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Time availability as a mediator between socioeconomic status and health

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ABSTRACT

This study shows that time availability is a significant mediator between SES and health. I draw on representative survey data from the Canadian Multinational Time Use Survey and supplement this data source with a second data set containing localized sociodemographic and time availability measures. In addition to testing existing time scarcity measures, I also propose a broader set of new, more inclusive measures. Analyses involve two stages. First, binary logistic regressions evaluate statistically significant relationships. The second stage uses mediation analyses to assess whether time availability is statistically significant in mediating the relationship between SES and self-reported health. I compute direct, indirect, and total effects, independently for each of the objective and subjective time availability measures, for both the nationally representative sample and for the localized sample. My results show that both time scarcity and time excess are important when examining the mechanisms linking SES and health. For example, 12 percent of the effect of household-level SES on health is via discretionary time availability. Further, over 10 percent of the effect of neighborhood-level SES on health is via subjective time scarcity. Objective time poverty mediates about 9 percent. 7.3 percent of the effect of SES on health is via objective time excess. Considering the differing temporal needs of marginalized populations, this work has important health policy implications for sociotemporal disparities in health.

1. Introduction

We don't have time for fun anymore. This is despite most working-age individuals asserting that they value time more than money. Over the last 30 years, rates of not having as much discretionary time as needed have skyrocketed in the West (Schor, 2008; Jacobs & Gerson, 2001; Gershuny, 2005; Giddens, 2013). This has important ramifications, as time scarcity undermines both individual and community well-being (George, 2014; Mani et al., 2013; Strazdins et al., 2011). Socioeconomic inequalities undergird the detrimental effects of time scarcity. The resources people can marshal to mitigate the effects of not having enough time vary significantly among working-age individuals (Becker, 1965; Clawson & Gerstel, 2014; Kalenkoski & Hamrick, 2013; Kalenkoski et al., 2011; Merz & Rathjen, 2014; Mullainathan & Shafir, 2013; Vickery, 1977). Time availability is thus a potentially significant pathway through which socioeconomic status (SES) influences well-being.

Despite the wealth of knowledge we have about social inequalities leading to inequalities in health (Freese & Lutfey, 2011; Link & Phelan, 1995), it is still unclear how the experience and availability of time is shaped by both individual and neighborhood-level socioeconomic factors, and how this matters for well-being. We know that individual sociodemographic characteristics undergird whether one has too little, just enough, or too much discretionary time (Adam et al., 2006; Bo, 2022; Clawson & Gerstel, 2014; Harvey & Mukhopadhyay, 2007; Vickery, 1977). However, it is still unclear how sociotemporal inequalities influence well-being. This article asks: How does time availability matter for self-reported health? Is time availability a significant mediator between SES and self-reported health?

Incorporating prevalent theoretical perspectives from fundamental cause theory and from the sociology of time, this study draws on representative survey data from the Canadian Multinational Time Use Survey (CMTUS) — along with a second data source containing more detailed and localized measures on time availability, and well-being — to show that time availability represents an important mechanism through which SES influences health. Time availability is a statistically significant mediator between SES and health. In addition to incorporating existing measures of subjective time scarcity and discretionary time scarcity, I also propose a set of more inclusive time availability measures. I do this to honor the discretionary time needs of individuals as they vary based on the sociodemographic characteristics commonly highlighted as significant in the literature on SES and health, such as income, age, gender, and race (Bo, 2022; Clawson & Gerstel, 2014; Goodin et al., 2008; Hochschild & Machung, 2012; Pinto & Ortiz, 2018;

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Sayer, 2005). Studying time availability thus generates unique insights on some of the possible pathways through which SES may influence health disparities.

2. Background

2.1. Discretionary time availability as a determinant of health

The social infrastructure of time reveals itself most clearly when it breaks down. This is apparent in how the measurement of time is discussed in the social sciences. Subjective discretionary time scarcity is frequently measured via queries such as how often respondents feel rushed (Williams et al., 2016). To assess time availability, researchers often measure discretionary and necessary time through the categorization of various activities. Activities required for the necessities of life – including activities dictated by legal, social and cultural norms – are considered necessary time. Discretionary time scarcity thresholds are then constructed relative to population distributions of available discretionary time (Harvey & Mukhopadhyay, 2007; Williams et al., 2016). Individuals are experiencing discretionary time scarcity when they fall into the lowest 25th quartile of the population when it comes to daily discretionary time availability.

Although everyone has 24 h each day, discretionary time availability is unequally distributed between social groups (Bó & Dukhovnov, 2022). Sociodemographic factors – such as gender, socioeconomic status, race, age, and the environment individuals reside in all influence whether one has too little, just enough, or too much time (Adam et al., 2006; Bo, 2022; Clawson & Gerstel, 2014; Harvey & Mukhopadhyay, 2007; Vickery, 1977). Due to the largely invisible labor of unpaid care work, women have overall less discretionary time and quality leisure time (Strazdins et al., 2016; Lentz, Bezner Kerr, Patel, Dakishoni, & Lupafya, 2019). Individuals lower on socioeconomic and racial hierarchies also have less access to time saving resources, leaving them with less daily discretionary time (Bittman & Wajcman, 2000a, 2000b; Tranter, 2010; Bó & Dukhovnov, 2022). Aging also increases the likelihood of experiencing subjective time scarcity: navigating an aging body often brings unexpected health events, requiring the reallocation of discretionary time (Bo, 2022; Charmaz, 1991; Strazdins et al., 2016).

The above is troubling, as time is integral for well-being (Krueger & Stone, 2014). Not having enough discretionary time is one of the most common reasons given for lacking exercise and homemade meals (Banwell et al., 2005; Hamermesh, 2010; Jabs & Devine, 2006; Spinney & Millward, 2010). The prolonged experience of discretionary time scarcity can additionally lead to poor mental health outcomes and risk behaviors (Mani et al., 2013; Strazdins et al., 2011, 2016). Not having as much time as one needs increases stress hormone levels (Offer & Schneider, 2011). This is accompanied by higher risks of depression, heart disease, poorer self-rated health, and sleep problems (Virtanen et al. 2011, Zuzanek, 2004, pp. 137–158). Economic and social inequalities further magnify the detrimental health effects of time scarcity (Becker, 1965; Bo, 2022; Kalenkoski & Hamrick, 2013; Mullainathan & Shafir, 2013). In sum, research has shown that time scarcity impacts both mental and physical well-being (Bianchi & Milkie, 2010; Moen et al., 2015; Zisberg et al., 2010). Yet, despite the wealth of knowledge we have about time scarcity being a health-stressor, it is still unclear how time availability may mediate the relationship between SES and health.

2.2. SES as a determinant of health

Given the consequential ramifications of time scarcity for both individual and population-level health outcomes, the socioeconomic conditions undergirding access to, and agency over discretionary time are important determinants of health disparities (Bo, 2022). Fundamental cause theory is a useful perspective for understanding the health effects of time availability (Freese & Lutfey, 2011; Link & Phelan, 1995). The theory suggests that social inequalities lead to inequalities in health. Specifically, that socioeconomic status (SES) is a fundamental cause of health disparities. Higher SES individuals can deploy more resources to avoid disease, maintain, or improve their health. These include individual and household-level resources, such as gender and income, along with the agency to enable positive changes in ones' environment (Bourdieu, 2018).

To better unpack the ramifications of time availability for health, in addition to individual-level resources and demographic characteristics, we also need to consider the role of area-level SES. This is because fundamental causes can be thought of as 'systems of exposure' (Riley, 2020:2). In other words, health risks vary based on an where an individual resides in the social stratification systems they inhabit. We can study these SES-based systems of exposure by getting a 'glimpse into a population or subpopulation in a particular sociotemporal context' (Riley, 2020:3). This meso-level perspective suggests that the actions of individuals in one SES group have consequences for both their own health, but also for the well-being of people in other SES categories (Freese & Lutfey, 2011). More concretely, communities may inadvertently perpetuate disparities in health through time utilization patterns. Neighborhood safety and transportation designs shape how differing groups of people encounter, spend time with, and relate to each other (Bó & Dukhovnov, 2022). Living in SES echo chambers can also influence individual health outcomes through the transmission of differing forms of health-focused cultural capital (Mollborn et al., 2021).

3. Time as a mechanism linking SES and health

Time availability may influence health through various mechanisms: by shaping how individuals relate to each other and to their environment. In lieu of testing mechanisms, in this paper, I focus on the consequential role of time availability for the relationship between SES and self-reported health. However, these mechanisms are pertinent to detail, as they reveal a set of plausible pathways through which time serves as a social determinant of health, occupying a mediating role between SES and self-reported health.

Individual relations. One of SES' main impacts on time is shaping how individuals relate to each other. Building and maintaining supportive social networks – essential for both mental and physical well-being – requires both available discretionary time and agency over time (Strazdins et al., 2016). High-SES individuals have more varied schedules and engage in a wider range of leisure activities than low-SES individuals do (Hamermesh, 2019). This enables them to allocate more time to maintaining and expanding their social networks via health-promoting activities, ultimately protecting their long-term well-being (Bo, 2022). They can do this despite working longer hours than lower-SES individuals, as they are able to purchase time by outsourcing domestic and caregiving duties (Goodin et al., 2008; Hamermesh, 2019).

On the other hand, lower-SES individuals contend with more schedule fragmentation, an overall lack of agency over their time, and more disruptions in their daily routines (Berkman et al., 2014). This influences their social relations. As their routines tend to be less predictable, it may be harder for them to schedule pre-planned activities with network members. Their social networks also tend to be more economically fragile, requiring them to forgo their discretionary time for caregiving (Bo, 2022; Wajcman, 2008; Zukewich, 2003). With limited access to stable jobs, lower-SES individuals also spend more of their time underemployed and unemployed than higher-SES individuals do (Castañeda, 2018; Hamermesh, 2019). As such, they may oscillate between periods when they lack enough discretionary time and periods when they have more discretionary time than needed. Both their time excess and deficiency carries important ramifications for their health, as the common denominator between both is an SES-driven lack of agency over one's own time.

Environmental relations. Another noteworthy way in which SES

impacts time availability is through influencing how individuals relate to their environments. Living in neighborhoods with less public investment, low-SES individuals need to spend extra time to mitigate the effects of deprivation (Bó & Dukhovnov, 2022; Castañeda, 2018). Lower income neighborhoods also tend to experience higher rates of disruption (Sharkey et al., 2014). This too necessitates that lower-SES individuals forgo their discretionary time to contend with pockets of neighborhood disorganization (Bo, 2022; Shihadeh & Barranco, 2010). They encounter their immediate environment through the social time of the neighborhood: waiting for buses, commuting long distances, and traveling between multiple part-time jobs (Cutler et al., 2008; Edin et al., 2003; Giurge et al., 2020; Sorokin & Richard, 2017). In other words, the social time of a particular environment may take precedence over individual discretionary time (Thompson, 2017).

In environments like this, low-SES, racialized, or immigrant women are particularly vulnerable. Social and cultural norms often dictate that they perform unpaid care labor for social network and family members (Bianchi et al., 2000; Pinto & Ortiz, 2018; Sayer, 2005). Partially due to this, low-SES women have less discretionary time, and they have overall less control over their schedules, both at home and at work (Clawson & Gerstel, 2014; Goodin et al., 2008; Hochschild & Machung, 2012). In sum, the experience and availability of time is also influenced by neighborhood-level socioeconomic inequalities. These sociotemporal inequalities achieve salience for well-being as individuals navigate their circumstances and interact with others in their lives.

Fig. 1 visually illustrates the links between SES, time availability, and self-reported health. Time availability mediates the relationship between SES and health. Individual and neighborhood-level sociodemographic characteristics and relations reflect the variance of health risks based on an individual's location in stratified systems of exposure (Riley, 2020)

4. Hypotheses

I hypothesize that low-SES individuals will be more likely to report poor health when experiencing time excess, time poverty, and time scarcity. Due to their overall higher levels of agency, I expect more high-SES individuals to be time balanced. I also hypothesize that both objective and subjective time availability will be a statistically significant mediator between SES and self-reported health, though a priory, the magnitude of the total effect is hard to estimate.

I build on previous research to show that time availability is a significant mediator in the relationship between SES and health. I do this by incorporating existing measures of subjective time scarcity and discretionary time scarcity, while also proposing a broader set of new, more inclusive measures. By centering objective time availability in the lives of respondents – I not only measure time excess, time poverty, and time balance – but also consider the changing discretionary time needs of individuals as they vary based on sociodemographic control variables such as partnership status, age, gender, family composition, and race (Bo, 2022; Clawson & Gerstel, 2014; Goodin et al., 2008; Hochschild & Machung, 2012; Pinto & Ortiz, 2018; Sayer, 2005).

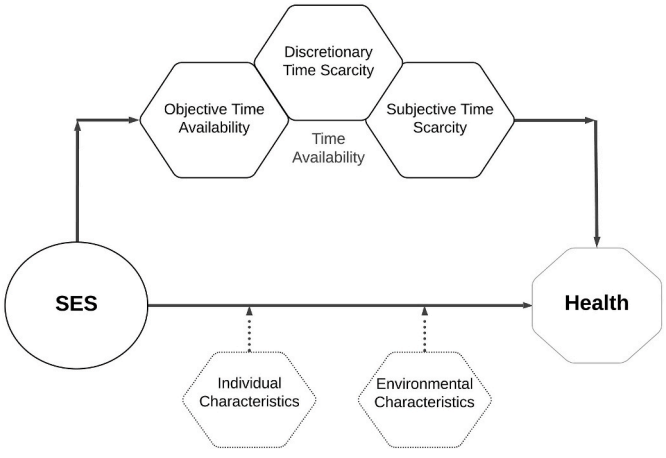

Fig. 1. Links between SES, time availability, and self-reported health.

5. Design and methods

5.1. Data

The analyses rest on two data sources. The first consists of the latest harmonized publicly available Multinational Time Use Study (MTUS) for Canada (CMTUS). The MTUS integrates and standardizes more than one million time diary days from over 70 randomly sampled nationally representative surveys.[1] The MTUS data set standardizes the above surveys, so that the time diary entries (categorized by activities) are comparable across people, space, and time. The 2010 wave of the CMTUS is a nationally representative, probability sample of the population (aged 15 and older) living at registered addresses in Canada (Fisher et al., 2019). The survey contains 69 main activities, categorized into 25 activity types, totaling 1440 min (24 h) per day per respondent, along with customary demographic and socioeconomic variables (age, gender, socioeconomic characteristics, partnership status, migration background, and self-reported health status). A crucial feature of the dataset is the ability to sort the above activities into categories for the calculation of discretionary vs necessary time availability. Time use data was collected through participant recall via time diaries. The response rate for the CMTUS is 55.2 percent. In this study, I rely on the responses of CMTUS respondents aged 18 and older. As the CMTUS does not contain adequate geocodes for precise neighborhood-level SES measures and is thus unable to detect neighborhood-level differences when it comes to the drivers of time availability, I supplement this data with an additional data source directly addressing the limitations of the CMTUS.[2]

The second data source is the 2019 Time for Health (TFH) survey. The inclusion of this data source enables the incorporation of more detailed, localized measures on time availability, race, and well-being. The TFH survey uses Facebook to recruit Torontonians aged 18 or older, living in ethnically and socioeconomically differing high-SES (Sunnybrook, Bridle Path) and low-SES (Regent Park, Thorncliffe) neighborhoods (Anon, 2017). As over 80 percent of adults are active on Facebook – and the social media platform's use is not stratified by race, gender and class – the coverage of Facebook's sampling frame can be comparable to address-based sampling (Couper, 2017; Greenwood et al., 2016; Link et al., 2008). This is a snowball sample, generated from the efforts of research participants who live in the four neighborhoods listed above, as they forwarded the survey to their neighborhood-based social network and affinity group members. Respondents from the snowball sample did not receive an incentive for completing the TFH survey. This mode of data collection is particularly beneficial for reaching hard-to-reach populations such as the reclusive wealthy and stigmatized poor (Dosek, 2021; Kayrouz et al., 2016). The inclusion criteria in the TFH survey consisted of being an adult resident of the above neighborhoods. Prior research has shown that results obtained via Facebook's snowball samples compare favorably to representative datasets such as the Multinational Time Use Survey (Brickman Bhutta, 2012; Baltar & Brunet, 2012).

[1] https://www.timeuse.org/sites/default/files/9727/mtus-user-guide-r9-february-2016.pdf.

[2] There is also a difference in the period captured by the CMTUS survey and the 2019 Time for Health survey. Unfortunately, the more recent CMTUS waves are not harmonized and do not contain subjective time scarcity measures. https://www.mtusdata.org/mtus/about_mtus.shtml.

To address potential selectivity bias on characteristics such as age, gender, education and race, post-stratification weights are used to align the sample demographics of the TFH data with the census profiles of each neighborhood produced by the City of Toronto (Anon, 2017). With the weights, the significance and magnitude of the estimated relationships between socioeconomic status, time availability, and outcomes such as self-reported health, remain largely unchanged. Unlike the CMTUS, the TFH survey is not nationally representative. The results from this survey are only generalizable to the select neighborhoods and populations. Given that online respondents were referred by friends, neighbors, and acquaintances known to them, completion rates were high. The approximately 11 percent of the sample who began the survey but did not finish is excluded. Comparing the characteristics of those who completed the survey versus those who did not shows that the groups do not vary significantly in their income, health, and time availability responses.

Considering that this study focuses on SES and self-reported health, situating this research in Canada (specifically Toronto in the case of the TFH survey) is intentional. Studying the experiences of low-SES and high-SES individuals in this context allows for a baseline level of health care and social safety net access (Raphael et al., 2004). This differentiates Toronto from similarly populous U.S. cities. Unlike in the United States (where some aged and poor patients encounter difficulties in finding a primary care provider who takes Medicare or Medicaid) (Baicker et al., 2004), in Toronto all can access necessary health care, regardless of SES or age. This allows for the incorporation of the experiences of individuals at similar points in the life course who live in differing neighborhoods (Abramson, 2015). In the wealthy neighborhoods of Bridle Path and Sunnybrook, the average family income is over $300,000 CAD per year. In contrast, the average family income is approximately $40,000 CAD in the poorest neighborhoods of Regent Park and Thorncliffe (Bélanger et al., 2016). Additionally, reflecting the population of the city, the neighborhoods are culturally heterogeneous while differing in terms of socioeconomic characteristics.

5.2. Measures

To assess their health, respondents were asked: "Would you say your health in general is very good, good, fair, or poor?" Self-reported health is a valid measure for physical, mental and social well-being (Rubin & Zimmer, 2015). This dependent variable is coded 1 if the respondent is in very good or good health. The variable is coded as 0 if the respondent is in fair or poor health. This question is queried, and the variable is coded in the same manner in both the TFH and the CMTUS surveys.

I use both household and neighborhood-level measures for SES. As the TFH survey sampled from Toronto's wealthiest and poorest neighborhoods, the predictor for neighborhood-level SES is coded as 0 for high-SES and 1 for low-SES. Correspondingly, the CMTUS survey harmonizes the total annual household income variable by recoding it into quartiles. I code the lowest 25 percent (those with the smallest amount of annual household income) as low-SES and the highest 25 percent (those with the most amount of household income) as high-SES. Using neighborhood-level and household-level income as a proxy for SES is reasonable, as the measures are conceptually relevant, applicable to my populations of interest, allow for comparison with other studies, while also capturing differing levels of measurement (Coburn, 2000; Ensminger et al., 2003; Evans et al., 2012).

I assess respondent time availability through three measures. Relying on the CMTUS, I consider respondents *discretionary time scarce* if they are in the lowest 25th quartile of the population when it comes to daily discretionary time availability. I measure discretionary time by considering minutes spent in activities deemed discretionary by the existing literature. These are leisure activities, socializing, recreation, and religious activities (Kalenkoski et al., 2011; Williams et al., 2016; Bó & Dukhovnov, 2022). Those experiencing discretionary time scarcity are coded as 1. Those not in the lowest 25th quartile of the population when it comes to daily discretionary time availability are coded as 0.

Relying on the TFH survey, I additionally incorporate a measure of *objective time availability*. I construct this categorical variable by assessing responses to two specific questions asked in the TFH survey: "How much downtime do you *need* to recover daily from your duties?" and "How much downtime do you currently *have* to recover daily from your duties?". If a respondent states that they have more time than they need, I categorize them as '*time rich*'. If a respondent has less time than they need, I categorize them as '*time poor*'. If a respondent reports that they have as much time as they need, I categorize them as '*time balanced*'.

For my third time availability measure, relying on precedent set by the existing literature, I consider TFH respondents as *subjectively time scarce* when they report "often" or "always" feeling rushed (vs. those who stated that they "never" or "occasionally" feel rushed) (Williams et al., 2016). Those experiencing subjective time scarcity are coded as 1. Those not experiencing subjective time scarcity are coded as 0.

I control for available socioeconomic and demographic characteristics that have been shown by previous research to influence the relationship between SES and self-reported health. These include respondent age; female, male, or non-binary gender identification; partnership status (single or couple); respondent marital status (never married, married, separated, divorced, widowed); number of children in the household; race (Asian, Black, Caucasian, Hispanic, Mixed, Native); and migration status (born outside of Canada versus native born). As such, the estimated associations between SES, temporal experiences and self-reported health are net of these sociodemographic variables.

Table 1 shows the survey each time scarcity measure comes from, and how the sample descriptive characteristics of the two surveys compare. As the TFH survey sampled from neighborhoods differing by SES, the TFH sample is overall younger, has more low-SES respondents, and is in poorer health than the CMTUS sample. The TFH and CMTUS samples are roughly similar when it comes to gender breakdown and coresident children in the household. However, the TFH survey also allows respondents to identify as non-binary. 1.8 percent selected this category. As expected, considering the composition of the Toronto neighborhoods the TFH survey sampled from, the TFH sample also has more migrant respondents.[3] Only the TFH data contains information on respondent self-reported race. 61.6 percent of the participants are Caucasian, followed by 19.4 percent Asian, 9.3 percent Black, 5.7 percent Mixed-race, and 4 percent Hispanic.

5.3. Analysis

There are two steps to the analysis. After providing an overview of the bivariate associations via percentage distributions of self-reported health by SES and time availability in Tables 2 and I first regress the neighborhood and household-level SES variables on the self-reported health dependent variable, accounting for the time availability and control variables described above. Although the datasets draw from differing samples, and are thus not directly comparable, this allows me to evaluate whether there is a statistically significant relationship between the variables. Models include an equation controlling for respondent sociodemographic characteristics and time availability. As my dependent variable is categorical, I use binary logistic regression. Results of the regressions are presented in Table 3, with a p-value threshold of $p < .05$ representing statistical significance.

Next, to assess whether time availability is statistically significant in mediating the relationship between SES and self-reported health, I conduct mediation analyses. I compute direct, indirect, and total effects, independently for each of the objective and subjective time availability measures, for both the nationally representative CMTUS sample and for the snowball-based TFH sample (Hayes & Rockwood, 2017; Preacher & Hayes, 2008). Fig. 2 graphically depicts the mediation analysis. Paths *a*

[3] www.toronto.ca/open.

Table 1
Sample descriptives.

	TFH	CMTUS
Self-reported health (%)		
Good health	60.4	82.7
Poor health	39.6	17.3
SES (%)		
High-SES	36.4	47.9
Low-SES	63.6	52.1
Time availability (%)		
Discretionary time scarcity		24.9
Subjective time scarcity	52.9	
Objective time availability		
Time excess	16.3	
Time poverty	47.0	
Time balanced	36.7	
Gender (%)		
Female	54.1	56.8
Male	44.1	43.3
Non-Binary	1.8	
Age group (%)		
18-24	17.9	6.0
25-34	35.6	12.9
35-44	19.5	16.5
45-54	10.8	19.9
55-64	5.6	20.3
65-74	8.8	13.8
75+	1.8	10.6
Race (%)		
Caucasian	61.6	
Black	9.3	
Asian	19.4	
Hispanic	4.0	
Mixed	5.7	
Marital status (%)		
Single	48.9	
Married	35.9	
Separated	6.7	
Divorced	4.4	
Widowed	4.1	
Living with Partner (%)		58.7
Coresident Children (%)		
0	68.8	72.6
	17.7	15.6
2	8.5	8.5
3	2.9	2.4
4+	2.1	0.9
Migrant (%)	32.0	17.7
N	1001	6596

and *b* refer to the direct effect. The path through which *X* (SES) influences *Y* (health) through *M* (time availability) is the indirect effect.

As my independent variables are categorical, I employ the recommended Stata mediation package developed by UCLA's Statistical Consulting Group (Anon, 2022; Hayes & Rockwood, 2017). I compute the indirect effects by using the common product of the coefficients approach (Hayes & Rockwood, 2017).

$$Y = B_0 + B_1X + B_2M + e$$

$$M = B_0 + BX + e$$

I calculate the total indirect effect by multiplying the regression coefficients obtained from the Regressions 1 and 2 (shown in the equations above).

$$B_{indirect} = (B_2)(B)$$

The regression coefficient for the indirect effect represents the change in Y for every unit change in X that is mediated by M. After statistically testing the indirect effect for significance, I use Stata's linear combinations of estimators command to calculate the total direct effect. From the above, I compute the ratio of indirect to direct effect and the proportion of total effect that is mediated.

Table 2
Percent distribution of self-reported health by SES and time availability.

		TFH		CMTUS	
		Good Health	Poor Health	Good Health	Poor Health
Time excess	High-SES	13.6	5.7		
	Low-SES	3.8	11.4		
Time poverty	High-SES	20.8	15.5		
	Low-SES	19.7	31.1		
Time balanced	High-SES	33.7	10.6		
	Low-SES	20.5	13.5		
X2			47.844***		
Subjective time scarcity	High-SES	21.6	13.6		
	Low-SES	13.3	32.3		
X2			55.36***		
Discretionary time scarcity	High-SES			12.7	1.6
	Low-SES			24.2	12.0
X2					39.01***

*.10 > p > .05; **.05 > p > .01; ***.01 > p.

6. Results

Table 2 shows the percentage distributions of self-reported health by SES and time availability. There is a strong bivariate association and Chi-square values are significant for all associations. Low-SES respondents are more likely to rate their health as poor when experiencing both objective time poverty and objective time excess. For example, 31.1 percent of low-SES objectively time poor individuals report being in poor health, while 15.5 percent of high-SES objectively time poor individuals report the same. The percentage rating their health as poor is higher for low-SES individuals who are subjectively time scarce (32.3 percent) vs high-SES individuals (13.6 percent). 33.7 percent of objectively time balanced high-SES individuals report being in good health, while 20.5 percent of the same low-SES respondents do.

Table 3 presents the binary logistic regression models summarizing the relationship between self-reported health, SES, and time availability. Each of the time availability independent variables is a significant predictor of health. The relative risk ratio (rrr) switching to being subjectively time scarce for those in poor health is 2.816. In other words, the expected risk of being in poor health is higher for respondents who are subjectively time scarce. Discretionary time scarcity (rrr = 1.582) and objective time poverty (rrr = 1.626) also significantly increase the relative risk of poor health. Time excess, or having more time than one needs, is also detrimental (rrr = 3.710).[4] Compared to 18–24-year-olds, as respondents enter working ages, their relative risks of poor health increase. Race also matters. The relative risk ratio of being in poor health for Black versus White respondents is 1.904. Being from an ethnically mixed background carries a relative risk ratio of 6.090, increasing the expected risk of poor health. SES is also a significant predictor of risking poor health.

Table 4 shows the results of the mediation analyses. As we can see

[4] See table A1 of the Appendix for tests of goodness-of-fit for the model, considering the time availability measures independently from each other.

Table 3
Binary logistic regression relative risk ratios.

Characteristics	TFH	CMTUS
Reference categories: not subjectively time poor, time balanced, not objectively time poor, High SES, good health, aged 18–24, female, white, non-migrant, single, no coresident children		
Intercept	0.075***	0.056***
Time Availability		
Discretionary time scarcity	–	1.582***
Subjective time scarcity	2.816***	–
Objective time excess	3.710***	–
Objective time poverty	1.626**	–
Low SES	3.025***	3.292***
Age Group		
25-34	1.137	1.057
35-44	7.262***	1.872***
45-54	4.218***	2.143***
55-64	12.658***	2.145***
65-74	14.943***	1.146**
75+	3.120	1.315
Gender		
Male	1.527**	1.078
Non-Binary	1.870	–
Race		–
Black	1.904*	–
Asian	1.431	–
Hispanic	2.794**	–
Mixed	6.090***	–
Migrant	0.366***	1.030
Marital Status		
Married	0.288***	–
Separated	0.783	–
Divorced	0.225***	–
Widowed	0.833	–
Living with Partner	–	0.899
Number of Coresident Children		
1	1.745*	0.846
2	1.635	0.795
3	0.947	0.865
4+	2.885*	0.786
AIC	1099.831	5883.674
Chi-Square	339.40***	469.44***

*.10 > p > .05; **.05 > p > .01; ***.01 > p.

from the indirect and direct effects, each of the time availability variables – discretionary time scarcity, subjective time scarcity, objective time poverty, and objective time excess – has a significant role in mediating the relationship between SES and health. The CMTUS data shows that 12 percent of the effect of household-level SES on health is via discretionary time availability. The findings from the TFH data are complementary. Over 10 percent of the effect of neighborhood-level SES on health is via subjective time scarcity. Objective time poverty mediates about 9 percent. 7.3 percent of the effect of SES on health is via objective time excess. In supplementary models[5] I also examine the role of time availability in mediating the relationship between SES and health by gender. Depending on the measure used, for women, approximately 8 percent of the effect of SES on health is via time availability. For men, the same is approximately 11 percent. In sum, both time scarcity and time excess are important to consider when examining the mechanisms linking SES and health.

7. Discussion

This study draws on two complementary data sources to systematically examine the relationships between SES, time availability, and self-reported health. I show that: (1) Time availability is a statistically significant mediator between SES and health. (2) Specifically, each of the time availability measures — discretionary time, subjective time scarcity, objective time poverty, and objective time excess — has a significant role in mediating the relationship between SES and health. (3) Time availability is a robust predictor of self-reported health. (4) The relationship between SES and time availability is also influenced by sociodemographic factors, where age, gender, race, migration status, and marital status are significant.

Through the incorporation of the novel Time for Health dataset, this research also tests a set of more inclusive time availability measures. Building on existing literature noting that discretionary time needs vary based on respondent sociodemographic characteristics and localized vulnerabilities (Bo, 2022; Clawson & Gerstel, 2014; Goodin et al., 2008; Hochschild & Machung, 2012; Pinto & Ortiz, 2018; Sayer, 2005), this study highlights the continued need to consider the perspectives of both high-SES and low-SES populations.

The robust influence of both individual and neighborhood-level SES is compelling. Though more high-SES individuals report being time poor, this does not necessarily translate to worse health outcomes for them. A higher percentage of low-SES individuals report being in poor

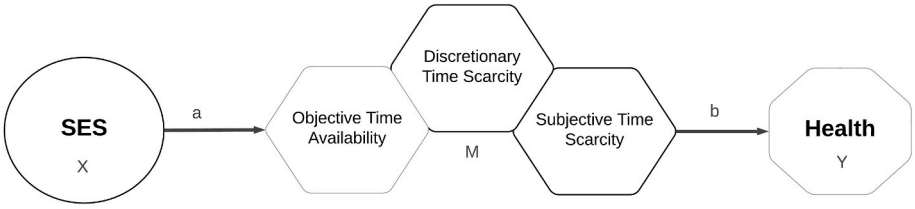

Fig. 2. Direct and Indirect effects between SES, Time Availability, and Self-Reported Health.

Table 4
Mediation analysis.

	Indirect Effect	Direct Effect	Indirect/Total Effect
CMTUS Discretionary Time Scarcity	−0.021***	−0.157***	12.0%
TFH Subjective Time Scarcity	−0.024***	−.217***	10.10%
TFH Objective Time Poverty	−0.023***	−0.219***	9.30%
TFH Objective Time Excess	−0.0178***	−0.224***	7.30%

*10 > p > .05; **.05 > p > .01; ***.01 > p.

health when time poor. These findings complement literature illustrating that as the sources of time poverty differ between low and high SES individuals, the well-being ramifications of time poverty also differ between the groups (Bo, 2022). Being time balanced is associated with overall better health for both socioeconomic groups, though more high-SES are time balanced (33.7 percent) than low-SES (20.5 percent). Yet, as my regression results show, the expected risk of being in poor health is higher for respondents who are subjectively time scarce, objectively time poor, or discretionary time scarce. Underscoring its centrality for well-being (Banwell et al., 2005; Hamermesh, 2010; Jabs & Devine, 2006; Krueger & Stone, 2014; Spinney & Millward, 2010), I show that time availability may influence health through both individual and contextual mechanisms.

I also examine how the above relationships are conditioned by

[5] Not shown.

respondent needs and vulnerabilities. Following the lead of the existing literature on SES and health, I expect that the control variables of race, gender, migration status, and age will all influence how temporal inequalities may become salient for well-being (Bianchi et al., 2000; Clawson & Gerstel, 2014; Hochschild & Machung, 2012; Pinto & Ortiz, 2018; Sayer, 2005). I find some support for this. Age matters, with working-age individuals being particularly vulnerable when it comes to risking poor self-reported health. Race also has interesting effects. The relative risk ratio of being in poor health for Asian, Black, Hispanic or Mixed respondents is higher than the same is for White respondents. In Toronto, being a migrant also increases the expected risk of poor self-reported health. My qualitative work in this context shows that this could be due to migrants experiencing more frustrations and longer wait times as they learn how to navigate the Canadian healthcare system.

These results reinforce that when examining the mechanisms connecting SES and health, it is important to also incorporate research from time use studies. I build on the previous literature to show that time availability is a significant mediator between SES and health. My nationally representative data shows that approximately 12 percent of the effect of household-level SES on health is via discretionary time availability. My representative neighborhood-based models illustrate that over 10 percent of the effect of neighborhood-level SES on health is via subjective time scarcity. Objective time poverty mediates about 9 percent. As approximately 7 percent of the effect of SES on health is via objective time excess, both time scarcity and time excess are imperative to consider when studying the mechanisms linking SES and health. Time availability is a statistically significant mediator between SES and health for both genders.

7.1. Limitations

My study highlights multiple opportunities for further research. One rich area could be to examine the influence of other individual and neighborhood-level SES measures. To capture differing levels of the measurement while also ensuring that my measures are conceptually relevant and comparable, I follow the recommendations of other scholars in using neighborhood-level and household-level income as a proxy for SES (Coburn, 2000; Ensminger et al., 2003; Evans et al., 2012). However, there is a burgeoning body of work on the various ways in which SES could be assessed in different contexts. Future research should also examine how time availability may mediate the relationship between differing SES measures (such as occupation, family wealth, land ownership, educational attainment, etc.) and differing well-being measures (such as depression, sleep quality, or community participation). This is particularly important to do with populations living outside of North America or Western Europe. It is also important to continue refining the SES, well-being, and temporal measures to ensure that they represent the experiences and needs of vulnerable populations. A clear limitation of both of my datasets is that they are cross sectional. It is therefore difficult to ascertain causal mechanisms. In addition to collecting longitudinal data on the topic of time, SES, and well-being, data needs to be supplemented by qualitative research exploring how individuals, households, and communities make decisions when faced with time pressures or excesses. Longitudinal mixed-methods data on the topic of time availability could also illuminate how individuals: may oscillate between time excess and time scarcity over the life course; possibly occupy more than one temporal category at different times; how the changing needs of aging respondents may undergird time availability over time; and how the relationship between SES, time availability, and well-being may change over the life course.

8. Conclusion

Our understanding of how SES influences health remains incomplete without an examination of time availability. Time availability is an important mechanism though which SES shapes health outcomes. Carefully detailed time availability measures — and the ways in which they mediate the relationship between SES and self-reported health — tell us as much about SES-based social norms dictating how individuals spend their time, as they do about the formal systems of support in place to assist vulnerable populations, whether they are low-SES, or marginalized based on their migration status, race, or gender (Vickery, 1977; Adam et al., 2006; Harvey & Mukhopadhyay, 2007; Clawson & Gerstel, 2014; Bó & Dukhovnov, 2022).

This study contributes to the current literature in several ways. It is among the first to deploy mediation analysis to understand the health effects of time availability, and it does so by honoring the experiences and needs of both high-SES and low-SES individuals. It highlights how sociodemographic characteristics may enable or constrain time availability. My findings show that it is important to consider the resource and social experience of time for theoretical development on fundamental causes. The inclusion of both time excess and deficiency measures is crucial. Time availability is a significant pathway through which SES influences well-being. This work has important policy implications. Considering the differing temporal needs of marginalized populations, there is continued necessity for concurrent focus on time availability and health.

Author statement

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Declaration of competing interest

The author declares that they have no conflict of interest.

Data availability

MTUS is publicly available to academics.

Appendix

Table A1
Binary logistic regression relative risk ratios by time availability

Characteristics	TFH	TFH	TFH	CMTUS
Reference categories: not subjectively time poor, time balanced, not objectively time poor, High SES, good health, aged 18–24, female, white, non-migrant, single, no coresident children				
Intercept	0.075***	0.126***	0.101***	0.056***
Time Availability				
Discretionary time scarcity	–	–	–	1.582***

(*continued on next page*)

Table A1 (*continued*)

Characteristics	TFH	TFH	TFH	CMTUS
Subjective time scarcity	2.816***	2.887***	–	–
Objective time excess	3.710***	–	3.629***	–
Objective time poverty	1.626**	–	2.369***	–
Low SES	3.025***	3.012***	3.066***	3.292***
Age Group				
25-34	1.137	1.110	0.989	1.057
35-44	7.262***	6.712***	6.537***	1.872***
45-54	4.218***	3.810***	4.023***	2.143***
55-64	12.658***	14.620***	10.592***	2.145***
65-74	14.943***	16.043***	18.787***	1.146**
75+	3.120	2.340	2.920	1.315
Gender				
Male	1.527**	1.540**	1.505**	1.078
Non-Binary	1.870	1.793	3.581*	–
Race				
Black	1.904*	1.994*	2.501*	–
Asian	1.431	1.332	1.607*	–
Hispanic	2.794**	2.480**	3.210**	–
Mixed	6.090***	5.997***	6.412***	–
Migrant	0.366***	0.356***	0.349***	1.030
Marital Status				
Married	0.288***	0.253***	0.317***	–
Separated	0.783	0.624	0.793	–
Divorced	0.225***	0.171***	0.278***	–
Widowed	0.833	0.656	0.895	–
Living with Partner	–	–	–	0.899
Number of Coresident Children				
1	1.745*	2.198**	1.720*	0.846
2	1.635	1.655	1.785	0.795
3	0.947	1.074	1.014	0.865
4+	2.885*	3.561**	2.345*	0.786
AIC	1099.831	1129.171	1135.266	5883.674
Chi-Square	339.40***	307.06***	302.96***	469.44***

*.10 > p > .05; **.05 > p > .01; ***.01 > p.

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