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Beyond the Resource Drain Theory: Salary satisfaction as a mediator between commuting time and subjective well-being

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ABSTRACT

Introduction: Understanding the mechanism between commuting time and subjective well-being is of great importance in formulating policies. In previous research, the negative impact of long commuting time on subjective well-being was mainly explained by the Resource Drain Theory which claims that the main reason for the impact was inadequate health-related and social activities in the commuters' life. However, this theory neglects the mediating roles of salary and residence satisfaction proposed by the Ecological Framework of Commuting Stress. According to this framework, commuting stress generated by prolonged commuting time may cause low satisfaction towards salary and residence and hence low life satisfaction. Using health, social support, satisfaction with salary, and satisfaction with residence in a mediation framework, this study aims to integrate the Resource Drain Theory and the Ecological Framework of Commuting Stress by analysing the direct and indirect effects of commuting time on subjective well-being.

Methods: We used data on 813 commuters from the first wave of the Hong Kong Panel Survey for Poverty Alleviation. Health was operationalised in terms of physical health (obesity measured by BMIs), psychological health (mental distress measured by the Chinese Health Questionnaire-12) and general health (measured by self-rated health). Social support is measured by using the Oslo 3-item Social Support Scale ("OSS-3"). Subjective well-being is measured by the satisfaction with life scale (SWLS-5). A bootstrapping-based multiple mediation analysis is used in this study.

Results: Significant direct and indirect effects on subjective well-being with indirect effects resulted in 23.1% of the effect of commuting time on well-being. It is also discovered that salary satisfaction is the only significant mediator of the association between commuting time and subjective well-being.

Conclusion: Policymakers need to consider not only the direct effects but also the indirect effects between commuting time and subjective well-being. The negative impact of commuting time on subjective well-being may be alleviated by improving the commuter's salary satisfaction.

1. Introduction

Increasing commuting distance and the consequential increased time spent on commuting has recently become a growing social

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policy concern in modern societies (Chng et al., 2016; Hilbrecht et al., 2014; Kroesen, 2014; Nie and Sousa-Poza, 2016; Stutzer and Frey, 2008). However, its mechanism still lacks consensus. Understanding the mechanism is of great importance to improving the existing transport policies and urban planning in promoting the well-being of the population.

Public health and social policy researchers have mainly explained the association between commuting time and subjective well-being with the Resource Drain Theory, one of the classic theories in explaining the link between work and family (Morris and Madsen, 2007). It refers to the phenomenon that when limited resources (e.g., time and energy) are transferred from one domain to another, available resources in the original domain decrease (Edwards and Rothbard, 2000). Long commuting time may occupy so much time that reduces the people's engagement in other health-related and social-related activities such as sleep (Nie and Sousa-Poza, 2016), physical activities (Christian, 2012), time spent with families and friends (Christian, 2012), social participation (Mattisson et al., 2015) and social oriented trips (Besser et al., 2008). Lack of sleep and physical activities lead to a higher risk of obesity and both physical and psychological health issues (Miles, 2007; Penedo and Dahn, 2005), all of which are also linked to subjective well-being (Diener et al., 1999). Moreover, lack of social activities caused by time scarcity is instinctively linked to a shrinking social network and weak social support, which have generally been recognised as being linked to subjective well-being (Diener et al., 1999; Helliwell and Putnam, 2004). Consistent with the Resource Drain Theory, it is found that the reduced time for physically active leisure mediates the association of commuting time with satisfaction with life (Hilbrecht et al., 2014). In a national representative study of China, the link between commuting time and happiness was found to be partially mediated by the time people spent on sleep (Nie and Sousa-Poza, 2016). In another study using the German socioeconomic panel data, the time spent on housework, childcare, physical and leisure activities was tested as the mediator of the association between commuting and subjective well-being (Lorenz, 2018). Satisfaction with social contacts was also identified as a mediator in a study based on a longitudinal internet study using the social sciences panel data on Dutch individuals (Kroesen, 2014).

Based on the Resource Drain Theory, many scholars argue for a more compact city design that reduces people's commuting time. Promoting public transport and active commuting is also regarded by many to be an effective way to increase the time spent by people on physical exercise on their way to and from work. However, different results from different regions also suggest that the mechanism of this association is context-sensitive. People from different culture and society may develop different preferences towards their use of time. Lack of time does not always lead to failure to participate in physical and social activities. For example, people suffering from time scarcity may also develop a coping mechanism to use their time more efficiently, so they are able to achieve better health and social support by spending less time doing other activities. Kenyon, et al (2002) developed the concept of virtual mobility. They argue that the use of modern information and communication technologies could enable virtual mobility which serves as an alternative to an increase in physical mobility (Kenyon et al., 2002). Time scarcity may reduce people's ability to physically participate in social activities, but virtual mobility can fit into any intervals between their tight schedules and allow them to make good use of their commuting time. In most developed cities, the past decade has witnessed the increasing prevalence of smartphones, and Hong Kong is no exception. According to an observational study in New Zealand, commuters on buses and trains used to mainly look straight or look out of the window, while only a few read, listened to headphones, talked, texted or slept during their trips between workplace and residence (Russell et al., 2011); but now, with their smartphones, people play games, visit social network platforms, text and make phone calls. In 2016, the smart phone penetration rate in Hong Kong reached 85.8% (persons aged 10 and above) and 98.9% (persons aged 25–44) (Hong Kong SAR Census and Statistics Department, 2017), and 88% daily commuters in Hong Kong are dependent on the public transport system (Hong Kong SAR Transport Department, 2014). Since nearly 90% of Hong Kong commuters do not drive, they are able to use their smartphones. Redmond and Mokhtarian (2001) argue that some commuters can productively use their commuting time by connecting with their families and friends, and participating in the virtual communities through online games or social network platforms. Therefore, there is possibility that long commuting time does not necessarily lead to low social support in Hong Kong.

According to the Ecological Framework of Commuting Stress proposed by Novaco et al. (1990), the commuting domain is viewed as a life domain linked with other domains such as the residential and occupational domains. The interactions among all the life domains are called interdomain transfer effects (Novaco et al., 1990). As one life domain, the daily travelling between workplace and residence may generate commuting stress. For example, long commuting time and distance, low commuting speed or traffic congestion can increase the commuters' perceived stress (Evans and Wener, 2006). Apart from the objective factors, subjective factors such as control and predictability of the commuting also influence the perceived stress level (Gottholmseder et al., 2009). The commuting stress generated from the commuting domain may lead to stress or dissatisfaction towards one's job and residence and thus negatively affect the people's subjective well-being (Novaco et al., 1991; So et al., 2001; Stutzer and Frey, 2008). This interdomain transfer effect will be a good supplement to the economic model and provides a better explanation to the commuting paradox. According to the classic economic model in job searching, assuming that people are rational, an evaluation of the cost and benefit of commuting should have been made, and an equilibrium achieved between the cost of longer commuting distance and the benefit from a better job and residence, thus a report of higher satisfaction with these two life domains should have been made. However, many studies have proved otherwise (Chng et al., 2016; Hilbrecht et al., 2014; Kroesen, 2014; Nie and Sousa-Poza, 2016; Stutzer and Frey, 2008). Economists have called this contradiction the commuting paradox and attribute it to the high transaction costs of job and residence, especially among the poor (Stutzer and Frey, 2008). However, the individuals' decisions in commuting may not be fully understood by the traditional economic framework. For example, it is impossible for people to precisely predict the cost of commuting when they were searching for the optimal combination of job and residence. They may easily predict and cope with the tight schedule caused by a long commuting time but not the daily commuting stress, which may make them doubt their choices of job and residence at the beginning. Perhaps also, some of them simply have no choice and have to take whatever is available.

The Resource Drain Theory and the Ecological Framework of Commuting Stress have been tested in a mediation framework to understand the link between commuting time and satisfaction with life in the context of Hong Kong. Accordingly, in the current study, mediators of health outcomes are optimised as the risk of obesity, psychological health and general health issues, and the concept of social support are used to measure the functions of social network, satisfaction with salary, and satisfaction with residence to test the Ecological Framework of Commuting Stress.

2. Data and method

2.1. The Hong Kong panel survey for Poverty Alleviation

The Hong Kong Panel Survey for Poverty Alleviation is a longitudinal study of households in Hong Kong funded by the Chief Executive community project. A stratified random sampling method was used in this study to select a representative regional sample of households, and face-to-face interviews were conducted to collect the information of the individuals and the households, including information on their commuting patterns, poverty and social stratification, social support, and physical and subjective well-being. The sample used in this study is the first wave study and restricted to those who have jobs and fixed workplaces (990 samples). Excluding the respondents with missing values (17.9%) on all the included variables in the multiple mediation model, the final sample consists of 813 commuters. In terms of demographic characteristics, the missing pattern was random because the excluded samples were not significantly different from the remaining samples.

2.2. Explanatory and outcome variables

The explanatory variable is the commuting time derived from the open question of 'How much time do you spend on the round trip journey between your home and work place?' This round trip commuting time ranging from 0 to 300 min is measured in minutes and treated as a continuous variable.

The outcome variable was measured by the Satisfaction With Life Scale ("SWLS"), which is a short five-item instrument designed to measure global cognitive judgements of satisfaction with one's life (Diener et al., 1999), validated on the Chinese population with a very high internal consistency reliability (Cronbach's $\alpha = 0.88$) (Bai et al., 2011). There are 5 items in the scale: 'I am satisfied with my life'; 'So far I have gotten the important things I want in life'; 'In most aspects, my life is close to my ideal'; 'The conditions of my life are excellent'; 'If I could live my life again, I would almost change nothing'. Based on the respondents' agreeing to the descriptions of each item, the responses range from "strongly disagree" (0) to "strongly agree" (6). As suggested by Diener et al. (1999), the total score of the SWLS was calculated on each participant. The total score ranged from 0 to 30 with the higher score indicating higher levels of life satisfaction.

2.3. Mediators

Health was operationalised in terms of physical health (obesity measured by BMIs), psychological health (mental distress measured by the Chinese Health Questionnaire-12) and general health (measured by self-rated health).

Weight, measured by the BMIs, could be treated as an objective health indicator. BMI is estimated by dividing the self-reported weight (kilograms) by the square of the self-reported height (metres) (World Health Organization, 2000). Researchers often dichotomise the status of weight according to certain cut-off values of the BMI as obese (versus normal or overweight) and interpret it as an objective dimension of health (Singh-Manoux et al., 2006), although some may argue that it is a lifestyle factor (Prosper et al., 2009). As Asians often have smaller body frames than the Caucasians, Hong Kong people may have abnormal body fat with lower BMIs than people from the western countries. In a study based on body fat assessment in Hong Kong, Ko et al. (2001) suggested using 26 kg/m² as the cut-off value of BMIs to define obesity in the Hong Kong population instead of the suggested 30 kg/m² cut-off value (World Health Organization, 2000). In this study, the cut-off value suggested by Ko et al. (2001) has been adopted.

Mental distress was measured using the 12-item Chinese Health Questionnaire ("CHQ"), which is the Chinese version of the General Health Questionnaire, a widely used and validated instrument to assess general psychological health in the Chinese populations (Chong and Wilkinson, 1989; Shek, 1987, 1989). Each question has a choice of four options to describe the presence or intensity of a state over the last few weeks related to its usual frequency or intensity, thereby creating a 36-point Likert scale (each question is scored from 0 to 3). The CHQ was first developed as a screening tool for minor psychiatric disorders and later used as a measurement of the general mental health.

Self-rated health was measured by asking the interviewees how they felt in terms of their general state of health, the responses ranged from "very poor" (0) to "very good" (4). This is the most widely used validated indicator of health in the field of social science (Idler and Benyamini, 1997).

Social support was measured using the Oslo 3-item Social Support Scale ("OSS-3") (Meltzer, 2003). Question one read: "How many people are so close to you that you can count on if you have serious problems?" This required the respondents to select their answers from four categories: none, 1–2, 3–5, or 5 or more. Questions two and three attracted a five-point Likert scale response options by asking the respondents "How easy can you get help from your neighbours should you need it?" (Very easy, easy, possible, difficult, very difficult) and "How much concern do people show in what you are doing?" (a lot, some, uncertain, little, no). Based on the responses to all three questions, the total score was calculated. The OSS-3 shows high feasibility and is recommended for use to measure social support (Meltzer, 2003).

Satisfaction with salary was measured by asking the interviewees how satisfied they were with their current salary from their main employment, the outcomes ranged from “very dissatisfied” (0) to “very satisfied” (4). Satisfaction with residence was measured by asking the interviewees how satisfied they were with their current accommodation, the outcomes ranged from “very dissatisfied” (0) “to very satisfied” (6).

2.4. Control variables

Demographic characteristics (such as gender, age, age-squared, logged monthly income from the main employment, whether the individual has a tertiary degree or higher, working hours in the past week) and geographic information such as the living location (Hong Kong Island, Kowloon, the New Territories) were included. A previous study found that commute mode had no significant association with satisfaction with life (Sha et al., 2019). In Hong Kong, nearly 90% of commuters travel by public transport (Hong Kong SAR Transport Department, 2014), and commuting mode is strongly associated with the commuters' socioeconomic characteristics (Sha et al., 2019). Therefore, in this study, we do not include a control variable for the commute mode.

2.5. Method

A bootstrapping-based multiple mediation analysis is used in this study to identify the indirect effects of the mediators in the relationship between commuting time and satisfaction with life. Accordingly, the total indirect effect of commuting time on satisfaction with life is the sum of the six indirect effects, meaning that the total effect of commuting time on satisfaction with life is the sum of the direct effects and the total indirect effects via those mediators. Using this multiple mediation analysis, not only can the total indirect effect associated with the six mediators be explored, but also the hypotheses on each mediator in the present multiple mediation context be tested. Bootstrapping is recommended for a precise estimation of the indirect effects in mediation research because it generates a reference distribution for the indirect effect based on a large number of repeated sampling from the original data and gives a robust estimate of the standard errors (MacKinnon, 2012). Therefore, the significance of the specific indirect effects was determined by computing the confidence intervals (95%) on the 1,000 bootstrapped samples.

The estimation is computed as follows: Firstly, the entire model was estimated (Model 1). Secondly, each of the six additional equations (Models 2–7) of the potential mediators was estimated. Finally, the direct effects, indirect effects and total effects were estimated and their values bootstrapped.

3. Results

3.1. Models for the direct effect

The estimated coefficients of the full sample are reported in Table 2. Commuting time has a statistically significant and negative direct effect on life satisfaction. Higher satisfaction with salary and residence, better social support, less mental distress and better self-rated health are associated with satisfaction with life. Higher monthly income and female are also associated with better satisfaction with life.

3.2. Models for the mediators

Models 2 to 7 in Table 2 display the estimates of the full sample, from satisfaction with salary (“SWS”), satisfaction with residence

Table 1
Descriptive statistics.

Variables	Definitions	Mean (SD)
Commuting time	Round-trip commuting time of the commuters (in minutes)	77.20 (46.86)
Satisfaction with life	0–30 scale: 0 = lowest satisfaction; 30 = highest satisfaction	16.59 (7.17)
Satisfaction with salary	0–4 scale: 0 = lowest satisfaction; 4 = highest satisfaction	1.56 (0.75)
Satisfaction with residence	0–6 scale: 0 = lowest satisfaction; 6 = highest satisfaction	3.92 (1.44)
Social support	0–11 scale: 0 = no social support; 11 = best social support	5.30 (2.41)
BMI	Body mass index of the commuters (weight in kg/height in meter ²)	23.01 (3.75)
Self-rated health	0–4 scale: 0 = worst health; 4 = best health	1.41 (0.85)
Mental distress	0–36 scale: 0 = no mental distress; 36 = highest mental distress	6.20 (4.45)
Age	Age of the commuters	44.20 (12.54)
Female	1 if female, 0 if male	0.44
Logged monthly income	Monthly logged income from the main employment (to the base of 10)	4.16 (0.34)
Higher education	1 if tertiary (degree) or above, 0 if otherwise	0.24
Hong Kong	1 if living on the Hong Kong Island, 0 if otherwise	0.20
Kowloon	1 if living in Kowloon, 0 if otherwise	0.38
New Territories	1 if living in the New Territories, 0 if otherwise	0.42

Note: Descriptive statistics are provided for the estimation of the sample (see Table 1).

Table 2
Regression models for life satisfaction (“LS”), satisfaction with salary (“SWS”), satisfaction with residence (“SWR”), social support (“SS”), BMI, self-rated health (“SRH”) and mental distress (“MD”).

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	LS	SWS	SWR	SS	BMI	SRH	MD
SWS	1.309 (0.288)***						
SWR	0.998 (0.147)***						
SS	0.573 (0.096)***						
BMI	-0.005 (0.058)						
SRH	0.962 (0.249)***						
MD	-0.294 (0.048)***						
Commuting time	-0.013 (0.005)***	-0.001 (0.001)**	-0.000 (0.001)	-0.000 (0.002)	0.002 (0.003)	-0.001 (0.001)	0.003 (0.003)
Age	-0.061 (0.111)	-0.025 (0.013)*	-0.030 (0.026)	-0.019 (0.040)	0.171 (0.066)**	0.000 (0.016)	0.060 (0.080)
Age-squared	0.002 (0.001)	0.000 (0.000)**	0.000 (0.000)	-0.000 (0.000)	-0.001 (0.001)*	-0.000 (0.000)	-0.001 (0.001)
Female	1.371 (0.459)***	0.018 (0.055)	-0.002 (0.107)	0.462 (0.164)***	-1.348 (0.268)***	-0.027 (0.063)	0.958 (0.325)***
Logged income	2.823 (0.768)***	0.367 (0.090)***	0.186 (0.177)	1.413 (0.271)***	0.126 (0.444)	0.176 (0.104)*	-1.815 (0.538)***
Working hours	-0.008 (0.016)	-0.006 (0.002)**	-0.004 (0.004)	-0.023 (0.006)***	0.010 (0.009)	-0.003 (0.002)	-0.001 (0.011)
Tertiary degree	1.142 (0.604)	-0.107 (0.073)	0.155 (0.143)	0.463 (0.220)**	-0.371 (0.359)	-0.109 (0.085)	-0.088 (0.435)

Note: All models are estimated on the full sample size with 813 commuters. All models are controlled for regional effects. Standard errors are in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1.

Table 3
Mediation effects on satisfaction with life.

	Satisfaction with Life Mediation
(A) Indirect satisfaction with salary	-0.002 (0.001)**
(B) Indirect satisfaction with residence	-0.000 (0.001)
(C) Indirect social support	-0.000 (0.001)
(D) Indirect BMI	-0.000 (0.000)
(E) Indirect self-rated health	-0.001 (0.001)
(F) Indirect mental distress	-0.001 (0.001)
(A + B + C + D + E + F) Total indirect effect	-0.004 (0.002)*
(G) Direct effect	-0.013 (0.005)***
(A + B + C + D + E + F + G) Total effect	-0.016 (0.005)***
Total indirect/total effect	0.231 (0.119)*

Note: The models are estimated on the full sample size of 813 commuters. Bootstrapped standard errors are in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1; based on 1,000 replications.

(“SWR”), social support (“SS”), BMI, self-rated health (“SRH”) to mental distress (“MD”). Only in Model 2 that it is found that satisfaction with salary is associated with life satisfaction.

3.3. Estimates of the mediating effects

Table 3 presents the bootstrapped estimates of the mediation analysis of the full sample. The mediation analysis shows that the effect of commuting time on well-being is significantly mediated by satisfaction with salary. The total indirect effect, the direct effect and the total effect of commuting time on life satisfaction are statistically significant. The total indirect effect accounts for 23.1% of the full effect of commuting time on life satisfaction. Satisfaction with salary explains 10.8% of the effect of commuting time on life satisfaction.

4. Discussion

The multiple mediation analysis examines the extent to which the relation between commuting time and satisfaction with life is explainable by specific mediators. As Table 2 shows, when all the potential mediators are included, the total effect of commuting time on life satisfaction remains significant, suggesting that commuting time still has a direct effect on satisfaction with life. The results in Table 3 indicate that the total indirect effect is also significant for life satisfaction, implying that the model is partially mediated by the six potential mediation variables. Moreover, a more in-depth examination of the specific indirect effects of the six mediators reveals only a significant indirect effect of the commuters’ satisfaction with their salary from their main employment. There is no association between commuting time and BMI, mental distress, perceived health, and social support, even though such effects have been reported to have connection with commuting time in previous studies (Besser et al., 2008; Feng and Boyle, 2014; Künn-Nelen, 2016; Mattisson et al., 2015; Oliveira et al., 2015; Roberts et al., 2011). Therefore, compared with the Resource Drain Theory, the Ecological Framework of Commuting Stress may better explain the negative impact of long commuting on life satisfaction in Hong Kong.

4.1. Commuting time as an extension of working hours

The mediation effect of salary satisfaction found in this study can be explained by the Ecological Framework of Commuting Stress proposed by Novaco et al. (1990). Hong Kong is a very competitive city with long working hours. Work pressure and heavy workload are the most common stressors on the Hong Kong working population (Siu et al., 1997; Wang et al., 2011). Long working hours have already caused time scarcity for many working people, and the long commuting time may make it even worse. Time scarcity generates stress on the commuter to and from work and makes the trips less enjoyable for those commuting for a long time. The stress generated by the commuting domain may lead to stress or dissatisfaction towards their jobs (Novaco et al., 1991; So et al., 2001; Stutzer and Frey, 2008). In the context of Hong Kong, commuting time may be regarded by some long-distance commuters as an extension of their working hours. When the commuters are already suffering from time scarcity and not enjoying their journey between their home and their workplace, inevitably they consider the time they spend on the road as part of their working time. Therefore, even with the same job or earning the same income, people commuting longer distances may more likely than their counterparts commuting shorter distances think they earn less than they deserve.

4.2. Lack of freedom to choose own jobs and residence in Hong Kong

From the economic perspective, if individuals are not satisfied with a salary that can fully compensate their commuting costs, they should search for another job or move their home to shorten their commuting distances to achieve an equilibrium. However, findings from the studies suggest that long-distance commuters in Hong Kong are not actually dissatisfied with their salary. This may be attributed to the fact that the working population in Hong Kong is not able to change jobs or move home easily. Most of the jobs

cluster around Hong Kong Island, Yau Tsim Mong and Kwun Tong, but most people cannot afford to live near these job centres. Even if they live near one of the job centres, they may not be able to find a suitable job there. Moreover, housing subsidies may also discourage the non-employed persons from relocating their residence (Van Ommeren et al., 2000). In 2017, about 44.7% Hong Kong residents were tenants living in public housing (Hong Kong Housing Authority, 2018), representing nearly half of the Hong Kong residences. Therefore, nearly half of the Hong Kong residents only had very limited choices on the location of their residence at the beginning. Furthermore, the significant difference of housing expense between public and private housing results in the lock-in effects among the public housing residents, making them less likely to move their residence than their private housing counterparts (Lui and Suen, 2011). Therefore, although the workers do not prefer long commutes, due to the high costs involved, they still avoid searching for another job or moving to another neighbourhood.

In Hong Kong, women's commuting time is also shorter than men's. This difference is particularly large in the suburban areas where women (particularly those who are married) are less likely to travel to the urban areas than men (Hui and Yu, 2013). Furthermore, women with children and lower socioeconomic status are much more deprived of employment opportunities compared to their male counterparts (Loo and Lam, 2013). These findings conform to the household responsibility hypothesis, while indicating the intersecting influences of different social factors.

4.3. Implications of the transport subsidy policies in Hong Kong

To encourage people living in remote areas to search for jobs or work in other districts, the Hong Kong government established the Transport Support Scheme ("TSS") to reduce unemployment rate (Labour and Welfare Bureau, 2009). Thereafter, with the objective to maintain low-income workers in their jobs by subsidising their transport expenses, the Work Incentive Transport Subsidy Scheme ("WITSS") expanded the original TSS to subsidise people in the whole territory (Hong Kong SAR Labour Department, 2011). However, both transport subsidy policies focus only on the employment issue, neglecting the effects of the well-being of the working population. This study explored the mechanism of how long commuting time affects people's life satisfaction. The findings provide several implications for future policy making.

The mediation effect of salary satisfaction found in this study suggests that it is possible to weaken the negative impact of long commuting time on life satisfaction through financial compensation. Compared to many other regions in the world, Hong Kong is a very expensive city with relatively high prices on general household goods, food, housing and transport. Therefore, the quality of life of the Hong Kong residents is very closely related to their income level. The TSS may have effectively compensated the financial cost of commuting among the PRH residents in remote areas so that they felt more satisfied with their salary when working in other districts. However, the burden of raising income should not be the sole responsibility of the government. Corporates and institutes should also take commuting time into consideration when providing for allowances to their employees.

Although the negative effects of long commuting on life satisfaction can be mitigated by financial compensation, the harm on physical well-being associated with long commuting (Sha et al., 2019) is still worth addressing. In Hong Kong, material subsidy is adopted as the main strategy to tackle spatial mismatch in employment. Admittedly effective, but it may increase the negative effect of long commuting on the residents' physical well-being. Long-term strategies to promote holistic well-being of the working population should never be neglected.

One alternative strategy is to move jobs closer to the residences so as to boost employment without increasing commuting distance. For example, the relocation of the Hong Kong International Airport has had a positive impact on the jobs-housing balance of the city, especially in the Islands district (Loo and Chow, 2011). However, the increased land value created financial burden on the residents, and eventually forced them to live further (Wong, 2004). Therefore, it is important for the government to comprehensively evaluate the financial implications of a policy on the individuals in order to balance its benefits on the economic development and the people's well-being. In the short-term, the Hong Kong government may adopt policies like Moving to Opportunities ("MTO"), which offers housing vouchers to families living in the PRH projects to move to lower-poverty neighbourhoods with more jobs (Sanbonmatsu et al., 2011).

4.4. Limitations

One of the major limitations of this analysis is that there may be other confounding and moderator variables that are not included in this model. The decision on housing location can be based on two different job locations in a dual earner household. However, lack of data on this information could be an alternative explanation for the insignificant association between commuting time and satisfaction with residence. Moreover, time used in other domains—for example, time spent with families and sleeping hours—may also mediate the effect of commuting time on well-being (Lorenz, 2018; Nie and Sousa-Poza, 2016). Moreover, as this is a cross-sectional study, the causality between associated variables may be bidirectional. Another main limitation is that all the health outcomes are self-reported. All the self-reported variables contain recall bias and are also subject to personal experiences and emotions. Further study should thus be a longitudinal design with more comprehensive variables measured by professional interviewers.

5. Conclusion

This study analysed the direct and indirect effects of commuting time on satisfaction with life using physical and mental health, social support, satisfaction with salary, and satisfaction with residence in a mediation framework. The direct effect of commuting time on satisfaction with life remained significant in the multiple mediation framework. Salary satisfaction was the only significant

mediator to partially mediate the association between commuting time and life satisfaction: there was no evidence on other mediators.

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Declaration of interest statement

The authors declare that they have no competing interests.

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