



How does commuting influence time use and domain and life satisfaction? Evidence from dual-earner couples with school-age children in a small Chinese city

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ABSTRACT

Most evidence about commuting, and how it influences time use, domain satisfaction, and life satisfaction, comes from the individual level; very few studies have investigated this issue within a household. Using survey data collected from couples with school-age children in Ganyu (a small Chinese city), this paper explores how women and men schedule their time use around daily activities—including the commute—and how such time use contributes to different degrees of domain and life satisfaction. Results of our structural equation modeling showed that for men, longer commutes reduce the amount of time spent on leisure activities at home which in turn decreases life satisfaction. By contrast, longer commutes for women reduce the amount of time spent on household tasks, but such reduced time for household tasks does not impact satisfaction with household task allocation. In addition, intra-household interactions regarding time use were also found, which have implications for each spouse's satisfaction obtained in various domains and overall life. Moreover, we found no direct impact of commute time on commute satisfaction, which is related to short commute times and light traffic volumes in Ganyu. Our study suggests that policies aiming at enhancing individual subjective well-being should consider time use from both a household perspective and a cultural context.

1. Introduction

As an important dimension of everyday life, subjective well-being (SWB) has received increased attention during recent decades. SWB encompasses both the cognitive evaluation of one's life as well as emotional well-being (or how positive and negative emotions are experienced) (Diener et al., 1985). Usually, SWB refers to the level of satisfaction a person generally has with their life, but it also implicitly includes the level of satisfaction a person has within certain life domains such as work and travel. Commuting—the journey between home and work—is one of the most important out-of-home activities influencing an individual's SWB (Gerber et al., 2020; Olsson et al., 2013b; Zhu et al., 2019; Zhu et al., 2020). Longer commutes, or unpleasant commuting such as in crowded, noisy, or polluted circumstances, may lead to lower SWB. In particular, rush hour traffic during a commute also contributes to more stress and lowered travel satisfaction (Morris & Zhou, 2018; Stutzer & Frey, 2008). Moreover, longer commutes reduce the time available for other activities (e.g., leisure and social activities), which further deteriorates the quality of life and thus SWB (Hilbrecht et al.,

2014; Nie & Sousa-Poza, 2018).

However, the time used for commuting is not only decided by oneself but is also affected by other household members. This is because household members have to jointly allocate and distribute household-related activities; the time used by one household member for certain activities will therefore influence the time used for other household members (Ettema et al., 2007; Schwanen et al., 2007). In a household, it is possible that one partner works near the residential location and carries out most of the household maintenance activities, such as grocery shopping and taking children to and from school, while the other partner commutes for a longer distance and so returns home late. Such intra-household interactions should be considered in research on the relationship between commute, time use, and SWB.

As each household member is under different social, spatial, and resource constraints (Ho & Mulley, 2015; Mao & Wang, 2020), the mechanism between commuting and time use differs among different household members, which may also lead to different implications on SWB. However, most evidence is based on individual-level data; very little comes from the household level. It is unclear how time used by one

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individual is influenced by their partner, and how this contributes to different SWB for different household members. Also, the relationship between the commute, time use, and SWB may work differently in different contexts (e.g., a small Chinese city), which has not been thoroughly investigated. Using household-level survey data collected in Ganyu, a small Chinese city, this research aims to narrow this gap by investigating the impact of commute time on time use across other activities as well as the satisfaction obtained in those domains and overall life for women and men within a household. The research questions addressed in this paper are:

- 1) Within a household, how does commute time influence time used in other activities for women and men, and to what extent is one's time used in various activities influenced by their spouse?
- 2) To what extent does time used in various activities (including commuting) influence the satisfaction obtained in those domains and life overall, and to what extent does this differ between women and men?

Following this introduction, the next section first presents a literature review regarding the linkage between time use, commuting, and SWB. Section 3 presents our hypotheses and the conceptual framework used to guide the empirical analysis; then we illustrate the data collection process and present key variables and statistical models that were used in the analysis. Sections 4 and 5 present the results and the conclusion respectively.

2. Literature review

2.1. Commute, time use, domain satisfaction, and life satisfaction

Time is limited on weekdays and longer commutes suggest that less time is therefore available for other activities. Many studies found that longer commuting distances reduce the time spent on leisure activities outside of the home (Bhat & Misra, 1999; Hilbrecht et al., 2014; Morris et al., 2020). In particular, Besser et al. (2008) found that socially-oriented trips (e.g., visiting friends and recreational activities) were reduced for American people who commuted 90 min or more. However, longer commute times do not suggest less time for work, as the amount of time spent at work is influenced more by the rules of an institution and its employers. In fact, Hilbrecht et al. (2014) and Morris et al. (2020) showed that individuals with longer commute times tend to work longer hours on a weekday. This might come from the fact that workers, given the long commutes, have to maximize the outcome of work activities and thus work for a longer time.

Long-distance commuting results in more fatigue and lower commute satisfaction (Chatterjee et al., 2020; Olsson et al., 2013a; Stone & Schneider, 2016). In addition to the impact on commute satisfaction, commute time holds implications for the level of satisfaction with various domains (i.e., domain satisfaction). A longer commute time reduces the amount of time for other activities during a day, which influences people's experience and satisfaction with those activities. Many studies have indicated that longer commute distances are associated with lower satisfaction levels across various aspects of life including lower job satisfaction (Clark et al., 2020; Stone & Schneider, 2016; Zhu et al., 2019), lower leisure time satisfaction (Clark et al., 2020; Dickerson et al., 2014; Lorenz, 2018), and lower levels of satisfaction with family life (Lorenz, 2018).

Commute times also have an impact on life satisfaction directly or indirectly by way of time used or the satisfaction obtained in various activities. For example, Hilbrecht et al. (2014) found that individuals who spend more time commuting tend to spend less time on sports, which in turn contributes to lower levels of life satisfaction. Sun et al. (2020) found that longer commuters are less satisfied with their lives because long commutes lower levels of satisfaction with work and reduce individuals' social connection to other residents in their

community. However, these two studies found that, after controlling for indirect effects, commute times have no direct effect on overall life satisfaction. Nonetheless, Nie and Sousa-Poza (2018) found that, after controlling for the indirect effect of commute time on the time used in other domain activities, commute time still exerts a direct and negative effect on life satisfaction.

As a result, there is no consistent conclusion about whether longer commute times result in lower levels of life satisfaction. Some findings indicate that longer commuting distances or times were associated with lower life satisfaction, including studies in the US (Choi et al., 2013); China (Nie & Sousa-Poza, 2018; Sun et al., 2020; Zhu et al., 2019); the UK (Clark et al., 2020); Germany (Stutzer & Frey, 2008); and Canada (Hilbrecht et al., 2014). However, other studies found that there is no such relationship, including studies in the Netherlands (Kroesen, 2014); the UK (Dickerson et al., 2014); and Germany (Lorenz, 2018). While contextual differences between countries could explain disparities to a certain degree, contradictory findings may, more importantly, be related to the specific study samples, measurements, or methods used.

2.2. Commute, time use, and SWB within households

Within a multiple-member household, the time used for various activities of one household member is not only decided by oneself but is also affected by the time commitments of other household members, as is widely explored in various studies (Dharmowijoyo et al., 2017; Ettema & van der Lippe, 2009; Golob & McNally, 1997; Zhang et al., 2005). Such intra-household interactions regarding time use also have implications for an individual's SWB. For instance, more time spent on household maintenance activities by one member suggests less time spent on these activities for the other, which may consequently leave more time for that member's leisure activities (Ettema et al., 2007), and thus enhanced life satisfaction if more leisure activities are assumed to bring more happiness. Nonetheless, lower levels of life satisfaction are also possible, as that household member in this situation may be the breadwinner who spends more time working and commuting, which results in more fatigue and unhappiness. However, the extent to which intra-household interactions regarding time use play a role in the SWB of different household members has not been thoroughly analyzed.

As each household member is under different space-time constraints, a longer commute time may have different implications for different household members in terms of travel experiences and satisfaction. For long-distance commutes, women tend to experience more stress and have lower levels of commute satisfaction than men, as women's responsibilities for household tasks tend to be under time pressure (Novaco et al., 1991). This has also been evidenced in similar studies where the life satisfaction of women is more easily affected by commute time than that of men (Clark et al., 2020; Roberts et al., 2011; Wheatley, 2014).

Moreover, the interactions between time use, domain satisfaction, and life satisfaction may differ between women and men. As women tend to be burdened with household tasks and childcare activities, increased participation in various domains (e.g., out-of-home activities and leisure activities) could significantly increase the subjective well-being of women as evidenced by Sweet and Kanaroglou (2016). In addition, women's life satisfaction could more likely be affected by their satisfaction with the allocation of household tasks, as they tend to assume responsibilities for household tasks. In contrast, for men, as more time is spent working, their life satisfaction is more likely to be affected by time used and satisfaction with work-related activities.

2.3. Time use, travel, and SWB in small Chinese cities

In the household-level research on commuting and the amount of time used to participate in activities, most evidence comes from big Chinese cities such as Shenzhen (Cao & Chai, 2007), Nanjing (Feng et al., 2020), and Hong Kong (Lai et al., 2019); little attention has been

paid to smaller cities. Time use and travel patterns in small cities are quite different from big cities. Compared with big cities, small cities tend to exhibit reduced population density and traffic volume as well as shorter travel distances between places (Hu et al., 2018; Robertson, 2001). Consequently, less time is spent commuting for most small city residents. Compared with long-distance commuters in big Chinese cities, nearly 2 h could be saved per person per day due to shorter commutes in small Chinese cities (AutoNavi Map, 2018). With less time spent on commuting, more time becomes available for other pursuits such as various outdoor activities, visiting friends, and walking recreationally. Such a lifestyle suggests a satisfactory life in small cities. In fact, Chen et al. (2015) found that inhabitants of Chinese cities with populations ranging from 200,000 to 500,000 are more satisfied with their lives than inhabitants in other-sized cities. However, the nexus between time use for various activities and SWB has not been thoroughly investigated in the context of small Chinese cities.

In terms of resident travel behavior, electric bicycles (e-bikes) are popularly used in small Chinese cities (Hu et al., 2018). E-bikes are easy to drive, quicker than normal bicycles, and require less physical strength (Cherry & Cervero, 2007; Fishman & Cherry, 2016), which adequately meets the short-distance travel needs of most residents in small Chinese cities. However, most e-bikes in China are not pedal-assisted but are ridden and propelled via a hand-operated throttle (Hu et al., 2021). Consequently, e-bikes in China are not considered an active travel mode, the use of which does not result in a higher level of travel satisfaction compared to other travel modes (Ye & Titheridge, 2017; Zhu & Fan, 2018). Moreover, as the public transportation system is neither developed nor efficient, people tend to drive cars if they want to travel for longer distances. However, as traffic volume is lighter in smaller cities, residents who travel by car may not encounter serious traffic congestion or have a poor travel experience.

3. Methodology

3.1. Conceptual framework and hypotheses

For our study, we developed a conceptual framework based on the multiple relationships between time use, domain satisfaction, and life

satisfaction (Fig. 1). Our conceptual framework illustrates how the amount of time used by one spouse in various activities is impacted by the other spouse; how the time spent in one activity influences that of another; and how time used in various domains influences the level of satisfaction with those domains, which finally impacts overall life satisfaction. As commutes and work activities—which we focus on—usually occur on weekdays, the relationship between time use, domain satisfaction, and life satisfaction was explored on weekdays accordingly. However, the aforementioned dynamic occurs differently outside of the weekdays (e.g., weekends). Some couples for example may change the allocation of household tasks when work and commute constraints are absent.

For a spouse's impact, it is assumed that the time used for work, commuting, childcare, and household tasks of one household member is affected by their spouse, as these activities are more important and involve intra-household interactions. In addition, we also assumed that the time used for work, commuting, childcare, and the household tasks of one's spouse also impacts the other spouse's time spent on discretionary activities (e.g., at-home leisure, eating out, out-of-home leisure). For time use from a personal perspective, it is assumed that work and commute decisions as well as household task decisions take primacy and so influence the time used for discretionary activities. As we focus on the commute and its related activities (i.e., working), it is assumed that the time spent on commuting and work has a direct impact on the time spent on childcare and household tasks, although the reverse is also possible. Moreover, we assumed that the time used in each activity has a direct impact on the level of domain satisfaction for that activity, which in turn influences overall life satisfaction. Due to the limited number of possible questions in the questionnaire, we did not ask about recreational activity satisfaction (i.e., the level of satisfaction with eating out socially, indoor leisure activities at home, and out-of-home leisure activities); we therefore assumed that recreational activity time use has a direct impact on life satisfaction. For commute satisfaction, in addition to the direct impact of commute time, the indirect impact of commute time on commute satisfaction via commute mode choice was also assumed in the framework, as commute mode choice tends to be correlated with commute time.

Finally, we assumed that one's time use, domain satisfaction, and life

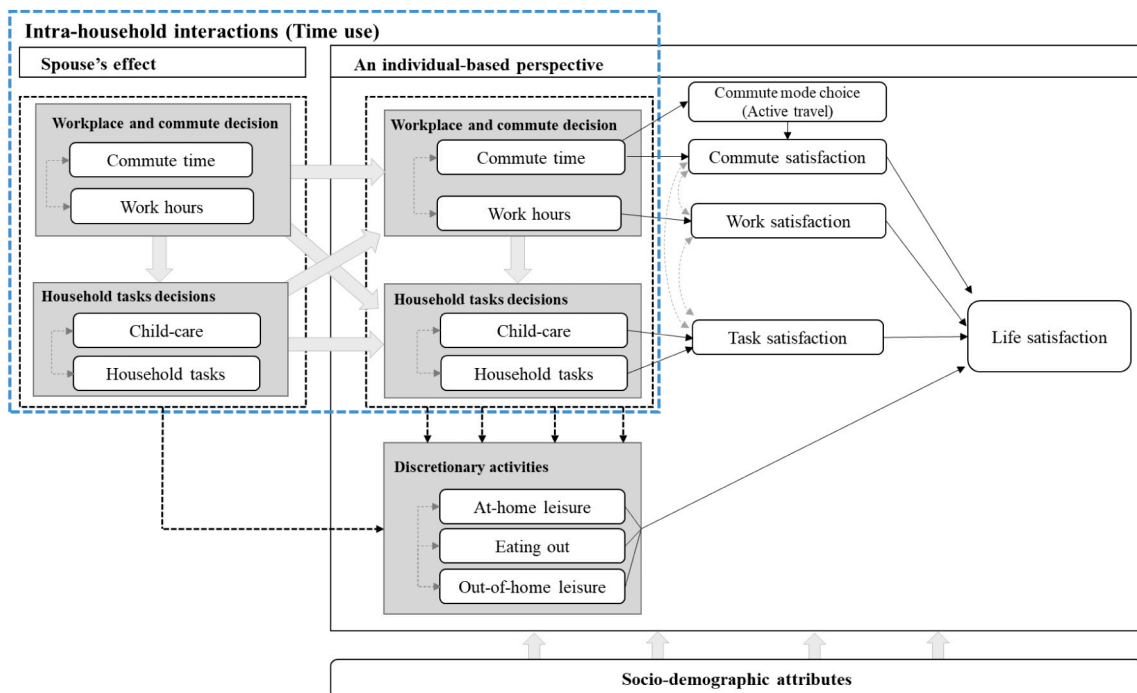


Fig. 1. Conceptual framework regarding time use, domain satisfaction, and life satisfaction.

satisfaction are impacted by socio-demographic attributes. For example, as our research derives from the Chinese context, we considered extended households where couples co-reside with elderly parents, as this has been observed to impact the time used in various activities within the household (Feng et al., 2013; Feng et al., 2020; Ta et al., 2019).

3.2. Data

Our study focused on Ganyu, a small Chinese city. The city of Ganyu covers an area of <100 km² and holds about 200,000 inhabitants. The residential areas of the city mainly consist of two parts: a centrally located old city with high commercial and population density, and more mixed land uses, and a new city in the eastern part with wider roads and high-rise buildings. Land use characteristics in those areas can be found in more detail in Hu et al. (2022). As it is very hard to simultaneously approach both spouses for data collection, a survey via local schools was initiated as a starting point where students' parents were invited to participate. In order to make sure respondents came from different geographical residences and within various age groups, four schools in Ganyu were contacted for the survey, including primary and junior high schools in both the old and new cities. Junior high school students are roughly 12–15 years old, while primary school students are generally 6–12 years old. It is important to mention that data collection was restricted to parents with children and therefore does not include elderly couples or those without children. While this is a limitation of our research, it nevertheless provides extra insights regarding time use and the well-being of a particular group—couples with school-age children.

During the survey, each student was sent home with an envelope containing two copies of the questionnaire: one copy each for the student's father and mother respectively. The details of our survey process can also be found in Hu et al. (2022). In December 2019, 2372 envelopes were distributed via four schools of which 1325 were valid responses (a 55.9 % valid response rate). After data cleaning, the information obtained from 987 dual-earner couples (987 *2 = 1974 respondents) was used in this study. As there are no same-sex households in our sample, the analysis of women and men also denotes wives and husbands respectively.

3.3. Key variables

3.3.1. Socio-demographic characteristics

Regarding socio-demographic attributes (Table 1), 58.5 % of couples have the same level of education; couples where men with higher levels of education than their partners (women) account for 23.4 %, while couples with the reversed condition only account for 18.1 %. In addition, among nearly half of all couples (47.8 %), women's income level is lower than men's; for a similar percentage of couples (46.9 %), men and women have roughly equal incomes; only among 5.3 % of couples, women's income is higher than that of men. We also found that 34.1 % of couples live with their elderly parents. Concerning commute mode choice, about two-thirds of men commute by car, while roughly one-fifth of men choose an e-bike. The condition is reversed for women: 63.2 % use an e-bike while 23.1 % use a car. Very few people commute on foot or by bicycle. Other travel modes (e.g., transit bus, company shuttle bus, and motorbike) are seldom used, and together account for 7.8 % and 10.4 % of commute trips for women and men respectively.

3.3.2. Time use

Survey questions regarding the amount of time spent in different activities were formulated in five categories: 1) Childcare (e.g., feeding; playing; washing; dressing; reading; dropping off; and helping with homework); 2) household tasks (e.g., cooking; setting the table; cleaning; washing; ironing; and grocery shopping); 3) eating out socially (e.g., eating out with friends and colleagues); 4) indoor leisure activities at home (e.g., watching TV; playing games or cards); and 5) out-of-home

Table 1
Socio-demographic characteristics and commute mode choice for women and men.

Variable name	Definition	Women %/mean (SD)	Men %/mean (SD)
Commute mode choice			
Foot/bike	Walking or riding a bicycle	5.9	5.2
E-bike	Riding an electric bicycle	63.2	22.2
Car	Commuting by car, either driving or as a passenger	23.1	62.2
Other	Other includes motorcycle, company shuttle bus, and transit bus	7.8	10.4
Age		38.5 (5.2)	39.6 (5.3)
Education			
Low	Individual's level of education is lower than his/her partner's	23.4	18.1
Equal	Individual's level of education is equal to his/her partner's	58.5	58.5
High	Individual's level of education is higher than his/her partner's	18.1	23.4
Income			
Low	Individual's annual income is lower than his/her partner's	47.8	5.3
Equal	Individual's annual income is equal to his/her partner's	46.9	46.9
High	Individual's annual income is high than his/her partner's	5.3	47.8
Age of the youngest child within the household		8.9 (4.0)	
Household type			
Extended household	Couples live together with their elderly parents	34.1	
Nuclear household	Couples do not live together with their elderly parents	65.9	

SD: standard deviation.

leisure activities (e.g., visiting friends; recreational shopping or walking). For each type of daily activity, we asked respondents how much time was spent, on average, during a weekday. It was assumed that time use on weekdays had a major impact on domain satisfaction and overall life satisfaction, as time used on weekdays accounted for a large part of a whole week for dual-earner couples. As it was generally difficult for respondents to calculate the exact hours spent on each activity, we created six categories to choose from, including the following: 1) Never; 2) 0.01–0.5 h/day; 3) 0.51–1 h/day; 4) 1.01–2 h/day; 5) 2.01–3 h/day; and 6) >3 h/day. This reduced the burden on respondents and enhanced the response rate. In addition, we asked the specific number of hours each respondent spent working. As the commute mode choice as well as work and residential locations were provided by the respondents, Gaode Map (i.e., AutoNavi Map) was used to calculate how much time was spent on commuting from a place of residence to work. The calculation period was set on morning rush hour conditions during a weekday. This commute time calculation also considered traffic conditions from their place of residence to the workplace such as congestion and wait times for traffic lights, which could therefore accurately reflect the amount of time required for the trip.

3.3.3. Domain satisfaction

Domain satisfaction refers to the extent to which an individual is satisfied with the activity in a particular domain, including work satisfaction, commute satisfaction, and satisfaction with household task

allocation. We used a rating scale—ranging from ‘Extremely dissatisfied’ to ‘Extremely satisfied’— to ask the following questions related to work satisfaction and household task allocation satisfaction respectively: 1) To what extent are you satisfied with your current pattern of household task allocation?; and 2) to what extent are you satisfied with your current work situation? Commute satisfaction was measured with the use of the Satisfaction with Travel Scale (STS), which has been widely used in the field of transport research (De Vos et al., 2016; Ettema et al., 2012). STS contains nine items, including six items measuring affective emotion and as well as three items measuring cognitive evaluation (Table 2). Affective emotion can be measured from two dimensions: activation and valence. Activation denotes the extent to which an individual is stimulated by environmental cues, ranging from de-activated to activated; valence refers to the extent of pleasure a person experiences, ranging from negative to positive (De Vos et al., 2015; Ettema et al., 2011; Ettema et al., 2013). Based on the combination of these two dimensions, an individual’s affective emotion ranges from: (1) negative de-activation (e.g., tired) to positive activation (e.g., alert); and (2) from negative activation (e.g., worried) to positive de-activation (e.g., calm).

Cronbach’s alpha in our study also showed good reliability within each STS dimension, with 0.87 for positive-activation, 0.81 for positive-deactivation, and 0.85 for cognitive evaluation for women, and 0.89, 0.82, and 0.89 as counterparts for men. We averaged the three scores to represent the value of each STS dimension, which were also further used as indicators to create the latent variable ‘Commute satisfaction’ (Appendix 1).

3.3.4. Life satisfaction

The Satisfaction With Life Scale (SWLS) was used to measure how satisfied people were with their daily lives (Diener et al., 1985). Respondents were asked their level of agreement with a set of statements based on a seven-point scale which ranged from 1 (Strongly disagree) to 7 (Strongly agree). The statements included the following: 1) In most ways, my life is close to my ideal; 2) the conditions of my life are excellent; 3) I am satisfied with my life; 4) so far, I have gotten the important things I want in life; and 5) if I could live my life over, I would change almost nothing. Cronbach’s alpha shows good consistency across all items (0.88 for women and 0.90 for men). With these indicators, the latent variable ‘Life satisfaction’ was created to measure life satisfaction for women and men respectively (Appendix 2).

3.4. Structural Equation Model

A SEM (Structural Equation Model) was used to estimate the multiple relationships between time use, domain satisfaction, and life satisfaction within our conceptual framework (Fig. 1) for women and men separately. As some variables do not follow the normal distribution, the bootstrapping procedure was used in M-plus (Muthén & Muthén, 2017). Relevant variables were put in the model, including those related to

Table 2
Satisfaction with Travel Scale (seven-point scale): endpoints of the scale.

<i>Negative de-activation – Positive activation</i>	
Very bored (–3)	Very enthusiastic (3)
Very tired (–3)	Very excited/alert (3)
Very fed up (–3)	Very engaged (3)
<i>Negative activation – Positive de-activation</i>	
Very stressed (–3)	Very calm (3)
Very hurried (–3)	Very relaxed (3)
Very worried (–3)	Very confident (3)
<i>Cognitive evaluation</i>	
My trip was the worst I can imagine (–3)	My trip was the best I can imagine (3)
My trip was low standard (–3)	My trip was high standard (3)
My trip worked very poorly (–3)	My trip worked very well (3)

socio-demographics (age; education; income; age of the youngest child; and extended household); commute mode choice (whether choosing an active travel mode or not); time use in different activities; domain satisfaction; and life satisfaction. To reduce the burden of modeling, the categorical variables of time use were converted to continuous variables. Except for the first and last categories, the middle value of each category was used to represent the value of each category whereby ‘0.01–0.5 h’ was converted to ‘0.25 h’; ‘0.51–1 h’ was converted to ‘0.75 h’; ‘1.01–2 h’ was converted to ‘1.5 h’; and ‘2.01–3 h’ was converted to ‘2.5 h.’ The time used for ‘Never’ was considered to be ‘0’ hours spent on an activity. For the category ‘>3 h,’ it was difficult to determine how many hours were spent on an activity. We assumed that ‘3.5 h’ represents this category, as there was not much time remaining when the time for necessary activities was excluded (e.g., eating; sleeping; commuting; and working) on a weekday.

4. Results

4.1. Descriptive analysis

For commutes, the average one-trip commute time in our sample was 12.3 min and 14.9 min for women and men respectively, indicating short commute durations in Ganyu. Moreover, men worked longer hours than women each day (8.7 h on average versus 8.2 respectively). Compared to men, women tended to spend more time on childcare and household tasks. As shown in Fig. 2, 34.5 % of women spent more than 3 h on childcare activities versus 8.2 % of men. In addition, 74.8 % of women spent more than 1 h on household tasks while most men (73.4 %) did not. The distributions of time spent on leisure-related activities (at-home leisure; out-of-home leisure) for women and men were fairly similar; most did not spend more than 1 h on these activities.

For commute satisfaction (Table 3), men have a higher positive activation score but a lower score in the positive de-activation of STS compared to women. There is no significant difference in cognitive evaluation between women and men. Compared with men, women are less satisfied with the household task allocation pattern but are slightly more satisfied with their work. This is possibly because people who spend longer amounts of time on certain activities tend to carry higher levels of responsibility, and are more easily stressed and fatigued, which lowers activity satisfaction. Specifically, as women spend more time on household work and childcare, but less time on work activities than men, women tend to have lower satisfaction levels with household tasks but not with work activities than men. For life satisfaction, there is no significant difference between women and men in terms of each statement except the last.

4.2. Modeling results

As SEM was run for women and men respectively, we illustrate the modeling result for each. Specifically, for each modeling result, we first describe the impact of socio-demographic attributes on time use, domain satisfaction, and life satisfaction and then illustrate the relationship between time use, domain satisfaction, and life satisfaction. According to the goodness-of-fit measures (Chi-square/df < 5, RMSEA (Root mean square error of approximation) < 0.08, and CFI (Comparative fit index) > 0.9) (Mokhtarian & Ory, 2009), both model specifications for women and men fit the data well (Chi-square/df = 2.51, RMSEA = 0.039, and CFI = 0.95 for women; and Chi-square/df = 3.03, RMSEA = 0.045, and CFI = 0.94 for men).

4.2.1. Women

With an increase in age, women tend to spend more time on household tasks, but less time on eating out and at-home/out-of-home leisure activities (Table 4). This is possibly due to differences in cooking and eating behaviors between people of various ages, where younger people are less inclined to cook at home, but tend to order food online or

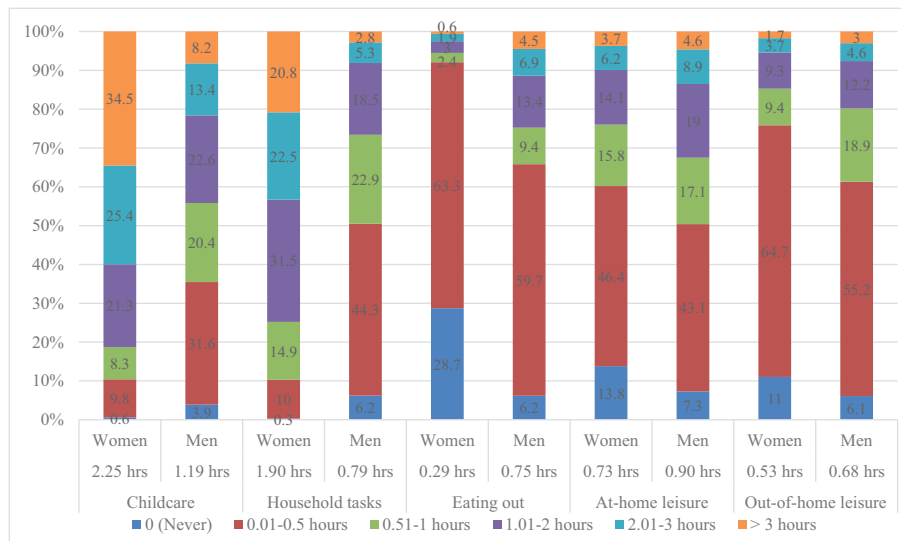


Fig. 2. Distribution of respondents in terms of time use across different activities. (The number below “women” and “men” in each column denotes the average hours spent on each activity calculated by the methods outlined in Section 3.4.)

Table 3 Differences in domain and life satisfaction between women and men.

	Min/ max	Women (mean/std. dev.)	Men (mean/std. dev.)	Difference (women-men)
Commute satisfaction				
Positive activation	-3/3	0.49 (0.91)	0.42 (0.90)	0.07*
Positive de-activation	-3/3	0.22 (1.30)	0.47 (1.26)	-0.25***
Cognitive evaluation	-3/3	0.79 (0.83)	0.77 (0.87)	0.03
Work satisfaction	1/7	4.95 (1.13)	4.87 (1.14)	0.08*
Satisfaction with household task allocation	1/7	4.66 (1.40)	5.28 (1.14)	-0.62***
Life satisfaction				
Statement 1	1/7	4.36 (1.36)	4.42 (1.33)	-0.06
Statement 2	1/7	4.67 (1.21)	4.64 (1.23)	0.04
Statement 3	1/7	4.71 (1.25)	4.64 (1.26)	0.07
Statement 4	1/7	4.41 (1.30)	4.33 (1.33)	0.08
Statement 5	1/7	3.48 (1.62)	3.61 (1.63)	-0.13**

*** Significant at <0.01 by paired sample t-test (two-tailed).

** Significant at <0.05 by paired sample t-test (two-tailed).

* Significant at <0.1 by paired sample t-test (two-tailed).

eat out, resulting in less time spent on household tasks as well as more time available for eating out and leisure activities. Also, women tend to spend more time on commuting, household tasks, and childcare if their level of education is higher than their spouses'. This is possibly because women with more advanced education degrees tend to attach great importance to children's education and nurture, and thus spend more time on household tasks and childcare activities (England & Srivastava, 2013). In addition, women with higher education degrees tend to commute for longer durations, suggesting that those highly educated women tend to work far away from their residences. Moreover, women tend to spend more time on working activities, but less time on household tasks, if their income is equal to or higher than their partners'. This suggests that if women have a higher economic status, they tend to work relatively more and account for less of the household tasks, which is consistent with previous research (Ettema & van der Lippe, 2009). The age of the youngest child within a household influences time use for women. With an increase in the age of the youngest child, women tend to spend more time on working and (at/out-of-home) leisure activities, but less time on childcare. This is mainly because women could be

relieved from childcare activities and thus spend more time on working and leisure activities when their youngest child has grown up. In addition, the household structure also influences the time use for women. Women in the extended household tend to spend more time on commute and working activities, but less time on household tasks and childcare activities. This is mainly because the presence of the elderly within an extended household reduces the burden of household tasks and childcare, which makes more time available for working and commuting for women (Feng et al., 2013; Feng et al., 2020; Ta et al., 2019).

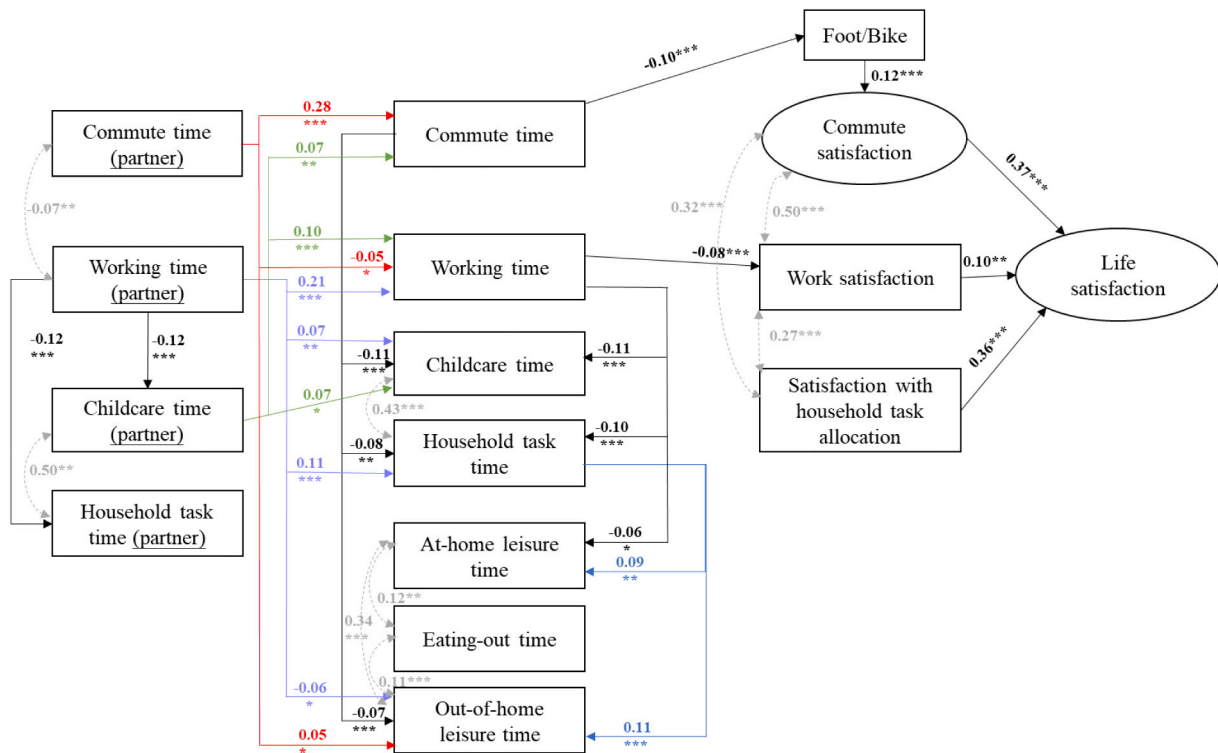
For satisfaction with various domains and overall life, women with higher levels of education than their partners tend to have a lower level of commute satisfaction, satisfaction with household task allocation, and life satisfaction. This is possibly because men with lower levels of education do not meet women's traditional expectation that male partners should have equal or higher levels of education than female partners, and this makes them unhappy across various domains. Moreover, women with higher incomes within a household tend to have a higher level of work satisfaction, which is possibly because high-salary jobs tend to be more interesting and satisfying. Also, women are more satisfied with household task allocation patterns but less with their work and life domains when the youngest child grows up. The potential reason is that women are less burdened with household tasks and thus are more satisfied with their household task allocation after the children have grown up. However, women in this situation spend more time on work, which contributes to a lower level of work satisfaction and life satisfaction as more time spent on work activities results in more fatigue and makes people less happy.

In terms of partner impact: commute times of women were positively associated with that of their partners'; the same tendency also occurs for the time spent at work (Fig. 3). This suggests that dual-earner couples have a tendency to spend commute and work activity time similarly; here the commuting aspect is consistent with another empirical study among dual-earner couples in America (Plaut, 2006). Also, women tend to spend more time on childcare and household tasks, but less time on out-of-home leisure activities if their partners work longer hours. This reflects a trade-off in various activities within a household, where more time spent on work for men suggests less time spent on childcare and household tasks, which makes their partners (women) assume primary responsibility for household maintenance activities. In addition, women tend to spend more time on childcare activities, if their partners are also involved more in these activities. This is possibly because couples tend to share childcare activities; where one partner spends some time on

Table 4
Standardized effects of socio-demographics on time use, mode choice, and satisfaction (women).

To	From						
	Age	Education (high)	Education (equal)	Income (high)	Income (equal)	Age of the youngest child	Extended household
<i>Time use</i>							
Commute	-0.01	0.07*	0.06*	0.02	0.08**	-0.02	0.12***
Working	-0.02	-0.03	-0.05	0.11***	0.06*	0.11***	0.06*
Household tasks	0.11***	0.09**	0.05	-0.07**	-0.12***	-0.02	-0.14***
Childcare	0.00	0.11***	0.07*	0.03	-0.06*	-0.27***	-0.06**
Eating out	-0.12***	-0.03	-0.08*	0.06	0.06*	0.03	-0.04
At-home leisure	-0.12***	0.00	-0.05	-0.01	-0.01	0.09**	0.01
Out-of-home leisure	-0.07*	0.05	-0.04	-0.05**	0.04	0.09**	-0.02
<i>Domain satisfaction and life satisfaction</i>							
Commute satisfaction	-0.01	-0.11**	-0.08*	-0.03	-0.01	0.04	-0.02
Work satisfaction	0.02	-0.04	0.00	0.06*	0.02	-0.07*	-0.02
Satisfaction with household task allocation	-0.05	-0.1**	-0.04	0.00	0.00	0.09**	-0.03
Life satisfaction	0.00	-0.12***	-0.04	0.01	-0.02	-0.07**	-0.04
<i>Commute mode choice</i>							
Active travel	0.09**	0.03	0.04	-0.06***	0.00	-0.01	-0.02

Significant-level denotation: * < 0.1, ** < 0.05, *** < 0.01.



Women

* significant at < 0.1; ** significant at < 0.05; *** significant at < 0.01

Path arrows with coefficients not significant at 0.1 level were not shown

Bootstrap = 1000

Fig. 3. Standardized effects in SEM for women.

feeding, washing, and dressing activities, while the other takes care of playing, reading, dropping off, and helping with homework. Such a division of childcare duties is possible and realistic for this particular

group—dual-earner couples with school-aged children—as they have to juggle childcare and careers.

For time used across various activities, longer working times are

significantly associated with less time spent on childcare, household tasks, and at-home leisure activities for women. A similar tendency also occurs for commute times, where more time spent on commuting significantly reduces the time spent on childcare, household tasks, and out-home leisure activities. This is understandable as more time spent on work and commuting reduces the time available for other activities such as household tasks, childcare, and leisure activities. Also, the amount of time spent on household tasks is positively correlated with the time spent on both at-home leisure and out-of-home leisure activities, which is difficult to explain. One possible reason is that women tend to schedule household tasks and leisure activities together, where less time spent on working and commuting suggests more time is available for both household tasks and leisure activities.

In terms of the relationship between time use and satisfaction, we found that work time has a direct and negative impact on work satisfaction, as longer working hours result in more fatigue and thus lowered work satisfaction. Moreover, commute time does not significantly impact commute satisfaction. One potential reason is the short commute times in our research area—12.3 min per one commute trip for women in our sample—which are unlikely to negatively impact commute satisfaction. Also, the non-significant impact of household tasks and childcare was also found on the satisfaction with household task allocation, which is possibly because women may be used to and do not tend to be unsatisfied with the current pattern of household task allocation, even if more time is spent on those activities. In addition, women who choose active travel modes (e.g., walking and cycling) tend to have a higher level of travel satisfaction, which is consistent with previous studies (Ettema et al., 2016; St-Louis et al., 2014).

In terms of the relationship between satisfaction with domain activities and life satisfaction, life satisfaction is mostly influenced by commute satisfaction, followed by satisfaction with household task allocation and work satisfaction for women. It is difficult to explain why commute satisfaction matters more for life satisfaction than work satisfaction, as time spent on commuting is less than that on work. One potential reason relates to how satisfaction with those activities is measured in this research: commute satisfaction is measured by the STS with nine items measuring both affective emotions as well as cognition evaluation, which is more likely to share the same variation with that of life satisfaction (Satisfaction With Life Scale) with five items. By contrast, one question used to measure work satisfaction may lose some information, which results in a smaller impact on life satisfaction than commute satisfaction does.

4.2.2. Men

With an increase in age, men tend to spend less time on commuting, working, eating out, and on leisure activities (at-/out-of-home), but more time on household tasks (Table 5). This is possibly related to differences in cooking and eating behavior, which have been illustrated in the above analysis of women. Men with higher levels of education than their partners tend to spend more time on the commute, but less time on working. This is mainly because highly educated men tend to work in a place far from home, resulting in longer commute durations. In addition, men with higher levels of education than their spouses tend not to work longer hours. One potential reason is that most of the individuals with higher education are employed as knowledge-intensive workers, which requires fewer working hours in small cities than other types of work (e.g., labor-intensive work). Men with higher incomes than their spouses spend more time on work activities, but less on household tasks. In addition, with the increase in the age of the youngest child, men tend to spend more time on working as well as at-home leisure activities, but less time on household tasks and childcare activities. This is understandable: men are relieved from the burden of household tasks and childcare and thus can spend more time on working and leisure activities as their youngest child grows up. Also, men in an extended household tend to spend less time on commuting, household tasks, and childcare. This is mainly due to the presence of elderly parents within the household who help with childcare and household tasks, which reduces the burden of those activities on men.

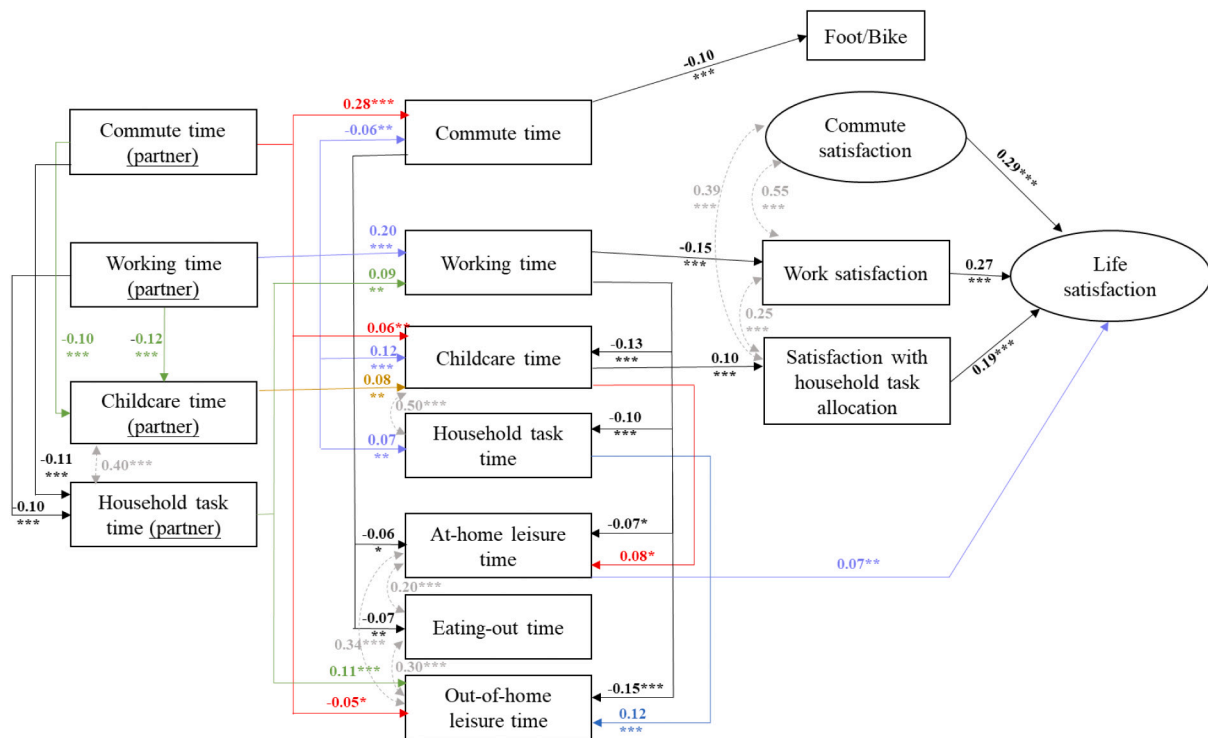
For domain satisfaction and life satisfaction, with an increase in age, men are more satisfied with their life. This is possibly because, with the increase in age, men tend to have more achievement in terms of various aspects such as career, wealth, and social network, and thus tend to be more satisfied with their life. In addition, men with higher income than their partners are more satisfied with their commute and work, which suggests that higher salaries bring more happiness to the work and even the trips to the workplace. Another explanation here is that high-salary jobs tend to be more interesting, making people more satisfied with these work activities and the trips to the workplace. Also, men are less satisfied with their work when the youngest child grows up. This is possibly because men tend to spend more time on work activities, which contributes to more fatigue and unhappiness.

For the partner's impact, commute times for both spouses are positively correlated; the same tendency also occurs for the time spent at work (Fig. 4). Men tend to spend more time on childcare or household task activities if their partners (women) commute or work for a longer

Table 5
Standardized effects of socio-demographics on time use, mode choice, and satisfaction (men).

To	From						
	Age	Education (high)	Education (equal)	Income (high)	Income (equal)	Age of the youngest child	Extended household
<i>Time use</i>							
Commute	-0.07*	0.10**	0.09***	-0.07	-0.01	-0.05	-0.06**
Working	-0.17***	-0.08*	-0.02	0.20***	0.15**	0.12***	0.05
Household tasks	0.15***	0.04	0.05	-0.12*	-0.08	-0.09**	-0.06*
Childcare	-0.05	0.02	0.06	-0.12	-0.04	-0.08**	-0.09***
Eating out	-0.13***	0.03	-0.01	-0.01	-0.04	0.01	0.00
At-home leisure	-0.11***	-0.01	0.01	0.09	0.08	0.09**	0.01
Out-of-home leisure	-0.09**	-0.04	-0.01	-0.10	-0.13	0.03	-0.04
<i>Domain satisfaction and life satisfaction</i>							
Commute satisfaction	0.06	0.05	0.00	0.19**	0.08	-0.05	-0.04
Work satisfaction	0.04	0.01	0.03	0.17*	0.07	-0.09**	-0.01
Satisfaction with household task allocation	0.02	-0.03	0.00	0.08	0.01	0.01	0.03
Life satisfaction	0.06*	0.02	0.01	-0.08	-0.05	-0.03	-0.03
<i>Commute mode choice</i>							
Active travel	0.14***	0.04	0.06*	0.10*	0.04	-0.02	0.00

Significant-level denotation: * < 0.1, ** < 0.05, *** < 0.01.



Men

* significant at < 0.1; ** significant at < 0.05; *** significant at < 0.01

Path arrows with coefficients not significant at 0.1 level were not shown

Bootstrap = 1000

Fig. 4. Standardized effects in SEM for men.

time. This is mainly because longer commutes or working times for women reduced the time available for childcare or household tasks, which makes their partners (men) spend more time on these activities. Also, men tend to spend more time on out-of-home leisure activities if their partners (women) spend more time on household tasks. This is understandable, as more household tasks completed by women make men less burdened with these activities and thus have more time available for out-of-home leisure activities. Moreover, time spent on childcare is positively correlated with each other between couples.

For time used across various activities, longer commute times significantly reduced time for at-home leisure and eating out¹; longer working hours significantly reduced the time for childcare, household tasks, and out-of-home leisure activities. This is understandable, as more time spent on working or commuting significantly reduces the time for other activities, due to limited total available time in one day. In addition, similar to women, the time spent on household tasks and out-of-home leisure activities for men is positively correlated, which is possibly because men tend to schedule time for household tasks as well as out-of-home leisure activities together.

For time use, domain satisfaction, and life satisfaction, commute time does not have a direct impact on commute satisfaction. By contrast, commute time has an indirect impact on life satisfaction via at-home leisure time, where longer commute time reduces the time available for at-home leisure activities and thus results in a lower level of life

satisfaction. This is understandable as more leisure activities make people feel relaxed and happier (Newman et al., 2014; Tinsley & Eldredge, 1995). In addition, as expected, working time exerts a negative impact on work satisfaction. Also, men are more satisfied with the allocation of household tasks if they spend more time on childcare. One potential explanation: men spend more leisure time with their children—such as playing together—which enhances their degree of satisfaction with the allocation of household tasks. For the relationship between satisfaction with domain activities and life satisfaction, life satisfaction for men is mostly influenced by commute satisfaction followed by work satisfaction and satisfaction with household task allocation.

5. Conclusion and discussion

As part of the household scheduling process, time used in various activities (including the commute) plays an important role in SWB. Our research, based on household-level data collected in Ganyu, China, explores how time used in various activities by one individual is influenced by partnerships, and how this contributes to different degrees of satisfaction with various domains and overall life. We also investigated the extent to which the mechanism between time use, domain satisfaction, and life satisfaction differs between women and men.

This research provides insights into the characteristics of the time used in various activities within dual-earner couples in a specific context: a small Chinese city. According to the descriptive analysis, we found differences between couples in Ganyu regarding time use: women spend more time on household tasks compared to men, while men in

¹ Here, “eating out” refers to eating out socially, where people get together to have lunch, dinner, or a drink in Chinese context.

turn spend more time on commuting and work activities than women. Both women and men spend more time on childcare but less time on leisure-related activities, compared with time spent on other activities. In addition, co-residence with elderly parents significantly reduces the couples' burden of household tasks and childcare, which is consistent with previous research (Feng et al., 2013; Feng et al., 2020; Ta et al., 2019).

Intra-household interactions regarding time use also have implications for satisfaction obtained in various domains and overall life. A household member tends to work for a longer time, and thus has a lower level of work satisfaction and life satisfaction, if their partner tends to work for a long time or spends more time on household tasks or childcare. In addition, men tend to spend more time on childcare and are more satisfied with household task allocation if their partners (women) spend more time on childcare or the commute. Moreover, men tend to spend more time on out-of-home leisure activities if their partners (women) are involved in more household tasks, although increased time on out-of-home leisure activities does not contribute to a higher level of life satisfaction.

The mechanism between time used in various activities and satisfaction obtained with those activities and overall life differs between women and men. SEM results showed longer commute times reduce the time spent on childcare and household tasks for women, but reduced time in those activities does not significantly enhance the degree of satisfaction with household task allocation. This is possibly because women are used to the current household task allocation pattern, and their satisfaction regarding this could hardly change, even though they spend more or less time on these activities. By contrast, longer commute times make men spend less time on leisure activities at home which in turn decreases life satisfaction. Also, we found that women tend to choose active travel modes if shorter times are required for commute, which consequently enhances commute satisfaction and thus life satisfaction. This is in line with previous research which showed that an active travel mode contributes to the highest level of travel satisfaction (Ettema et al., 2016; St-Louis et al., 2014). However, we did not find such an impact on men. This is mainly because most men who do not use an active travel mode in our study tend to commute by car in a small Chinese city context with no serious traffic congestion; this context does not therefore consequently contribute to a significantly lower level of travel satisfaction than traveling by foot or bicycle. In addition, we found that the relationship between domain satisfaction and life satisfaction differs between women and men. Life satisfaction for women is mainly influenced by satisfaction with household task allocation and less by work satisfaction. Conversely, life satisfaction for men is mainly influenced by work satisfaction and less by satisfaction with household task allocation. Such gendered differences between women and men might come from the different lengths of time spent on those activities. In particular, spending a long time on household tasks means that life satisfaction for women is more easily affected by satisfaction with household task allocation while longer amounts of time spent on work activities means that life satisfaction for men is more easily affected by work satisfaction.

We also found that commute time does not have a significant impact on commute satisfaction, although commute satisfaction has a significant and direct impact on life satisfaction. At least for men, commute time mainly influences life satisfaction indirectly by way of the time used in other activities. This is aligned with most studies (Clark et al., 2020; Hilbrecht et al., 2014; Sun et al., 2020) where commute time mainly influences life satisfaction indirectly through time use and the level of satisfaction with those activities. The non-significant impact of the commute time on commute satisfaction may be related to the short commute time and light traffic volume in local areas. In our sample, the average commute time for one trip is approximately 12.3 min for women and 14.9 min for men, which could hardly harm commute satisfaction in the context of smaller Chinese cities, where traffic volume is lighter and congestion is less severe. Moreover, the limited impact of commute time

on commute satisfaction compels us to reflect on the differences between big and small Chinese cities. In smaller cities, less time spent on commuting may limit its impact on the time used in other activities and SWB. As time spent on work still accounts for a significant part of a work day, it is more appropriate to consider both commute time and work time as a package to explore the relationship between time use, domain satisfaction, and life satisfaction in smaller Chinese cities.

Our study suggests that policies aimed at enhancing SWB in small Chinese cities should consider intra-household interactions regarding time use. Due to intra-household interactions, one household member's time use adjustment could not only impact satisfaction in a specific domain, it could even exert an impact on the time use of the other household member. Findings in this research suggest that less time spent on work not only enhances one's work satisfaction but also makes one's partner spend less time on household tasks, although time used on household tasks does not significantly influence satisfaction with the household task allocation pattern. Hence, achieving a balance between household tasks and working time not only benefits one household member but also benefits their partner. In addition, different mechanisms by gender in terms of time use and well-being should also be considered in policymaking. For women, increasing satisfaction with household task allocation is equally important to improving travel satisfaction when it comes to enhancing life satisfaction. In contrast, reducing the amount of working time and increasing work satisfaction are key to enhancing life satisfaction for men. Moreover, reducing travel time also matters for enhancing life satisfaction for both women and men, but it works in different ways. Based on the results of the pathway between time use, domain satisfaction, and life satisfaction in our models, reducing travel time and encouraging walking and cycling is the key to enhancing commute satisfaction and life satisfaction for women, while reducing commute time and making more time available for at-home leisure activities is the key for enhancing life satisfaction for men. These aims could be realized by retaining compact land-use planning practices and the creation of a more walkable and cyclable environment.

Our research has some limitations. The data used in our research are restricted to couples with school-age children which might not reflect travel patterns and life satisfaction of local populations. Also, time spent on each activity in this research is an estimation, which might bias the impact of time used in one activity on the other. Hence, random sampling for the whole population as well as a household survey that features more accurate time use are also required for future research. Moreover, this study only investigates the relationship between time use and SWB on weekdays. However, this relationship occurs differently when it comes to weekends. More importantly, time uses on weekdays and weekends are interdependent and thus should be looked at as a whole when it comes to the relationship between time use and SWB. Hence, including time used in various activities during one week (both weekdays and weekends), rather than weekdays only, is more appropriate for the exploration of the relationship between time use and SWB. In addition, this study only focuses on a small Chinese city, which is context-specific. Studies from other geographical areas, especially those that compare different contexts, are required to further clarify the role of context and to solidify knowledge about time use and life satisfaction.

CRediT authorship contribution statement

Yang Hu: Conceptualization, Funding acquisition, Investigation, Data curation, Methodology, Writing - original draft, review & editing

Anae Sobhani: Methodology, Formal analysis

Dick Ettema: Conceptualization, Methodology, Formal analysis, Writing - review.

Declaration of competing interest

The authors declare that there is no conflict of interest.

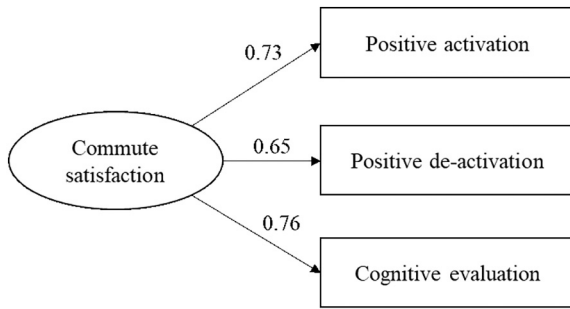
Data availability

Data will be made available on request.

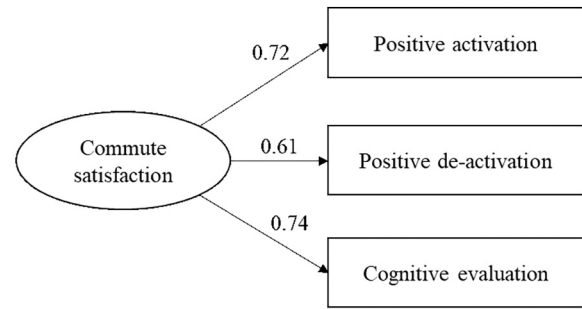
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Appendix 1. Standardized factor loading of the commute satisfaction measurement

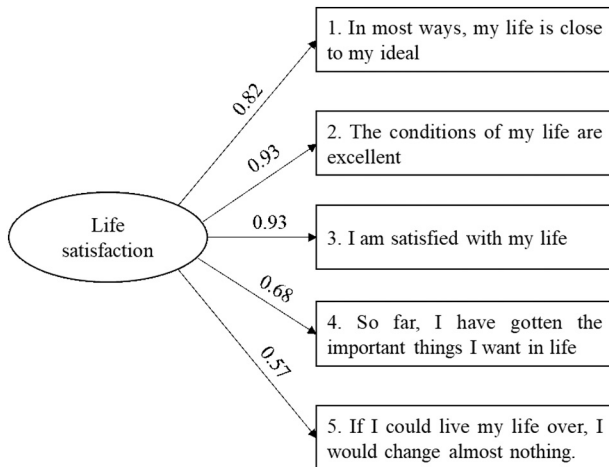


Women

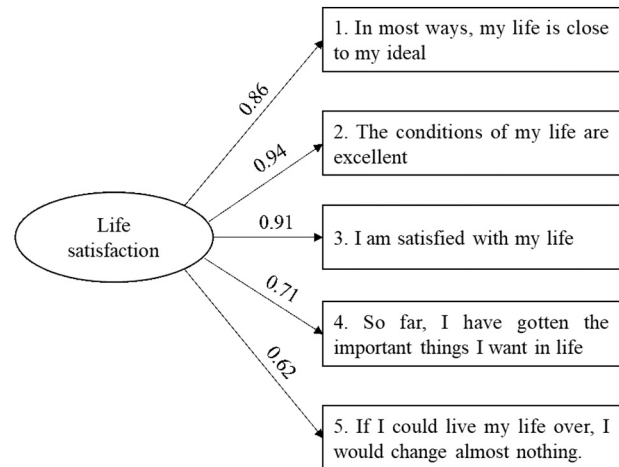


Men

Appendix 2. Standardized factor loading of the life satisfaction measurement



Women



Men

References

AutoNavi Map. (2018). *Traffic analysis in main Chinese cities 2018 Q3*.
 Besser, L. M., Marcus, M., & Frumkin, H. (2008). Commute time and social capital in the US. *American Journal of Preventive Medicine, 34*(3), 207–211.
 Bhat, C. R., & Misra, R. (1999). Discretionary activity time allocation of individuals between in-home and out-of-home and between weekdays and weekends. *Transportation, 26*(2), 193–229.
 Cao, X., & Chai, Y. (2007). Gender role-based differences in time allocation: Case study of Shenzhen, China. *Transportation Research Record, 2014*(1), 58–66.
 Chatterjee, K., Chng, S., Clark, B., Davis, A., De Vos, J., Ettema, D., Handy, S., Martin, A., & Reardon, L. (2020). Commuting and wellbeing: A critical overview of the

literature with implications for policy and future research. *Transport Reviews, 40*(1), 5–34.
 Chen, J., Davis, D. S., Wu, K., & Dai, H. (2015). Life satisfaction in urbanizing China: The effect of city size and pathways to urban residency. *Cities, 49*, 88–97.
 Cherry, C., & Cervero, R. (2007). Use characteristics and mode choice behavior of electric bike users in China. *Transport Policy, 14*(3), 247–257.
 Choi, J., Coughlin, J. F., & D'Ambrosio, L. (2013). Travel time and subjective well-being. *Transportation Research Record, 2357*(1), 100–108.
 Clark, B., Chatterjee, K., Martin, A., & Davis, A. (2020). How commuting affects subjective wellbeing. *Transportation, 47*(6), 2777–2805.
 De Vos, J., Mokhtarian, P. L., Schwanen, T., Van Acker, V., & Witlox, F. (2016). Travel mode choice and travel satisfaction: Bridging the gap between decision utility and experienced utility. *Transportation, 43*(5), 771–796.

- De Vos, J., Schwanen, T., Van Acker, V., & Witlox, F. (2015). How satisfying is the scale for travel satisfaction? *Transportation Research Part F: Traffic Psychology and Behaviour*, 29, 121–130.
- Dharmowijoyo, D. B., Susilo, Y. O., & Karlström, A. (2017). Analysing the complexity of day-to-day individual activity-travel patterns using a multidimensional sequence alignment model: A case study in the Bandung metropolitan area, Indonesia. *Journal of Transport Geography*, 64, 1–12.
- Dickerson, A., Hole, A. R., & Munford, L. A. (2014). The relationship between well-being and commuting revisited: Does the choice of methodology matter? *Regional Science and Urban Economics*, 49, 321–329.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75.
- England, P., & Srivastava, A. (2013). Educational differences in US parents' time spent in child care: The role of culture and cross-spouse influence. *Social Science Research*, 42(4), 971–988.
- Ettema, D., Friman, M., Gärling, T., & Olsson, L. E. (2016). Travel mode use, travel mode shift and subjective well-being: Overview of theories, empirical findings and policy implications. In *Mobility, sociability and well-being of urban living* (pp. 129–150).
- Ettema, D., Friman, M., Gärling, T., Olsson, L. E., & Fujii, S. (2012). How in-vehicle activities affect work commuters' satisfaction with public transport. *Journal of Transport Geography*, 24, 215–222.
- Ettema, D., Gärling, T., Eriksson, L., Friman, M., Olsson, L. E., & Fujii, S. (2011). Satisfaction with travel and subjective well-being: Development and test of a measurement tool. *Transportation Research Part F: Traffic Psychology and Behaviour*, 14(3), 167–175.
- Ettema, D., Gärling, T., Olsson, L. E., Friman, M., & Moerdijk, S. (2013). The road to happiness: Measuring dutch car drivers' satisfaction with travel. *Transport Policy*, 27, 171–178.
- Ettema, D., Schwanen, T., & Timmermans, H. (2007). The effect of location, mobility and socio-demographic factors on task and time allocation of households. *Transportation*, 34(1), 89–105.
- Ettema, D., & van der Lippe, T. (2009). Weekly rhythms in task and time allocation of households. *Transportation*, 36(2), 113–129.
- Feng, J., Chuai, X., Lu, Y., Guo, X., & Yuan, Y. (2020). Who will do more? The pattern of daily out-of-home activity participation in elderly co-residence households in urban China. *Cities*, 98, Article 102586.
- Feng, J., Dijst, M., Wissink, B., & Prillwitz, J. (2013). The impacts of household structure on the travel behaviour of seniors and young parents in China. *Journal of Transport Geography*, 30, 117–126.
- Fishman, E., & Cherry, C. (2016). E-bikes in the mainstream: Reviewing a decade of research. *Transport Reviews*, 36(1), 72–91.
- Gerber, P., Thériault, M., Enaux, C., & Carpentier-Postel, S. (2020). Links between attitudes, mode choice, and travel satisfaction: A cross-border long-commute case study. *Sustainability*, 12(21), 9203.
- Golob, T. F., & McNally, M. G. (1997). A model of activity participation and travel interactions between household heads. *Transportation Research Part B: Methodological*, 31(3), 177–194.
- Hilbrecht, M., Smale, B., & Mock, S. E. (2014). Highway to health? Commute time and well-being among Canadian adults. *World Leisure Journal*, 56(2), 151–163.
- Ho, C., & Mulley, C. (2015). Intra-household interactions in transport research: A review. *Transport Reviews*, 35(1), 33–55.
- Hu, H., Xu, J., Shen, Q., Shi, F., & Chen, Y. (2018). Travel mode choices in small cities of China: A case study of changing. *Transportation Research Part D: Transport and Environment*, 59, 361–374.
- Hu, Y., Sobhani, A., & Ettema, D. (2021). To e-bike or not to e-bike? A study of the impact of the built environment on commute mode choice in a small Chinese city. *Journal of Transport and Land Use*, 14(1), 479–497.
- Hu, Y., Sobhani, A., & Ettema, D. (2022). Exploring commute mode choice in dual-earner households in a small Chinese city. *Transportation Research Part D: Transport and Environment*, 102, Article 103148.
- Kroesen, M. (2014). Assessing mediators in the relationship between commute time and subjective well-being: Structural equation analysis. *Transportation Research Record*, 2452(1), 114–123.
- Lai, X., Lam, W. H., Su, J., & Fu, H. (2019). Modelling intra-household interactions in time-use and activity patterns of retired and dual-earner couples. *Transportation Research Part A: Policy and Practice*, 126, 172–194.
- Lorenz, O. (2018). Does commuting matter to subjective well-being? *Journal of Transport Geography*, 66, 180–199.
- Mao, Z., & Wang, D. (2020). Residential relocation and life satisfaction change: Is there a difference between household couples? *Cities*, 97, Article 102565.
- Mokhtarian, P. L., & Ory, D. T. (2009). Structural equations models. In R. Kitchin, & T. Nigel (Eds.), *International encyclopedia of human geography* (Vol. 11, pp. 10–17). Oxford: Elsevier.
- Morris, E. A., Ettema, D., & Zhou, Y. (2020). Which activities do those with long commutes forego, and should we care? *Transportation Research Interdisciplinary Perspectives*, 5, Article 100119.
- Morris, E. A., & Zhou, Y. (2018). Are long commutes short on benefits? Commute duration and various manifestations of well-being. *Travel Behaviour and Society*, 11, 101–110.
- Muthén, B., & Muthén, L. (2017). *Mplus*. Chapman and Hall/CRC.
- Newman, D. B., Tay, L., & Diener, E. (2014). Leisure and subjective well-being: A model of psychological mechanisms as mediating factors. *Journal of Happiness Studies*, 15(3), 555–578.
- Nie, P., & Sousa-Poza, A. (2018). Commute time and subjective well-being in urban China. *China Economic Review*, 48, 188–204.
- Novaco, R. W., Kliever, W., & Broquet, A. (1991). Home environment consequences of commute travel impedance. *American Journal of Community Psychology*, 19, 881–909.
- Olsson, L. E., Gärling, T., Ettema, D., Friman, M., & Fujii, S. (2013a). Happiness and satisfaction with work commute. *Social Indicators Research*, 111(1), 255–263.
- Olsson, L. E., Gärling, T., Ettema, D., Friman, M., & Fujii, S. J. S. I. R. (2013). In, 111(1). *Happiness and satisfaction with work commute* (pp. 255–263).
- Plaut, P. O. (2006). The intra-household choices regarding commuting and housing. *Transportation Research Part A: Policy and Practice*, 40(7), 561–571.
- Roberts, J., Hodgson, R., & Dolan, P. (2011). "It's driving her mad": Gender differences in the effects of commuting on psychological health. *Journal of Health Economics*, 30(5), 1064–1076.
- Robertson, K. (2001). Downtown development principles for small cities. In *Downtowns: Revitalizing the centers of small urban communities* (pp. 9–22).
- Schwanen, T., Ettema, D., & Timmermans, H. (2007). If you pick up the children, I'll do the groceries: Spatial differences in between-partner interactions in out-of-home household activities. *Environment and Planning A*, 39(11), 2754–2773.
- St-Louis, E., Manaugh, K., van Lierop, D., & El-Geneidy, A. (2014). The happy commuter: A comparison of commuter satisfaction across modes. *Transportation Research Part F: Traffic Psychology and Behaviour*, 26, 160–170.
- Stone, A. A., & Schneider, S. (2016). Commuting episodes in the United States: Their correlates with experiential wellbeing from the american time use survey. *Transportation Research Part F: Traffic Psychology and Behaviour*, 42, 117–124.
- Stutzer, A., & Frey, B. S. (2008). Stress that doesn't pay: The commuting paradox. *Scandinavian Journal of Economics*, 110(2), 339–366.
- Sun, B., Lin, J., & Yin, C. (2020). How does commute duration affect subjective well-being? A case study of Chinese cities. *Transportation*, 1–24.
- Sweet, M., & Kanaroglou, P. (2016). Gender differences: The role of travel and time use in subjective well-being. *Transportation Research Part F: Traffic Psychology Behaviour*, 40, 23–34.
- Ta, N., Liu, Z., & Chai, Y. (2019). Help whom and help what? Intergenerational co-residence and the gender differences in time use among dual-earner households in Beijing, China. *Urban Studies*, 56(10), 2058–2074.
- Tinsley, H. E., & Eldredge, B. D. (1995). Psychological benefits of leisure participation: A taxonomy of leisure activities based on their need-gratifying properties. *Journal of Counseling Psychology*, 42(2), 123.
- Wheatley, D. (2014). Travel-to-work and subjective well-being: A study of UK dual career households. *Journal of Transport Geography*, 39, 187–196.
- Ye, R., & Titheridge, H. (2017). Satisfaction with the commute: The role of travel mode choice, built environment and attitudes. *Transportation Research Part D: Transport Environment*, 52, 535–547.
- Zhang, J., Timmermans, H. J., & Borgers, A. (2005). A model of household task allocation and time use. *Transportation Research Part B: Methodological*, 39(1), 81–95.
- Zhu, J., & Fan, Y. (2018). Commute happiness in Xi'an, China: Effects of commute mode, duration, and frequency. *Travel Behaviour and Society*, 11, 43–51.
- Zhu, Z., Chen, H., Chen, J., Ma, J., & He, Y. (2020). The effect of commuting time on job stress in obese men with different exercise frequency in China. *American Journal of Men's Health*, 14(6), 1557988320975542.
- Zhu, Z., Li, Z., Chen, H., Liu, Y., & Zeng, J. (2019). Subjective well-being in China: How much does commuting matter? *Transportation*, 46(4), 1505–1524.