Prevalence and Patterns of Active Commuting According to Socio-demographic Factors in the Chilean Population

Short title - Active commuting in Chile

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Conflict of interest

None declared.

Abstract

Introduction: The objective of this study was to investigate levels of self-reported active commuting by socio-demographics factors in Chile. **Methods:** This cross-sectional study was conducted in 5,157 participants (women: 59.3%, age range 15-101 years) from the Chilean National Health Survey (CNHS) 2009-2010. The Global Physical Activity Questionnaire (GPAQ v2) was utilised to measure frequency and time spent in active commuting (walking or cycling). In addition, age, sex, education, place of residence, income and occupation were used as socio-demographics factors of interest. **Results:** 31.9% [95% Confidence Interval (CI): 29.7; 34.2] of the population reported not doing any form of active commuting, this prevalence was higher in women than men (34.0% vs. 29.7%), in older (≥65y) than younger individuals (≤24y) (44.1% vs. 24.4%), in individuals with lower education compared to higher education (38.4% vs. 28.2) and in retired individuals than in those who were employed (46.0% vs. 31.2%). Being a non-active commuter was associated with a higher prevalence of physical inactivity (OR: 11. 1 [95% CI: 8.27; 14.8], p<0.0001). Similar findings were observed when analyses were stratified by socio-demographics factors. **Conclusions:** Our findings show that prevalence and levels of active commuting differ by socio-demographic factors. In addition, our results provide evidence that commuting physical activity is an important domain that contribute to achieving the physical activity guidelines. Individuals who do not engage in active commuting presented a higher prevalence of physical inactivity.

Keywords: Active travel; Active commuting; Walking; Cycling; Physical activity; Sociodemographic;

1. INTRODUCTION

In recent decades, the Chilean population has reported an important shift towards westernised lifestyles, including mainly the adoption of poor dietary habits and low physical activity (PA) levels (Fisberg et al., 2017; Guthold et al., 2018). These changes in lifestyle have been linked to an increasing prevalence of obesity and cardiovascular risk factors in the population (NCD, 2016). Currently, more than 74.2% of the Chilean population is overweight or obese, 26.6% is physically inactive, 27.6% and 12.3% had hypertension and diabetes, respectively (MINSAL, 2017) .

Despite the fact that strong evidence supports the link between PA and health outcomes such as obesity and non-communicable diseases (Celis-Morales et al., 2019; Celis-Morales et al., 2018; WHO, 2010), 26.6% of the Chilean population remain physically inactive (Guthold et al., 2018). However, physical inactivity prevalence differs considerably by sociodemographic factors (Guthold et al., 2018). Previous evidence has reported that physical inactivity is higher in women, older adults and individuals with lower education levels (Celis-Morales et al., 2011; Celis-Morales et al., 2012; Díaz-Martínez et al., 2018). Despite the efforts made by policy makers in Chile to tackle physical inactivity, the prevalence continues increasing, moving from 20.1% in 2003 to 26.6% in 2017 (Guthold et al., 2018). Therefore, there is an urgent need to explore different approaches that may help us to increase PA levels in the population.

Active travel may offer a feasible way to integrate PA into our daily routine and it could also tackle some of the main barriers identified in the population for not engaging in regular PA such as lack of time, education and socio-economic status (Shephard, 2008). Moreover, active commuting is an inexpensive and practical approach to increasing the overall PA levels of the population in order to reduce the risk of NCDs (Shephard, 2008). Some of the benefits associated with active commuting include a reduction in obesity related markers (Flint et al., 2016; Garrido-Méndez et al., 2017; Steell et al., 2017) and chronic diseases such as diabetes, hypertension, cardiovascular diseases, cancer and premature mortality (Celis-Morales et al., 2017; Hou et al., 2004; Hu et al., 2007; Hu et al., 2005; Steell et al., 2017).

However, there is limited information on prevalence and levels of active commuting in Latin American populations, including Chile (da Silva et al., 2016; Del Duca et al., 2016; Kienteka et al., 2014; Rodríguez-Rodríguez et al., 2017; Sa et al., 2013; Steell et al., 2017). Most of the evidence available to date has been generated in the Brazilian population (da Silva et al., 2016; Del Duca et al., 2016; Kienteka et al., 2014; Sa et al., 2013). With the huge socioeconomic diversity across Latin American countries patterns of active commuting could differ by socio-demographics factors but also within Latin American countries. Therefore, this study aimed to examine the prevalence of active commuting, such as walking or cycling, by socio-demographic factors in Chile.

2. Material and methods

2.1 Study Design

This cross-sectional study was conducted in 5,157 participants from the Chilean National Health Survey 2009 -2010 (MINSAL, 2010). The CNHS is a nationally representative population-based study conducted every 6 years, which aims to investigate risk factors, lifestyle and health outcomes in the Chilean population (aged ≥15 years). The survey response rate was 85% whereas 12% of the people invited to take part in the CNHS rejected the invitation. The age of the recruited population ranged from 15 to 101 years, 87% of the recruited population were from urban cities and 48.7% were men.

Data collection occurred in two stages: the first stage (n=5,434) was comprised of face-to-face interviews to collect information on self-reported health, household characteristics and living conditions. In the second stage (n=4,956) phenotypic and biological samples were collected. A total of 5,276 (97%) people provided data on PA behaviours collected with the Global Physical Activity Questionnaire (GPAQ), version 2. In addition, 121 participants (3%) with PA data were excluded based on the GPAQ protocol for outlier detection (48% were women). Complete data was available for 5,157 participants for the present analysis (MINSAL, 2010).

2.2 Ethical approval

The CNHS was funded by the Chilean Ministry of Health and developed by the Department of Public Health, from the Pontificia Universidad Católica de Chile. Moreover, the CNHS 2009 – 2010 was approved by the Ethics Research Committee of the Faculty of Medicine at the Pontificia Universidad Católica de Chile (Reference number 09-113). All CNHS participants provided written consent, prior to participation, to take part in the CNHS 2009 – 2010 (MINSAL, 2010).

2.3 Physical activity and active commuting

To ensure the quality of data collection, both nurses and technicians underwent joint training sessions prior to the survey and standardized protocols were used (MINSAL, 2010). The GPAQ (version 2) was used to measure PA and sitting time, a proxy of sedentary behaviours, in the CNHS (WHO, 2009). Developed by the World Health Organization (WHO) to measure population-level PA, the GPAQ uses standardised protocols shown to be reliable, valid and adaptable to incorporate cultural and other differences (Aguilar-Farias and Leppe, 2016; Bull et al., 2009; Hoos et al., 2012). The GPAQ assesses total time spent sitting and time spent on active commuting (travel-related PA). For the active commuting domain, participants were asked the following questions: (i) Do you walk or use a bicycle (pedal cycle) for at least 10 min continuously to get to and from places? (Yes, No); (ii) In a typical week, on how many days do you walk or bicycle for at least 10 min continuously to get to and from places? and (iii) How much time do you spend walking or bicycling for travel on a typical day? These questions were used to derive time spent on active commuting in minutes per day. Total PA was reported as metabolic-equivalent value (MET) using recommendations made by the GPAQ protocol (4-METs was used for transport-related activities and moderate intensity physical activities, whereas 8-METs was used for vigorous intensity physical activities) (WHO, 2009). The GPAQ uses algorithms to categorize weekly PA into two categories: inactive individuals (<600 MET-min.week^{-1}) and active individuals (≥600 MET-min.week^{-1}) (WHO, 2009). Sitting time, a proxy of overall sedentary behaviours, was collected using the following question: How much time do you usually spend sitting or reclining on a typical day? (WHO, 2009).

2.4 Sociodemographics

Sociodemographic data were collected for all participants, including age, sex, education level (primary, <8 years; secondary, <12 years; beyond secondary, >12 years), monthly household income (low, ≤$US 480; middle, $US 481–865; high, ≥$US 866) and place of residence (urban or rural) using nationally validated questionnaires (MINSAL, 2010).

2.5 Anthropometrics

Anthropometric markers were measured using standardised protocol. Height was measured to the nearest 0.1 cm using a portable stadiometer and body weight was measured to the nearest 0.1 kg using a digital scale (Tanita HD313), for both measurements participants were instructed to remove their shoes and wearing light clothing, as described elsewhere (MINSAL, 2010). Body mass index (BMI) was calculated as [weight/height^2] and classified using the WHO criteria (<18.5 kg m^{-2}, underweight; 18.5–24.9 kg m^{-2}, normal; 25.0–29.9 kg m^{-2}, overweight;

$\geq$30 kg m^{-2}, obese) (WHO, 2016). Central obesity was defined based on waist circumference using >102cm cut-off points for men and >88 cm for women (WHO, 2008).

2.6 Statistical analysis

Statistical analyses were performed using survey-weighted values and the statistical software package Stata MP version 15 (StataCorp; College Station, TX). A two-sided α-level of 0.05 was used and all analyses accounted for the complex sample design of CNHS 2009-2010 data.

Descriptive characteristics were presented as means and standard deviation (SD) for quantitative variables, for categorical variables data was presented as proportion and their 95% confidence intervals. Quantitative variables were inspected for normality using skewness and kurtosis normality tests. For all analysis, self-reported time spent on active commuting was stratified into the following two categories: non-active commuters (include those who reported non-walking or cycling as part of their commute) and active commuters (include those who reported ≥10 minutes per day of walking or cycling associated to their commute).

For statistical analysis, age was stratified into five categories (<18, 18–29, 30-49, 50-64 and ≥65 years). Years of education were classified into three categories (<8, 8–12 and >12 years of formal education). Monthly household income was stratified into three categories: low, ≤$US 480; middle, $US 481–865; high, ≥$US 865). The lowest category is equivalent to the individual minimum wage in Chile.

The prevalence of non-active commuters by sociodemographics factors (age, sex, place of residence (rural or urban), education, gross income, and current working status) was investigated using logistic regression and weighted-survey prevalence and their 95% confidence interval (95% CI) estimated were produced. The difference within groups was derived using logistic regression; however, when the exposure of interest had ≥3 categories, then a p-value for trend was derived. To investigate whether people who were classified as non-active commuters were more likely to do not meet the PA guidelines we conducted logistic regression analyses. The reference group were active commuters; therefore, the odds ratios and 95% CI for being physically inactive were estimated for non-active commuters. These analyses were stratified by sociodemographic factors and adjusted for age, sex, education, place of residence, working status and BMI (except when these were used as main exposure in the analysis). To test an interaction effect between commuting mode and socio-demographic factors (age categories, sex, place of residence, education categories, gross income categories and occupation status) on meeting guidelines physically, a multiplicative interaction term between commuting mode (coded as binary variable 0=non active commuters; 1=active commuters) and socio-demographic factors (coded as ordinal variable i.e. 0, 1 and 2) was fitted into the logistic regression model. A significant interaction means that the association between commuting mode and meeting the physical activity guidelines differ by categories of the socio-demographic factor of interest.

3. Results

Table 1 shows the cohort characteristics according to non-active and active commuters. In summary, compared to active commuters those classified as non-active commuters were older. Total levels of PA were 1.8 times higher in active commuters compare to non-active commuters, as well as moderate and vigorous intensity PA (Table 1). No major differences were observed for sitting time between the active commuting groups (Table 1).

When the prevalence of non-active commuters by sociodemographic factors was investigated, this was higher among individuals who were retired compared to active workers and in older adults compared to younger or middle age individuals ($p<0.05$) (Table 2). Similarly, individuals with high education had a lower prevalence of active commuting than those with lower education ($p=0.006$). However, no significant differences or trend were observed for the prevalence of non-active commuters within sex ($p=0.065$), place of residence ($p=0.071$) and gross income categories ($p=0.965$), as shown in Table 2.

When time spent in active commuting by sociodemographic factors was investigated, women reported 9.27 $min.day^{-1}$ lower commuting time than men ($p=0.023$) (Table 3). Individuals who were retired, reported 20.9 $min.day^{-1}$ lower time spent in active commuting compare to those who were employed ($p<0.0001$). The difference in time spent in active commuting was bigger between age categories, compare to individuals aged ≤24 those aged ≥65 years reported 19.2 $min.day^{-1}$ lower commuting time. No significant differences were observed on time spent on active commuting between education ($p=0.173$) and income categories ($p=0.804$) (Table 3).

Not engaging in any active commuting was associated with a higher prevalence of physical inactivity compare to active commuters (OR: 11.1 [95% CI: 8.27; 14.9], $p<0.0001$) (Table 4). When the odds of being physically inactive in non-active commuters was investigated by socio-demographics factors, we found that there was a significant interaction of commuting mode with place of residency, education and working status ($p<0.05$) (Table 4). Compared to active commuters' those classified as non-active commuters living in rural or urban locations were associated with higher levels of physical inactivity (OR rural: 33.0 [95% CI: 16.7; 64.9], $p<0.0001$; and OR urban: 9.95 [95%CI: 7.26; 13.6], $p<0.0001$), although the association were significantly higher in rural than urban setting (p-interaction=0.006). Similarly, the association between occupational status (retired versus employed) and active commuting shows that the prevalence of physical inactivity was significantly higher in those who reported being retired and not doing any active commuting than those who were employed but who also reported not doing any active commuting (OR retired individuals: 21.3 [95% CI: 10.6; 42.7] versus OR for employed individuals: 7.63 [95% CI: 4.78; 12.1]), p-interaction=0.010. For education, individuals who reported being non-active commuters across all education categories had a higher odd for being physically inactive, however the magnitude of the association was higher in individuals with lower or middle education levels compare to those with higher education (p-interaction=0.028). Although no significant interactions were found for commuting category with age, sex and income categories, being a non-commuter was associated with a higher odd of being physically inactive across all these categories (Table 4).

4. Discussion

The main findings of this study suggest that in Chile active commuting differs by age, occupation status and education levels but not for sex, income or place of residency. Not engaging in active commuting was most common for older adults, people who are retired and those with lower education levels. Moreover, our study found that active commuting is one of the main domains contributing to achieving PA guidelines, as those who reported not doing any active commuting were strongly associated with higher prevalence of physical inactivity. This association was even stronger for occupation status (retired versus employed individuals). The aforementioned results allow identifying which sociodemographics factors associate with active commuting, specially, which groups are less likely to engage in active commuting and therefore could be at higher risk of not meeting the current PA guidelines and developing non-communicable diseases (Celis-Morales et al., 2019; Celis-Morales et al., 2017; Steell et al., 2017). This information could be used in turn to implement policies that generate a bigger governmental investment in creating safe walking and cycling infrastructure to promote active commuting. By promoting and implementing walking and cycling programs across the lifespan, especially in older adults and retired individuals who would specially benefit by engaging in PA levels.

With regards education and income, as a marker of socio-economic status, our findings conflict with previous evidence generated from studies conducted in brazilian population (da Silva et al., 2016; Del Duca et al., 2016; Kienteka et al., 2014). Kienteka and cols., reported from a household survey involving 677 adults that active commuting was more common in individuals with a low socioeconomic status (Kienteka et al., 2014). Similarly, da Silva and cols., using nationwide data from 46,981 workers from the survey "Lifestyle and leisure habits of industry workers" in 24 Brazilian states (2006-2008) reported that adults with lower education levels were more likely to commute actively. These findings are opposite to the ones reported by our study were individuals with lower education levels were less to engage in active commuting. This discrepancy could be explained by other sociodemographic factors not measured in this study, including but not limited to commuting distance, time used in transport and urban planning. This last factor could be particularly relevant to understand this difference in active commuting across Latin American countries as more deprived sectors of the population may live at the periphery of towns which make active commuting less likely to be adopted, as larges distance need to be covered which make walking or cycling an unfeasible option.

Similar studies have reported that a gender difference exists between men and women, with men more likely to engage PA than women (Díaz-Martinez et al., 2017). A previous study reported that in women, feeling unsafe when doing PA was a key factor negatively associated with bicycling and walking as part of their commuting (Alvim de Matos et al., 2018). Although the sex difference in active commuting in our study agrees with the findings from Alvim de Matos et al. (2018) study, we were unable to investigate what factors explained these differences within sex in Chile. A recent study conducted in the Chilean population also confirmed that there is an important sex difference on time spent in active commuting (Concha et al., 2019). In this study, Concha et al reported that women aged ≤20 years spent on average 53.5 minutes per day in walking or cycling as part of their commuting, whereas men with a similar age spent 45% more time than women (77.7 minutes per day) in commuting related PA. Levels of active commuting decreased substantially with increasing age, where men aged ≥80 years spent on average 27.2 minutes per day in active commuting compare to 16.1 minutes per day in women of a similar age (Concha et al., 2019).

Age was another strong factor associated with active commuting patterns in Chile. Although there is strong evidence that PA declines with age, there is scarce evidence regarding active commuting patterns across the lifespan, especially in Lain American countries. A recent cross-sectional population-based study conducted in 12,402 adults and 6,624 elderly in 100 counties from 23 States of Brazil found that only 33.4% of adults and 26.1% of the elderly population evaluated, participated in active commuting showing that cycling or walking, as a form of commuting is unusual. However, a recent Chilean study reported that age has a strong effect in active commuting, where 28% of women and 21% of men aged <20, reported not doing any PA related to commuting (Concha et al., 2019). This prevalence increased to above 60% for women and men aged ≥80, which is in line with our study showing that older adults, especially, those reaching retirement age, experienced a significant decrease in active commuting levels. These findings are also corroborated by occupation status, where individuals who were actively working were more likely to engage in active commuting than retired individuals. This may have important clinical and public health implications, as it is suggested that retirement age can not only have a negative impact on the overall PA levels of the population but also could have a strong impact on an individual's health (Stenholm et al., 2014; Wu et al., 2016). Therefore, reducing active commuting, which is one of the main contributors to total PA in older adults (McDonald et al., 2017), may accelerate the development of NCDs and increase frailty in older adults (Stenholm et al., 2014; Wu et al., 2016). Surveillance data on how active commuting differs by age and other socio-demographics factors, especially during the retirement transition are important for informing and designing effective interventions targeting PA patterns during this period. Therefore, it is necessary to conduct further research so that public policies can utilise these findings to reduce the barriers to PA and to promote active commuting.

4.1 Strengths and Limitations

The CNHS offered an opportunity to assess our research question in a nationally representative sample of Chile. However, a key limitation of this study, in common with much of the literature on active commuting, is the self-reported measurement of active commuting. The CNHS participants were asked to report their time spent on commuting PA, meaning mixed-mode or single-mode journeys (i.e. cycling only, walking only and public transport) were not captured in the present study. Additionally, the cross-sectional nature of this study provides further limitation for any causal inference. As is the case with any observational study, there is the possibility of reverse causation and residual confounding. This is thought to be because individuals who are unhealthy (i.e. those who are obese or who have diabetes) are unable to engage in active commuting.

5. Conclusions

The findings of this study report how the patterns and prevalence of active commuting differ by sociodemographic factors, including age, sex, occupation and education. Moreover, our study provides key information that active commuting is a main PA domain contributing to meeting the current PA guidelines. Identifying factors associated with active commuting (cycling and walking) would be relevant when developing strategies to encourage or promote active commuting and therefore increase the overall PA levels at a population level.

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Table 1. Sociodemographic, anthropometric and lifestyle characteristics of the population according to active commuting categories.

	Non-active commuter (N=1,794)	**Active commuter (N=3,363)**
Socio-demographic		
Age (years)	44.5 (43.0; 45.9)	39.9 (39.0; 40.9)
Sex		
Women	54.8 (50.3; 59.0)	49.8 (46.7; 52.8)
Men	45.2 (40.9; 49.6)	50.2 (47.1; 53.2)
Geographic zone, (%)		
Rural	14.8 (12.3; 17.7)	12.0 (10.5; 13.7)
Urban	85.2 (82.3; 87.6)	88.0 (86.3; 89.5)
Years of formal education	10.4 (10.0; 10.7)	10.8 (10.6; 11.1)
Educational level, (%)		
Up to primary (<8 years)	22.4 (19.4; 25.6)	16.8 (14.9; 18.9)
Secondary (8-12 years)	55.7 (51.4; 59.9)	57.0 (53.9; 60.0)
Beyond secondary (>12 years)	21.8 (18.2; 55.9)	26.0 (23.2; 29.1)
Socio-economic level, (%)		
Low	47.5 (43.2; 51.8)	49.8 (46.8; 52.9)
Middle	40.3 (35.9; 44.8)	35.5 (32.7; 38.5)
High	12.2 (35.9; 44.8)	14.6 (12.5; 17.0)
Working status, (%)		
Working	77.5 (772.8; 81.5)	86.6 (84.2; 88.6)
Retired	22.5 (18.4; 27.1)	13.4 (11.3; 15.8)
Anthropometrics		
Weight (kg)	72.9 (71.6; 74.2)	71.9 (70.9; 72.8)
IMC ($kg.m^{-2}$)	27.7 (27.3; 28.1)	27.1 (26.6; 27.6)
Nutritional status		
Underwieght <18,5 $kg.m^{-2}$	1.5 (0.6; 3.3)	1.8 (1.2; 2.6)
Normal 18,5–24,9 $kg.m^{-2}$	30.6 (26.7; 34.8)	35.3 (32.3; 38.4)
Overweight ≥25,0–29,9 $kg.m^{-2}$	38.7 (34.6; 43.1)	40.1 (37.1; 43.1)
Obese ≥30,0 $kg.m^{-2}$	29.1 (25.5; 32.9)	22.8 (20.5; 25.2)
Waist circumference (cm)	91.4 (90.3; 92.5)	89.5 (88.7; 90.3)

Central obesity, (%)		
Normal	57.0 (52.5; 61.2)	59.2 (56.1; 62.2)
Obese	43.0 (38.7; 47.4)	40.8 (38.7; 47.4)
Physical activity		
Total physical activity (MET-hour.week^{-1})	79.7 (69.1; 90.3)	147.6 (138.2; 157.1)
Commuting physical activity (min.day^{-1})	0 (0; 0)	72.0 (66.5; 77.4)
Moderate physical activity (min.day^{-1})	93.7 (80.1; 107.4)	118.9 (110.3; 127.6)
Vigorous physical activity (min.day^{-1})	38.5 (29.3; 47.7)	62.7 (54.3; 71.1)
Sitting time (hour.day^{-1})	3.95 (3.66; 4.24)	3.50 (3.33; 3.68)
Physical inactivity, (%)	47.5 (43.3; 51.7)	7.4 (5.9; 9.2)
Smoking, (%)		
Never	37.4 (33.4; 41.5)	36.5 (33.7; 39.3)
Ex-smoker	25.2 (21.5; 29.4)	21.8 (19.5; 24.3)
Smoker	37.3 (33.3; 41.4)	41.6 (38.6; 44.8)

Data presented as mean (95% CI) for continuous variables and as % (95% CI) for categorical variables.

Table 2. Prevalence non-active commuters by socio-demographic factors in Chilean adults.

Socio-demographics factors	Prevalence (95% CI)
Age categories	
≤24 years	24.4 (20.0; 28.7)
25-44 years	30.6 (26.6; 34.6)
45-64 years	34.2 (30.1; 38.3)
≥65 years	44.1 (38.2; 50.1)
P-trend	<0.0001
Sex	
Women	34.0 (31.1; 36.9)
Men	29.7 (26.1; 33.2)
P-value	0.065
Place of residency	
Rural	36.6 (31.1; 42.1)
Urban	31.2 (28.7; 33.7)
P-value	0.071
Education	
<8 years	38.4 (33.9; 43.0)
8-12 years	31.4 (28.4; 34.4)
>12 years	28.2 (23.1; 33.3)
P-trend	0.006
Gross income categories	
Low	31.6 (28.5; 34.7)
Middle	35.4 (31.3; 39.6)
High	28.7 (22.1; 35.3)
P-trend	0.965
Occupation status	
Working	31.2 (27.7; 34.7)
Retired	46.0 (39.4; 52.5)
P-value	<0.0001

Data presented as survey weighted prevalence and their 95% confidence intervals. Differences on prevalence within socio-demographics factors was estimated using logistic regression analyses. Household income was stratified into three categories: low, ≤$US 480; middle, $US 481–865; high, ≥$US 865.

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Table 3. Time spent in commuting physical activity by socio-demographic factors.

Socio-demographics factors	Mean (95% CI)
Age categories	
≤24 years	54.8 (46.1; 63.5)
25-44 years	48.2 (42.6; 53.8)
45-64 years	51.2 (42.3; 60.2)
≥65 years	35.5 (28.2; 42.8)
P-trend	0.029
Sex	
Women	44.5 (40.2; 48.8)
Men	53.7 (47.0; 60.5)
P-value	0.023
Place of residency	
Rural	46.9 (39.1; 54.8)
Urban	49.3 (44.9; 53.7)
P-value	0.613
Education	
<8 years	40.2 (34.4; 46.1)
8-12 years	52.3 (46.4; 58.3)
>12 years	48.1 (41.2; 55.1)
P-trend	0.173
Gross income categories	
Low	47.7 (42.8; 52.6)
Middle	51.3 (44.3; 58.3)
High	43.6 (36.2; 51.1)
P-trend	0.804
Occupation status	
Working	52.3 (46.6; 57.96)
Retired	31.2 (24.9; 37.6)
P-value	<0.0001

Data presented as adjusted means and their 95% confidence intervals (95%CI). Differences time spent in active commuting (walking and/or cycling) within socio-demographics factors was estimated using linear regression analyses. Household income was stratified into three categories: low, ≤$US 480; middle, $US 481–865; high, ≥$US 865. Analyses were adjusted for age, sex, education, place of residence, working status and BMI (except when these were used as main exposure in the analysis).

Table 4 . Odds ratio for meeting physical activity guidelines on active commuters and non-active commuters by socio-demographic factors.

Socio-demographics factors	Active commuter OR (95% CI)	Non-active commuter OR (95% CI)	P-value	P for interaction [commuting*sociodemographic]
Age categories				
≤24 years	1.00 (Ref.)	13.0 (6.76; 25.7)	<0.0001	
25-44 years	1.00 (Ref.)	9.84 (5.88; 16.4)	<0.0001	0.516
45-64 years	1.00 (Ref.)	10.6 (6.08; 18.6)	<0.0001	
≥65 years	1.00 (Ref.)	16.5 (9.61; 28.6)	<0.0001	
Sex				
Women	1.00 (Ref.)	12.4 (8.75; 17.7)	<0.0001	0.293
Men	1.00 (Ref.)	9.27 (5.65; 15.2)	<0.0001	
Place of residency				
Rural	1.00 (Ref.)	33.0 (16.8; 64.9)	<0.0001	0.006
Urban	1.00 (Ref.)	9.95 (7.26; 13.6)	<0.0001	
Education				
<8 years	1.00 (Ref.)	14.1 (8.38; 23.8)	<0.0001	
8-12 years	1.00 (Ref.)	15.7 (10.4; 23.6)	<0.0001	0.028
>12 years	1.00 (Ref.)	6.55 (3.58; 12.0)	<0.0001	
Gross income categories				
Low	1.00 (Ref.)	14.4 (10.0; 20.6)	<0.0001	
Middle	1.00 (Ref.)	11.2 (6.87; 18.4)	<0.0001	0.270
High	1.00 (Ref.)	9.80 (4.28; 22.4)	<0.0001	
Occupation status				
Working	1.00 (Ref.)	7.652 (4.78; 12.1)	<0.0001	0.010
Retired	1.00 (Ref.)	21.3 (10.6; 42.7)	<0.0001	

Data presented as adjusted odds ratios and 95% confidence intervals (95%CI). The reference category were those individuals classified as active commuters. Therefore, the odds ratio represented the odds for not meeting the physical activity guidelines (>600 MET-min.wek^{-1}) in non-active commuters compare to active commuters. An interaction effect between the commuting and socio-demographic factors was investigated using logistic regression. A multiplicative interaction term between commuting (coded as binary variable 0=non-commuters and 1=commuters) and the socio-demographics factors (coded as ordinal variables 0, 1 and 2) was fitted into the logistic regression model. If the interaction term was significant $p<0.05$ then the association between commuting and meeting the physical activity guidelines is not the same across the categories of the socio-demographics factor of interest. Analyses were adjusted for age, sex, place of residency, education and BMI, except when these ones were used as main exposure in the model. Household income was stratified into three categories: low, ≤$US 480; middle, $US 481–865; high, ≥$US 865.