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The Effect of Commuting Time on Job Stress in Obese Men With Different Exercise Frequency in China

Zhenjun Zhu[1], Hongsheng Chen[2], Junlan Chen[3], Jianxiao Ma[1], and Yudong He[1]

Abstract

Previous studies have mainly focused on the independent impact of commuting time, exercise, and stress on people. There are few studies regarding the impact of the combined effect of multiple factors on special populations such as obese people. As obesity has become increasingly widespread in China, we studied the impact of commuting time on work stress on Chinese obese men (who exercise regularly vs. who exercise irregularly). We performed a secondary retrospective analysis of the cross-sectional data from the 2014 China Labor Force Dynamics Survey. We found that long commute times and less exercise have a positive effect on the increase in stress, but the effect is less evident for people who exercise regularly. Commuters traveling on foot are more stressed than those traveling by car. This study also found that commuting time had a significant impact on the perceived work stress of obese men who exercised irregularly. But the relationship between commuting time and work stress was different among groups with different commuting styles. For obese men who commuted on foot or motorcycle, commuting time had a significant impact on their job stress. However, for obese men who commuted by bicycle, bus, or car, commuting time had no significant effect on job stress. Additionally, active and passive commuting have different effects on stress. Active commuters tend to be more stressed, while passive commuters do not show a significant impact.

Keywords

commuting, work stress, physical exercise, obese men, obesity in China

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In China, the rapid increase in urban population density and the separation of work and residence in cities has led to traffic congestion and increased commuting time (J. Guo et al., 2020; Sun et al., 2016; Zhu et al., 2017). Commuting time and traffic congestion have become significant factors affecting people's physical and mental well-being (Dickerson et al., 2014; Xu et al., 2013). Longer commutes have a positive effect on employees' absenteeism due to illness (M. Guo et al., 2020). Hansson et al. (2011) found that there is a relationship between public transport commuting time and negative health outcomes. Sha et al. (2019b) found that people with longer commuting times report lower levels of subjective well-being systematically. Thus, long commuting times are linked to poor health outcomes (Sun et al., 2020). An empirical study demonstrated the physical and mental harm caused by long commuting times. A lengthy commuting time also has a deleterious effect on various daily activities. It has been shown to increase psychosomatic complaints and difficulties in family and social life (M. Guo et al., 2020; Sha et al., 2019b; Sun et al., 2020). Sha et al. (2019b) found that people who commute for a long time are more likely to feel dissatisfied or complain about work. Chinese work longer hours on average, and long commutes may have even more serious effects on health and relationships (M. Guo et al., 2020). Sha et al. (2019a)

[1]College of Automobile and Traffic Engineering, Nanjing Forestry University, Nanjing, China
[2]School of Architecture, Southeast University, Nanjing, China
[3]School of Transportation, Southeast University, Nanjing, China

Corresponding Author:
Hongsheng Chen, School of Architecture, Southeast University, No. 2, Sipailou Road, Xuanwu District, Nanjing 210096, China.
Email: chen.hongsheng@seu.edu.cn

found that commuters who commute for more than 90 min are associated with obesity.

Physical exercise is believed to be related to physical and psychological health (Guo et al., 2016; Lear et al., 2017; Li et al., 2015; Xu et al., 2016; Zhang et al., 2018, 2020). Xu et al. (2016) found that physical exercise is an effective treatment for depression. Participating in regular physical activity contributes to significant improvements in adults' quality of life (Xiao et al., 2019). Moderate exercise every week can help prevent depression (Wang et al., 2018). For urban residents living in green space environment, physical exercise can promote their health (Chen, Liu, Li, et al., 2017; Chen, Liu, Zhu, et al., 2017). Participants with higher physical activity levels reported fewer burnout symptoms when they experienced high levels of stress (Gerber et al., 2020). Christian (2012) investigated people of full-time working age living in urban areas. Their results show that as commuting time increases, the total number of minutes of moderate or high exercise per day decreases. An additional 60 min in daily commuting is associated with a 6% decrease in aggregate health-related activities, while an additional 120 min is associated with a 12% decrease in these activities. Cycling is generally believed to be a way of physical exercise and has a positive effect on health. Some scholars have studied the health effects of cycling to commute to work. Oja et al. (1998) illustrated that daily walking and biking could be used as commuting options for health-enhancing activities. Xu et al. (2017) found that cycling can decrease male employees' risk of obesity.

There is a bidirectional association between stress and physical activity in adults who are overweight or suffering from obesity (Brockmann & Ross, 2020). For example, if we consider that work is an indispensable part of people's lives, then, to obtain the ideal job, individuals may need to make sacrifices, including enduring longer commuting times and more work stress (J. Guo et al., 2020). Artazcoz et al. (2009) analyzed the relationship of working overtime with different health indicators among men and found that the male role as the family's "breadwinner" is related to increased work stress. Under the economic pressure of supporting their families, men worked overtime to increase their income, and accepted long-term commuting due to fear of unemployment. The association of psychosocial stress with weight gain may have important implications for public health interventions. Addressing psychosocial stress may help to limit weight gain among overweight and obese men (Block et al., 2009). Obesity is a major health problem worldwide (Wolfenden et al., 2019). Owing to long working hours and work stress, obese men are a vulnerable group who need more attention in the United States (Frank et al., 2004). Ko et al.'s (2007) study suggests that working overtime is a potential risk factor for weight gain. They (Ko et al., 2007) observed associations between less sleep, working overtime, and weight gain, especially among men. Several researchers have focused on associations between work stress and overweight individuals. Niskanen et al. (2017) suggested that overweight individuals might be at a higher risk of weight gain when facing psychosocial strain in the workplace. Kivimaki et al. (2006) found that work stress induces weight gain in overweight individuals.

Previous studies did not fully consider the combined effects of commuting time, work stress, and physical exercise, and only studied the effects of two or less of them on obese male workers. According to the 2015 annual report of the World Health Organization, people with a BMI of >30 now account for about 3% of the Chinese population. As China is undergoing rapid motorization, long commuting times (normal commuting time plus extended commuting time caused by other reasons) have become common in Chinese people's daily lives (Zhu et al., 2017). Commuting is an essential part of work life, and existing literature on work stress has not combined the impact of commuting time and physical activity on work stress for obese people. To address this gap in the literature and reveal the relationship between commuting and obese Chinese men's psychological and physiological health, this study will analyze the interaction between commuting time, work stress, and physical exercise in obese men in China. Furthermore, this study aims to discover whether physical exercise has a positive effect on commuters' work stress and tolerance of commuting time.

Data and Methods

Data and Research Subjects

The data used in this study are from the 2014 China Labor-Force Dynamics Survey (CLDS 2014), which was conducted by the Center for Social Science Survey of Sun Yat-sen University in China (Chen, Liu, Li, et al., 2017; Chen, Liu, Zhu, et al., 2017; Wang et al., 2017). This is a secondary retrospective analysis of already collected data. In this study, obese male respondents were selected as study subjects. Obese male respondents (age ≤ 60) were defined as those with a BMI over 23 (BMI cutoff for Asians). In this study, we focused on the impact of commuting time and physical exercise on job stress. Those respondents' commuting methods included walking, bicycle, motorcycle, bus, and private car. After we eliminated the samples with incomplete information, a total of 2298 samples in this study.

Variables

Dependent Variables. The dependent variable in this study is respondents' work stress. In CLDS 2014, work stress

scores were obtained through self-evaluation on four related items. Respondents were asked about their perceptions of their job in the following four aspects: (1) "Work makes me feel physically and mentally exhausted," (2) "The whole job is really stressful for me," (3) "I think my work is very valuable," and (4) "I am becoming less and less interested in this job." Respondents chose between five responses: 5 = *having this feeling every day*, 4 = *having this feeling several times a week*, 3 = *having this feeling several times a month*, 2 = *having this feeling several times a year*, and 1 = *never having this feeling* (adjusted by the authors). Cronbach's reliability coefficient for the four items was 0.69. We added the scores of items 1, 2, and 4 and subtracted the scores of item 3 to obtain the participants' work stress score. The higher the score, the more stressful the respondent's job. The mean value of participants' work stress is 4.93 ($SD = 3.03$, $N = 3156$). The 95% confidence intervals of work stress are [4.82, 5.03]. We further transformed the dependent variable into a binary variable. Respondents whose work stress scores are higher than the average value are those with high work stress, and those whose work stress scores are lower than the average value are those with less work stress. Groups with high work stress accounted for 50.38% ($N = 1590$), and groups with low work stress accounted for 49.62% ($N = 1566$).

Main Independent Variables. In this study, the effects of commuting time on the work stress of two groups of obese men were compared; one group was composed of obese men who exercised regularly and the other group was composed of obese men who did not exercise regularly. In the regression analysis, the main independent variables were commuting time and physical activity. In addition, we also compared the effect of commuting time on the work stress of obese men with active commuting methods to those with passive commuting methods. In this study, active commuting mainly refers to commuting by walking or bicycle, while passive commuting refers to commuting by motorcycle, bus, and private car. The former has been shown to be effective in reducing commuters' BMI, while the latter has a weaker effect (Heelan et al., 2005).

Covariates. We used the respondents' personal socioeconomic status as the control variable, including (log) annual personal income (continuous variable), education level (continuous variable), age (continuous variable), self-rated physical health (continuous variable), marital status (categorical variable), job type (categorical variable), and urban neighborhood (categorical variable). Since the dependent variable, work stress, is a categorical variable, we adopted a logistics regression model to analyze the impact of commuting time on the work stress of obese men with different exercise frequency. The data analysis was carried out on a STATA13.1 platform.

Results

The descriptive statistics of all the variables used in the analysis are showed in Table 1. Table 2 shows the mean values of the work stress of respondents with different physical exercises frequency and commuting using different transportation methods. Respondents who did physical exercises regularly have low work stress, while those who did physical exercises irregularly have high work stress. And respondents who commuted by walking were found to be relatively more stressed, while those who commuted by private car were shown to be relatively less stressed.

The regression results of the relationship between commuting time and work stress for all respondents are showed in Model 1 in Table 3. Overall, the longer their commute, the more likely respondents were to rate their work as stressful ($OR = 1.148$, $p < .05$). Respondents who did not exercise regularly were likely to have more work stress than those who exercised regularly ($OR = 1.247$, $p < .05$). In terms of the effect of covariates, education level ($OR = 0.898$, $p < .01$), age ($OR = 0.971$, $p < .01$), and self-rated physical health ($OR = 0.691$, $p < .01$) had significant negative effects on the respondents' work stress. In terms of job types, respondents who work in enterprise and self-employed were significantly more stressed than those working in government departments ($OR = 1.273$, $p < .10$; $OR = 1.659$, $p < .01$). Compared with respondents living in rural neighborhoods, those living in urban neighborhoods reported significantly higher levels of work stress ($OR = 1.202$, $p < .05$).

The regression results on the relationship between commuting time and work stress for the two types of respondents (respondents who have regular physical exercise and respondents without regular physical exercise) are shown in Models 2 and 3 in Table 3. By comparing the respondents who exercise regularly with those without regular physical exercise, it was found that commuting time has a significant positive effect on the work stress of respondents without regular physical exercise ($OR = 1.159$, $p < .05$), but no significant effect on those who exercise regularly.

The regression results on the relationship between commuting time and work stress for the respondents who used active commuting are shown in Table 4. For respondents using active commuting, commuting time is significantly associated with their work stress ($OR = 1.731$, $p < .01$). However, among respondents who used active commuting, for those having regular physical exercise, commuting time has no significant effect on their work stress; while for those without regular physical exercise,

Table 1. Descriptive Statistics of the Variables Used in This Research ($N = 3156$).

	Respondents Using Active Commuting		Respondents Using Passive Commuting			
	Mean Value/ Proportion	*SD*	Mean Value/ Proportion	*SD*	Test Statistics/ Chi-Square	*p* Value
Continuous variable						
Work stress (−2–14)	5.07	3.06	4.81	2.99	2.35[a]	.019
Commuting time (0–6, hr)	0.32	0.39	0.66	0.69	−16.50[a]	.000
Annual personal income (yuan)	31456.67	67102.61	55101.25	183054.5	−4.65[a]	.000
Education level (1–11)	3.63	2.06	4.54	2.51	−10.98[a]	.000
Age (years old)	43.95	9.94	40.97	10.12	8.31[a]	.000
Health (1–5)	3.80	0.93	3.96	0.83	−5.13[a]	.000
Categorical variable						
Regular physical exercise (%)					9.94[b]	.002
Yes	19.51		24.18			
No	80.49		75.82			
Marital status (%)					0.93[b]	.628
Single	7.57		7.87			
Married	88.68		88.99			
Divorced and widowed	3.75		3.15			
Job type (%)					227.31[b]	.000
Government department	9.86		17.19			
Enterprise	21.81		41.32			
Self-employed and others	68.33		41.49			
Neighborhood types (%)					68.49[b]	.000
Rural neighborhoods	64.38		49.71			
Urban neighborhoods	35.63		50.29			

Note. [a]*t*-test statistics.
[b]Chi-square statistics.

Table 2. Mean Values of Work Stress of Respondents With Different Physical Exercise Frequency and Commuting by Different Transportation Methods.

		Mean Value of Respondents' Work Stress (*SD*)
Physical exercises	Regularly	4.24 ($SD = 3.03$)
	Irregularly	5.12 ($SD = 3.00$)
Commuting methods	Walking	5.10 ($SD = 3.01$)
	Bicycle	4.78 ($SD = 3.39$)
	Motorcycle	5.00 ($SD = 3.08$)
	Bus	4.65 ($SD = 2.86$)
	Private car	4.47 ($SD = 2.86$)

commuting time has a significant effect on their work stress ($OR = 2.170, p < .01$).

The regression results on the relationship between commuting time and work stress for the respondents who used passive commuting are shown in Table 5. For respondents using active commuting, commuting time has no significant effect on their work stress. Compared with those doing regular physical exercise, respondents without regular physical exercise have higher work stress ($OR = 1.341, p < .05$). However, for both respondents with and without regular physical exercise, commuting time has no significant effect on their work stress.

Discussion

Previous studies on the physical and psychological health of workers have largely focused on the separate impacts of commuting time, work stress, and physical exercise on

Table 3. Regression Results on Respondents' Work Stress.

	Model 1: All Respondents		Model 2: Respondents Who Have Regular Physical Exercise		Model 3: Respondents Who Do Not Have Regular Physical Exercise	
	OR	95% CI	*OR*	95% CI	*OR*	95% CI
Commuting time	1.148**	[1.013, 1.300]	1.101	[0.863, 1.404]	1.159**	[1.002, 1.341]
Without regular physical exercise (ref: have regular physical exercise)	1.247**	[1.037, 1.501]				
(log) annual personal income	0.975	[0.937, 1.014]	0.937	[0.856, 1.025]	0.984	[0.942, 1.028]
Education level	0.898***	[0.862, 0.936]	0.918**	[0.850, 0.991]	0.889***	[0.846, 0.933]
Age	0.971***	[0.963, 0.980]	0.957***	[0.939, 0.975]	0.975***	[0.966, 0.984]
Self-rated physical health	0.691***	[0.634, 0.753]	0.675***	[0.551, 0.826]	0.695***	[0.632, 0.765]
Marital status (ref: single)						
Married	1.177	[0.872, 1.589]	1.766*	[0.983, 3.172]	1.048	[0.735, 1.494]
Divorced and widowed	0.969	[0.593, 1.583]	1.388	[0.502, 3.842]	0.871	[0.495, 1.534]
Job type (ref: government department)						
Enterprise	1.273*	[0.987, 1.641]	1.189	[0.779, 1.814]	1.342*	[0.972, 1.854]
Self-employed and others	1.659***	[1.267, 2.172]	1.494	[0.914, 2.444]	1.747***	[1.252, 2.438]
Urban neighborhood (ref: rural neighborhood)	1.202**	[1.010, 1.429]	1.242	[0.855, 1.804]	1.211*	[0.994, 1.475]
Number of samples	3156		696		2460	
Log likelihood	−2081.048		−449.696		−1628.179	
Chi-square	212.866		47.368		146.404	

Note. Exponentiated coefficients; 95% confidence intervals in brackets.
*$p < .10$, **$p < .05$, ***$p < .01$.

Table 4. Regression Results on the Work Stress of Respondents Who Use Active Commuting.

	Model 4: All Respondents		Model 5: Respondents Doing Regular Physical Exercise		Model 6: Respondents Without Regular Physical Exercise	
	OR	95% CI	*OR*	95% CI	*OR*	95% CI
Commuting time	1.731***	[1.271, 2.358]	1.093	[0.600, 1.989]	2.170***	[1.457, 3.231]
Without regular physical exercise (ref: have regular physical exercise)	1.172	[0.872, 1.575]				
(log) annual personal income	0.976	[0.927, 1.028]	0.985	[0.861, 1.128]	0.973	[0.919, 1.030]
Education level	0.904***	[0.844, 0.968]	0.903	[0.791, 1.031]	0.902**	[0.831, 0.979]
Age	0.970***	[0.958, 0.982]	0.929***	[0.897, 0.961]	0.977***	[0.963, 0.990]
Self-rated physical health	0.627***	[0.553, 0.711]	0.553***	[0.403, 0.759]	0.652***	[0.568, 0.749]
Marital status (ref: single)						
Married	1.096	[0.690, 1.741]	3.108**	[1.120, 8.624]	0.896	[0.522, 1.541]
Divorced and widowed	0.949	[0.461, 1.950]	0.743	[0.107, 5.144]	0.953	[0.424, 2.142]
Job type (ref: government department)						
Enterprise	1.103	[0.702, 1.735]	1.446	[0.672, 3.113]	1.001	[0.558, 1.798]
Self-employed and others	1.556*	[0.982, 2.464]	2.135*	[0.925, 4.929]	1.426	[0.797, 2.550]
Urban neighborhood (ref: rural neighborhood)	1.090	[0.830, 1.433]	1.273	[0.686, 2.362]	1.108	[0.812, 1.512]
Number of samples	1440		281		1159	
Log likelihood	−932.268		−170.517		−753.766	
Chi-square	129.228		45.088		92.032	

Note. Exponentiated coefficients; 95% confidence intervals in brackets.
*$p < .10$, **$p < .05$, ***$p < .01$.

Table 5. Regression Results on the Work Stress of Respondents Who Use Passive Commuting.

	Model 7: All Respondents		Model 8: Respondents Doing Regular Physical Exercise		Model 9: Respondents Without Regular Physical Exercise	
	OR	95% CI	*OR*	95% CI	*OR*	95% CI
Commuting time	1.040	[0.901, 1.201]	1.175	[0.886, 1.558]	1.002	[0.847, 1.184]
Without regular physical exercise (ref: have regular physical exercise)	1.341**	[1.056, 1.704]				
(log) annual personal income	0.978	[0.920, 1.041]	0.903	[0.792, 1.030]	1.003	[0.934, 1.076]
Education level	0.895***	[0.850, 0.943]	0.937	[0.851, 1.032]	0.877***	[0.824, 0.934]
Age	0.971***	[0.960, 0.982]	0.969**	[0.946, 0.993]	0.972***	[0.959, 0.984]
Self-rated physical health	0.767***	[0.679, 0.865]	0.826	[0.628, 1.087]	0.757***	[0.661, 0.867]
Marital status (ref: single)						
Married	1.277	[0.857, 1.904]	1.456	[0.688, 3.081]	1.212	[0.752, 1.955]
Divorced and widowed	0.996	[0.504, 1.968]	1.806	[0.523, 6.236]	0.776	[0.343, 1.756]
Job type (ref: government department)						
Enterprise	1.376**	[1.011, 1.873]	1.106	[0.662, 1.847]	1.557**	[1.054, 2.301]
Self-employed and others	1.669***	[1.189, 2.341]	1.240	[0.656, 2.344]	1.893***	[1.250, 2.866]
Urban neighborhood (ref: rural neighborhood)	1.318**	[1.050, 1.656]	1.296	[0.799, 2.104]	1.344**	[1.035, 1.744]
Number of samples	1716		415		1301	
Log likelihood	−1139.769		−272.571		−862.770	
Chi-squared	98.589		14.259		76.472	

Note. Exponentiated coefficients; 95% confidence intervals in brackets.
*$p < .10$, **$p < .05$, ***$p < .01$.

employees' health (M. Guo et al., 2020; Sha et al., 2019a; Sun et al., 2020; Xu et al., 2017). Less attention has been paid to the interaction of all three and to the impact of physical exercise on commuting time. Owing to work stress, obese men are a vulnerable group who have become a cause for concern in China. This study analyzed the relationship between the commuting time, work stress, and physical exercise of obese men and investigated whether physical exercise affects commuters' work stress and tolerance of commuting time. Further, we have attempted to determine what these effects are.

This study found that people who did not exercise regularly were only able to endure shorter commutes and that long commuting times increased their work stress levels. There may be two reasons for this. Commuting is, in some ways, like physical exercise, because it consumes time and energy (Angrave et al., 2015; Gerber et al., 2020). People who do not regularly exercise may not do so due to time pressures. There are many things that occupy our time in modern life, such as working long hours and taking care of the older members of our families and/or children. Therefore, individuals desire short commutes to have more time to do other necessary things, which was confirmed by Christian (2012). On the other hand, people who exercise less regularly may be more prone to fatigue and exhaustion, because Gerber et al. (2014) found that physical exercise is related to health and physical recovery. In addition, studies have shown that being overweight or obese is associated with a higher risk of certain diseases, including heart disease, high blood pressure, gastrointestinal digestive problems, and respiratory problems (Dixon, 2010). Overweight people who do not exercise regularly have an increased risk of developing such health conditions. Therefore, people who do not exercise regularly have lower tolerance for lengthy commuting times and desire more time for rest. Lengthy commuting times will lead to increased physical and mental pressures, which will affect their work and thus further increase their work stress levels. Long commuting times are related to poor health outcomes (Halonen et al., 2020). An increase in work stress may further reduce people's tolerance for commuting times.

We found that obese men who exercised regularly were able to tolerate longer commuting times better than those who did not exercise regularly, and that commuting time had no additional or simultaneous impact on their work stress levels. Long commutes often result in physical fatigue, as some individuals must stand for a long time on public transport without a seat during rush hour, and others endure long driving times due to traffic congestion. They can also have effects on mental health; for example, uncomfortable and crowded public transport or traffic noise can make people irritable and unhappy. Previous studies have shown that participating in regular

physical activity contributes to significant improvements in adults' quality of life and that higher levels of physical activity can act as a buffer for stress (Crews & Landers, 1987; Xiao et al., 2019). Therefore, it is possible that regular physical activity buffers the stress and negative effects of a long commute (Stults-Kolehmainen & Sinha, 2014). People who regularly exercise may have more energy and a more relaxed mood, making them more capable of enduring longer commutes. Furthermore, long commuting times have no additional impact on their work stress, which may be a result of the fact that the impact of long commuting times on work stress mainly lies in the tiredness it produces and the energy it consumes. Physical exercise can act as a buffer against these negative effects, meaning that long commuting times are less likely to increase an individual's work stress. A longitudinal study conducted by Gerber et al. (2014) found similar results that physical exercise is related to the ability to resist occupational stress.

Physical exercise is a significant factor affecting commuting time tolerance in obese men. The definition of an obese or overweight person is generally based on their BMI, which considers weight in comparison to height. BMI is a common, international standard for measuring the degree of obesity. Nonetheless, BMI is an inaccurate measure of obesity. Many people who are muscular and of a healthy weight have a BMI of more than 25, which would normally be classified as overweight (Speed et al., 2019). Furthermore, how much of an individual's BMI is due to fat, and where this fat is located, might also be of importance (Berner et al., 2015). Therefore, in the case of these body fat levels being unobtainable, the frequency of an individual's physical exercise can, to some extent, effectively reflect the health and physical fitness of people categorized as overweight or obese according to their BMI. Physical fitness is an important factor affecting men's tolerance for commuting times. Men designated as obese due to their BMI who do not exercise regularly are more likely to be unhealthy and therefore be less tolerant of commuting times. Men designated as obese due to their BMI who exercise regularly are more likely to be physically fit and therefore have a higher tolerance for commuting times. Additionally, the results of our study may have significance as reference points for other relevant studies into obesity that is based on BMI. Future studies may wish to take the factors of individual exercise habits into account in obesity-related research, which relies on BMI to increase the accuracy of research results.

Many studies show that urban or transportation planning has the potential to contribute substantially to the physical activities and health of urban residents (Jiang et al., 2017; Lee & Moudon, 2004; Litman, 2003; Sallis et al., 2016), for example, through better urban planning and traffic distribution, which encourages more walking and cycling. Therefore, this study proposes the following three policy suggestions. First, commuting is a part of an urban resident's work life and has an impact on employees' work stress and health. Transportation planning should consider the commuting needs of vulnerable groups, such as obese men with long commuting times and high levels of work stress. This might include establishing convenient transfer facilities, creating comfortable travel environments, and subsidizing transportation based on commuting time. Second, urban and transportation planning in China lacks health-oriented policy guidelines. Urban planning and health policies should consider the positive health effects generated by physical exercise and should encourage enterprises with high levels of work stress and/or long working hours to equip their workplaces with fitness equipment or gyms according to the number of employees. Enterprises might also be encouraged to take athletic facilities into account when choosing the location of their workplaces and employees' residential areas. It might also be important to consider keeping necessary stores and services within walking distance of residential areas, encouraging people to walk more. Third, the implementation of a people-oriented transport policy is conducive to social equity. The protection of the temporal-spatial right of way for pedestrians and cyclists is not yet fully consummated in China. The Chinese government needs to promote slow and nonmotorized traffic systems, by, for example, building more attractive fitness trails around subways, improving traffic infrastructure to ensure the safety of those walking and cycling, and creating more accessible bike sharing facilities. All the above would be beneficial for obese men, enabling them to participate in physical exercise during their commutes in a time-efficient manner.

The limitations of this study are mainly in two aspects. First, the health effects of commuting are not only related to commuting time and methods, but also to the commuting environment. If people's traffic environment is seriously polluted (such as air pollution), this will exacerbate the negative health effects of commuting. However, since the data used in this study do not contain information about commuting environment, further research on the health effects of the commuting environment can be carried out in the future. Second, in this study, we found that physical exercise had a positive moderating effect on the stress effect caused by a long commute. But the health effects may vary depending on the type of exercise people perform. This aspect also needs to be further analyzed in future research.

Conclusion

This study found that commuting time had a significant positive impact on Chinese obese men's perceived job

stress, and that the longer the commute time was, the more likely it was to increase their perceived job stress. Physical exercise, on the other hand, was shown to be an effective method to significantly increase resistance to work stress. This study found that commuting time had a significant impact on the perceived work stress of obese men who exercised irregularly. It also found that the relationship between commuting time and work stress was different among groups with different commuting styles. For obese men who commuted on foot or motorcycle, commuting time had a significant impact on their job stress. However, for obese men who commuted by bicycle, bus, or car, commuting time had no significant effect on job stress.

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ORCID iD

Junlan Chen https://orcid.org/0000-0002-3531-1082

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