.

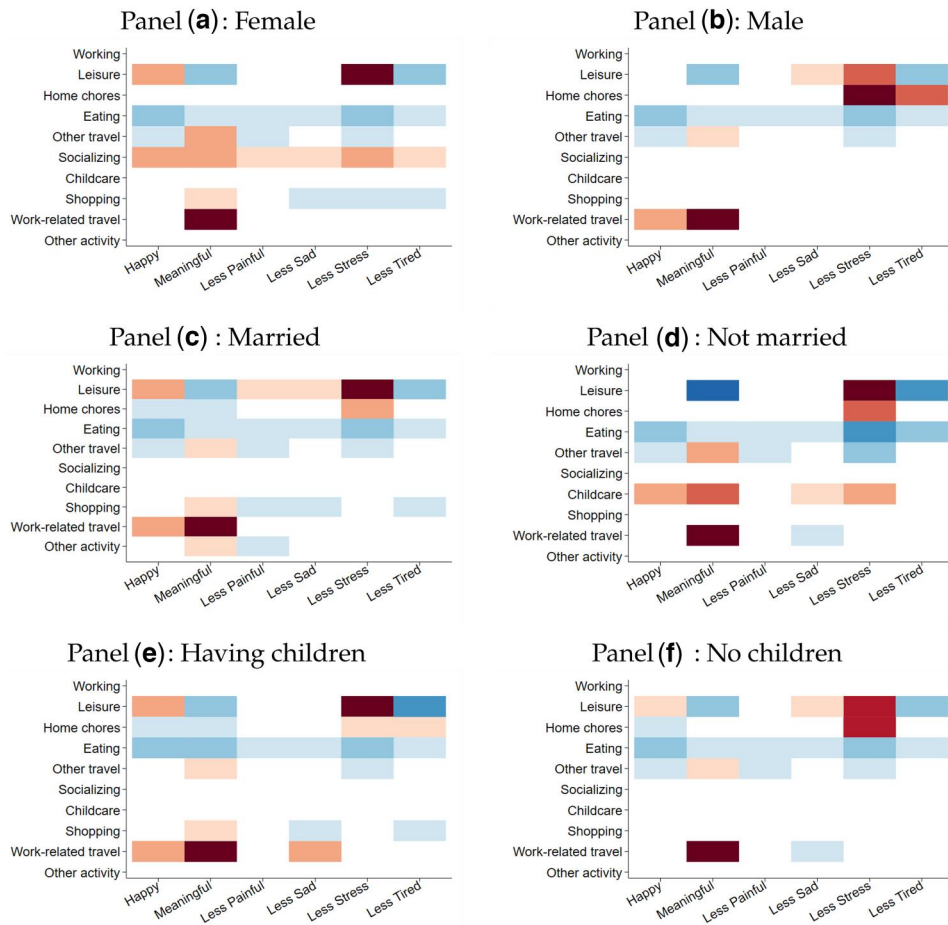


Figure A.2 Well-being heatmap, heterogeneity. *Note:* The figure shows the values of Ω for the six feelings in the Well-being module. Ω is rescaled from -1 to 1 with 10 bins. Blue and red colors represent positive and negative values of Ω_f^u , respectively, and darker shades of each color represent larger absolute values of Ω_f^u . We only show Ω_f^u for which both β^u and $\omega_f^u - \bar{\omega}_f$ are statistically different from zero. See the text for more details.

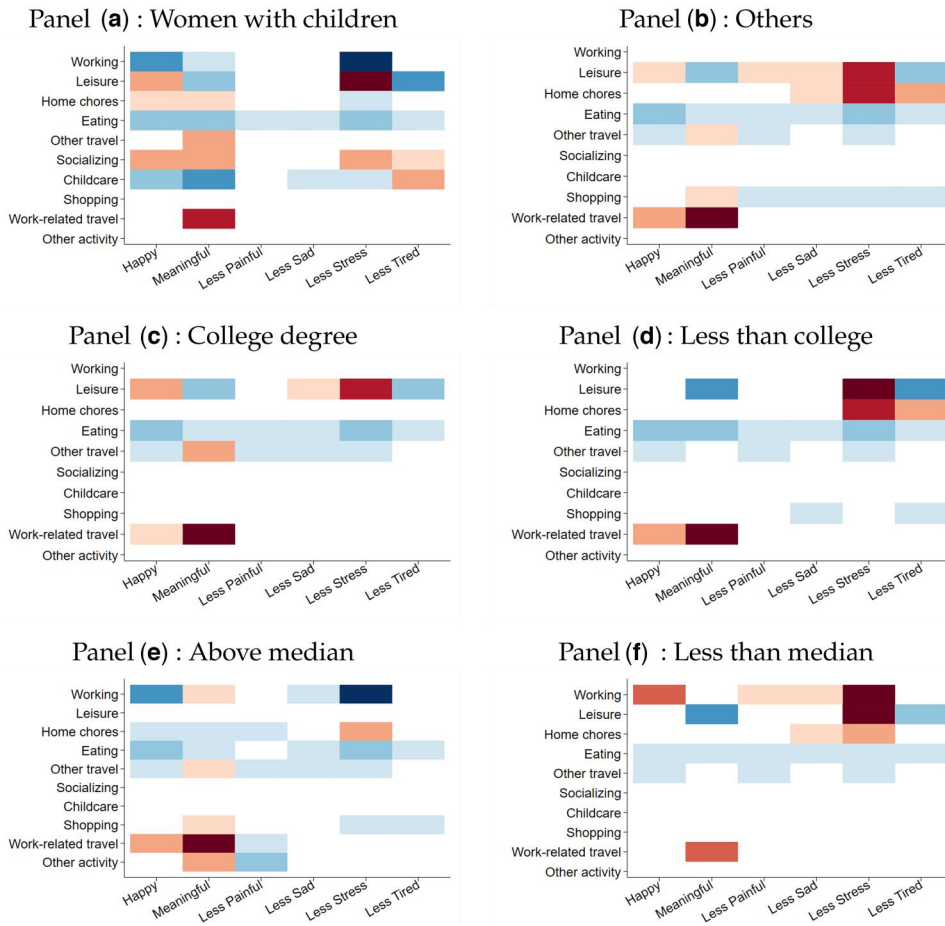


Figure A.3 Well-being heatmap, heterogeneity. *Note:* The figure shows the values of Ω for the six feelings in the Well-being module. Ω is rescaled from -1 to 1 with 10 bins. Blue and red colors represent positive and negative values of Ω_f^u , respectively, and darker shades of each color represent larger absolute values of Ω_f^u . We only show Ω_f^u for which both β^u and $\omega_f^u - \bar{\omega}_f$ are statistically different from zero. See the text for more details.

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