frontiers | Frontiers in Built Environment

TYPE Original Research
PUBLISHED 31 August 2023
DOI 10.3389/fbuil.2023.1257198

OPEN ACCESS

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RECEIVED 14 July 2023
ACCEPTED 14 August 2023
PUBLISHED 31 August 2023

CITATION
Razzak HA, ElShamy A, Harbi A, AlKarbi M, Al Shaali L, Salama R, Alosi A and Madi HHN (2023), A cross-sectional study: exploring the relationship between commuting time and subjective wellbeing in the UAE.
Front. Built Environ. 9:1257198.
doi: 10.3389/fbuil.2023.1257198

A cross-sectional study: exploring the relationship between commuting time and subjective wellbeing in the UAE

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Background: Commuting has become an integral part of modern life, impacting individuals' daily routines and overall wellbeing. The duration of commuting has been recognized as important determinants of subjective wellbeing, with potential implications for public health.

Aim: To examine the association between commuting time and subjective wellbeing across the seven emirates of the UAE.

Methods: A cross-sectional survey was conducted on adults aged 18 years and above, encompassing both officially employed and self-employed individuals in the UAE. The sample of 5,476 participants was randomly selected from the population across the seven Emirates. To assess subjective wellbeing, the WHO-5 instrument, available in 31 languages and known for its ease of completion, scoring, and interpretation, was employed. Both Arabic and English versions of the tool were provided to the participants. Logistic regression analysis was conducted to investigate the relationship between commuting time and wellbeing, while controlling for individual, social, economic, and environmental factors. The adjusted odds ratios (aORs) were calculated to determine the association with poor wellbeing.

Results: The commuting time was associated with a higher odds ratio (OR) of experiencing poor subjective wellbeing. This association remained consistent even after accounting for individual, social, economic, and environmental factors in the analysis models. Among employees with commuting times greater than 60 min, the adjusted OR of poor subjective wellbeing was 2.24 (95% CI, 1.82–2.77) times higher compared to individuals with less than 15 min of commuting time. Similarly, for employees with commuting times between 31 and 60 min, the adjusted OR of poor subjective wellbeing was 1.7 (95% CI, 1.39–2.09) times higher, while for those with commuting times between 15 and 30 min, the adjusted OR was 1.26 (95% CI, 1.04–1.53) times higher, both compared to individuals with less than 15 min of commuting time.

Conclusion: The findings of this study indicate that commuting time plays a crucial role in determining the subjective wellbeing of employees in the UAE. Specifically, employees with longer commuting times tend to report lower levels of subjective wellbeing. This suggests a potential opportunity to implement policies aimed at reducing commuting durations, which could ultimately enhance the wellbeing of the employed workforce. Such measures have the potential to positively impact the mental wellbeing of employees in the United Arab Emirates.

KEYWORDS

Subjective, WHO-5, wellbeing, commuting time, United Arab Emirates

1 Introduction

Wellbeing is a multidimensional concept that encompasses the overall state of an individual's physical, mental, emotional, social health and happiness (Ruggeri et al., 2020). It encompasses a sense of fulfillment, contentment, and harmony in various domains of life, such as physical health, emotional stability, social relationships, and a purposeful existence. Achieving wellbeing involves maintaining a positive outlook, effectively coping with challenges, nurturing supportive connections, and pursuing activities that promote personal growth and meaning (Ereaut and Whiting, 2008). It is a dynamic and interconnected state that reflects the overall quality of life and the ability to thrive in the face of diverse circumstances and experiences.

Subjective wellbeing (SWB) is the central focus in establishing and nurturing societies of wellbeing. It represents a complex and multifaceted aspect of life. The determinants of SWB can be categorized into seven groups, namely, basic demographics, personality traits, health and functioning, socioeconomic status, social support, religion and culture, geography and infrastructure (Das et al., 2020). At present, the association between commuting and wellbeing, specifically subjective wellbeing, has drawn the interest of policymakers and scholars alike (Smith, 2013). Subjective wellbeing is a comprehensive notion that encompasses an individual's perception of their wellbeing, including their emotions and moods in response to events (affective component) and their overall evaluation of their life (cognitive component) (Diener et al., 2009).

Commute time means normal time spent by the employee traveling from home to their assigned work place. Several explanations have been presented to clarify the observed differences in commuting. The most important components of commuting aspect are: the commuting time; the commuting distance; and the mode of transportation. The daily commute to work can take up a substantial amount of time and can significantly influence an individual's wellbeing. Recent research suggests that commuting can have a negative impact on the overall wellbeing and life satisfaction of people (Clark et al., 2020). Large-scale national surveys have demonstrated that longer commute times are negatively associated with subjective wellbeing, with the negative effects often outweighing any economic benefits of the commute, such as higher salaries or cheaper housing (Morris and Guerra, 2015; BrysonClarkFreeman, 2016). Furthermore, the commuting also contributes to increase in the levels of stress and more so if an individual travel by car rather than a public transport or a bicycle (Legrain et al., 2015; Avila-PalenciaNazelle et al., 2017). While not all studies support this notion, some studies have reported that a certain portion of the population actually enjoy the activity of commuting (Ory et al., 2004). For instance, Olsson et al. (2013) found that feelings experienced during commutes were predominantly neutral or positive (Olsson et al., 2013).

The characteristics of commuting and travel to and from work can have both direct and indirect effects on an individual's wellbeing. Factors such as longer commute duration can reduce the time available for activities that contribute to subjective wellbeing, such as socializing, spending time with family, and exercising. Additionally, exposure to hazards and nuisances such as crowds, traffic noise, pollution, congestion, and poor thermal conditions during travel can lead to emotional and physical distress, potentially impacting an individual's mental and physical health (Wener et al., 2003; De Nazelle et al., 2009). Studies by Ettema et al. (2010) and Stutzer and Frey (2008) have highlighted the negative effects of commuting on wellbeing (Stutzer and Frey, 2008; Ettema et al., 2010).

In addition, transitioning from physically active modes of transportation (such as biking and walking) to solely relying on vehicles can restrict the opportunity for engaging in physical activity, which is crucial in preventing obesity and other chronic illnesses (Wareham et al., 2005). A wealth of evidence suggests a link between commuting-related factors, such as mode of transportation and travel time, and an individual's subjective wellbeing (Olsson et al., 2013; Mokhtarian et al., 2014; Susilo and Cats, 2014). Thus, the empirical work in this area is still limited, and the majority of these studies are undertaken in Europe and North America.

Several studies have extensively explored the health impacts of commuting to work. In 2020, Norgate and colleagues conducted a systematic review, investigating the effects of using public transportation on health. The authors discovered links to various health-related issues, including absenteeism, mental health risks, reduced sleep quality, commuting-related stress, mood, motivation, and complaints related to the musculoskeletal and gastrointestinal systems (Norgate et al., 2020). Interestingly, some studies have also highlighted the therapeutic aspects of commuting (Green, 1997), noting its value as a transitional time for preparing for upcoming demands at the destination and as an opportunity for respite from obligations, allowing for engagement in other activities like reading (Jain and Lyons, 2008). Furthermore, a study in Sweden, focusing on happiness and subjective wellbeing, demonstrated that satisfaction with the work commute contributes significantly to overall happiness (Olsson et al., 2013).

In this study, we have employed a socioecological model, which categorizes the determinants of wellbeing into distinct groups,

drawing inspiration from the research conducted by Dahlgren and Whitehead (2006). The model in this study integrates individual, social, economic, and environmental factors to investigate the complex relationship between subjective wellbeing and commuting (Dahlgren and Whitehead, 2006). Individual factors such as sex, age categories, education, and medical conditions are considered to explore their impact on wellbeing in the context of commuting, including how health challenges interact with commuting experiences. Social factors and marital status, as well as economic factors such as income levels, are incorporated to understand their influence on wellbeing and commuting choices. Environmental factors such as emirate of residence, commute duration, distance, and transportation mode are also given importance. By integrating these factors, our comprehensive framework allows for a deeper understanding of the multifaceted nature of subjective wellbeing in relation to commuting dynamics and offers insights to enhance overall wellbeing in commuting experiences. The framework recognizes the interplay between individual and contextual factors, emphasizing the significant role of the environment and paving the way for further exploration of the intricate relationship between health, the built environment, and subjective wellbeing.

This study offers several unique contributions to the existing body of knowledge. Firstly, the study focusses on the specific context of the UAE, considering cultural, socioeconomic, and other factors that may influence the commuting-well-being link uniquely in this region. Secondly, we employ a comprehensive approach, examining various dimensions of subjective wellbeing, including affective and cognitive components, to provide a more holistic understanding of individuals' wellbeing experiences. Additionally, our study addresses the potential mediating factors and policy implications, offering valuable insights for policymakers and stakeholders to enhance the wellbeing of commuters in the UAE. Overall, our research contributes vital insights and practical implications to promote wellbeing and enhance commuting experiences in this specific context. To date, only a limited amount of research has been carried out to assess the wellbeing of the UAE population. Additionally, due to worldwide economic constraints, lower income individuals often have limited travel options and they are more likely to face transportation-related issues that prevent them from engaging in work, social activities, healthcare, and education opportunities, ultimately diminishing their wellbeing and prospects for a fulfilling life (Cochran et al., 2022; Rozynek and Lanzendorf, 2023). Hence, the objective of this study is to contribute to the expanding literature by investigating the correlation between commuting and subjective wellbeing in the UAE population.

2 Materials and methods

2.1 Design and settings

A cross-sectional survey (both in English and Arabic) was conducted between December 2020—August 2021, in the United Arab Emirates (UAE). The UAE consists of seven emirates: Abu Dhabi, Dubai, Sharjah, Ajman, Fujairah, Ras Al Khaimah, and Umm Al Quwain. The discovery of oil in the country has contributed significantly to the UAE's industrial and economic growth, leading to changes in the country's demographic landscape.

2.2 Sampling/sample size

The survey was distributed to 5,500 randomly selected individuals from all 7 Emirates. In total, 5,476 adults aged 18 years and above participated in the study, resulting in an overall response rate of 99.5%. The sample size was determined using Epi-info software. (https://www.openepi.com/SampleSize/SSCohort.htm), considering the population size of the United Arab Emirates and previous research studies on similar topics, with a 5% margin of error and a 95% confidence interval.

2.3 Inclusion criteria

- Working Population: Participants who were formally employed or self-employed.
- Participants who were 18 years old and above
- Participants willing to provide self-reported data on their subjective wellbeing and other related measures.

2.4 Exclusion criteria

- Participants who provided incomplete responses on the subjective wellbeing measures or commuting time were excluded from the analysis.

2.5 Data collection/questionnaire/instrument

An electronic survey was created on mSurvey, a UAE government platform for survey generation and management, and participants were provided with an online link via SMS or email. The survey was designed to allow participants to complete it anonymously online.

2.6 Data collection/questionnaire/instrument

The study utilized the WHO-5 (World Health Organization Wellbeing Index) questionnaire. Subjects received a link to a survey designed with mSurvey software. Each participant completed the survey anonymously online.

2.7 Demographic questions

The survey encompassed various demographic questions, covering age, gender, education level, monthly income, place of residence, employment status, marital status, and medical condition, specifically including chronic medical conditions such as cardiovascular risk, chronic lung disease, obesity, diabetes, or a

weakened immune system resulting from smoking, cancer treatment, or other immune deficiencies, among others.

2.8 WHO-5 questionnaire

The WHO-5 Questionnaire, also known as the World Health Organization Wellbeing Index, is a widely used self-reported assessment tool designed to measure subjective wellbeing and mental health in individuals. This questionnaire is widely used to assess subjective wellbeing based on positive mood, general interest, and vitality. The European offices of the World Health Organization (WHO) have developed this questionnaire comprising five questions that explore different facets of wellbeing (Green, 1997). The questionnaire is brief, easy to administer, and is available in various languages, making it suitable for use in diverse cultural settings. It has been extensively used in research studies.

The WHO-5 Questionnaire consists of five simple and straightforward items, each addressing a different aspect of wellbeing over the past 2 weeks:

> "I have felt cheerful and in good spirits."
>
> "I have felt calm and relaxed."
>
> "I have felt active and vigorous."
>
> "I woke up feeling fresh and rested."
>
> "My daily life has been filled with things that interest me."

The WHO-5 scores, used to assess wellbeing, span from 0 to 25, with higher scores reflecting better wellbeing. By summing up the five answers, a raw score is obtained, ranging between 0 (representing the lowest wellbeing) and 25 (indicating the highest level of wellbeing). If an individual scores 12 or below on the assessment, it is considered an indication of low wellbeing, suggesting the need for additional evaluation for potential depression (Topp et al., 2015).

The brevity and simplicity of the WHO-5 make it a valuable tool for screening purposes, allowing for quick and reliable assessments of an individual's subjective wellbeing. Moreover, it serves as a useful starting point for further exploration and evaluation of mental health, enabling healthcare professionals and researchers to identify individuals who may require more comprehensive assessments and appropriate interventions. It is essential to note that the WHO-5 Questionnaire is a screening tool and not a diagnostic instrument. If someone scores low on the questionnaire or is experiencing mental health concerns, it is important to seek professional support and guidance from a qualified healthcare provider or mental health specialist.

2.9 Commuting time

Commute time means the normal time spent by the employee traveling from home to their assigned work place. Commuting time to work was divided into four groups: <15 min, 15–30 min, 31–60 min, >60 min per day. The questionnaire was pilot tested on 30 individuals showing a Cronbach alpha score higher than 0.7, hence indicating a good consistency among the item variables being a good measure to be acceptable.

2.10 Data analysis

The data gathered underwent computerized entry into a system and was analyzed using Stata. Data analysis was performed using descriptive and inferential statistics, including logistic regression and chi square analysis. Categorical variables were reported as frequencies (n) and percentage (%).

2.11 Ethical approval

Approval was obtained from the Ethical Review Board of the Ministry of Health and Prevention, ensuring that the study adheres to the ethical guidelines. The confidentiality and anonymity of all information collected during the survey were explained to the participants, and they were assured that their participation was voluntary. Respondents provided digital consent prior to completing the questionnaire, and were informed that the collected data would only be used for scientific purposes. The importance of maintaining confidentiality of the information provided on the questionnaire was underscored, with a commitment to uphold ethical considerations at all stages of the research.

3 Results

Table 1 exhibits the gender distribution of the study participants. The analysis included a total of 5,476 individuals. The mean age of the participants was 41.50 years (SD ± 9.205), with the age range being 18 years and above. The study examined the frequencies and distributions of various characteristics for the entire sample, with the majority (57.6%) falling in the age group of 30–44 years. Around 53.3% of the respondents were males, and 46.7% were females. The majority of participants were married 80.8%, and 55.6% had attained college education or above. The highest income group (20,001 and above AED) constituted 35.9% of the respondents, followed by the income range of 5,001–10000 AED (25.9%). Among the surveyed individuals, around 19.2% reported having one or more medical conditions while approximately 75.4% said they did not have any ongoing medical issues.

3.1 Reported SWB level

SWB was examined among different categories of the sample. Out of the total sample size, approximately 79.9% of individuals (4,377 participants) attained a score above 12, indicating a high level of quality of life or wellbeing. On the other hand, 20.1% of participants (1,099 individuals) obtained a score below 12, indicating a lower level of wellbeing (p-value =<0.001). Low SWB was less reported in males (18.8%, n = 549) than females (21.5%, n = 550, p-value = 0.012). While the participants from the emirate of Ras Al Khaimah reported the lowest percentage of low SWB of 16.2% (n = 120), the difference in the percentage of population reporting low level of SWB by emirate was not statistically significant

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TABLE 1 Characteristics of study participants based on their self-reported subjective wellbeing (N = 5,476).

Variables	Total N (%)	Subjective wellbeing		*p*-Value
		Low wellbeing N (%)	High wellbeing N (%)	
		1,099 (20.1%)	4,377 (79.9%)	
Age group				
18–29 years	435 (7.9%)	117 (26.9%)	318 (73.1%)	<0.001
30–44 years	3,155 (57.6%)	716 (22.7%)	2,439 (77.3%)	
45–59 years	1,677 (30.6%)	248 (14.8%)	1,429 (85.2%)	
60+	209 (3.8%)	18 (8.6%)	191 (91.4%)	
Gender				
Males	2,921 (53.3%)	549 (18.8%)	2,372 (81.2%)	0.012
Females	2,555 (46.7%)	550 (21.5%)	2005 (78.5%)	
Emirate of Residence				
Abu Dhabi	566 (10.3%)	110 (19.4%)	456 (80.6%)	0.071
Dubai	1,053 (19.2%)	238 (22.6%)	815 (77.4%)	
Sharjah	1738 (31.7%)	357 (20.5%)	1,381 (79.5%)	
Ajman	378 (6.9%)	75 (19.8%)	303 (80.2%)	
Fujairah	728 (13.3%)	142 (19.5%)	586 (80.5%)	
Ras Al Khaimah	739 (13.5%)	120 (16.2%)	619 (83.8%)	
Umm al-Quwain	274 (5.0%)	57 (20.8%)	217 (79.2%)	
Marital Status				
Single	781 (14.3%)	189 (24.2%)	592 (75.8%)	0.006
Married	4,422 (80.8%)	858 (19.4%)	3,564 (80.6%)	
Separated	45 (0.8%)	14 (31.1%)	31 (68.9%)	
Divorced	180 (3.3%)	30 (16.7%)	150 (83.3%)	
Widowed	48 (0.9%)	8 (16.7%)	40 (83.3%)	
Education Level				
School Education	1,309 (23.9%)	262 (20.0%)	1,047 (80.0%)	0.636
College Education	3,042 (55.6%)	620 (20.4%)	2,422 (79.6%)	
Higher Education	1,092 (19.9%)	213 (19.5%)	879 (80.5%)	
Other Academic Pursuits (Not elsewhere classified)	33 (0.6%)	4 (12.1%)	29 (87.9%)	
Monthly income (AED)				
0–5,000	505 (9.2%)	131 (25.9%)	374 (74.1%)	0.002
5,001–10,000	1,421 (25.9%)	300 (21.1%)	1,121 (78.9%)	
10,001–15,000	661 (12.1%)	126 (19.1%)	535 (80.9%)	
15,001–20,000	923 (16.9%)	187 (20.3%)	736 (79.7%)	
20,001 and above	1966 (35.9%)	355 (18.1%)	1,611 (81.9%)	
Employment status				
Employed	5,367 (98.0%)	1,081 (20.1%)	4,286 (79.9%)	0.349
Self employed	109 (2.0%)	18 (16.5%)	91 (83.5%)	

(Continued on following page)

TABLE 1 (*Continued*) Characteristics of study participants based on their self-reported subjective wellbeing (N = 5,476).

Variables	Total N (%)	Subjective wellbeing		*p*-Value
		Low wellbeing N (%)	High wellbeing N (%)	
		1,099 (20.1%)	4,377 (79.9%)	
Any ongoing medical condition				
Yes	1,053 (19.2%)	285 (27.1%)	768 (72.9%)	<0.001
No	4,129 (75.4%)	722 (17.5%)	3,407 (82.5%)	
Don't know	294 (5.4%)	92 (31.3%)	202 (68.7%)	
Commuting behavior of the respondents Average commuting to work				
<15 min	1,232 (22.5%)	185 (15.0%)	1,047 (85.0%)	<0.001
15–30 min	2057 (37.6%)	367 (17.8%)	1,690 (82.2%)	
31–60 min	1,242 (22.7%)	287 (23.1%)	955 (76.9%)	
>60 min	945 (17.3%)	260 (27.5%)	685 (72.5%)	
Distance travelled to work				
<5 km	841 (15.4%)	165 (19.6%)	676 (80.4%)	0.787
6–10 km	872 (15.9%)	173 (19.8%)	699 (80.2%)	
11–15 km	584 (10.7%)	130 (22.3%)	454 (77.7%)	
16–20 km	565 (10.3%)	115 (20.4%)	450 (79.6%)	
>20 km	1,369 (25.0%)	280 (20.5%)	1,089 (79.5%)	
Don't know	1,245 (22.7%)	236 (18.9%)	1,009 (81.0%)	
Mode of transportation				
Bike	5 (0.1%)	2 (40.0%)	3 (60.0%)	0.624
Bike + Public transport	6 (0.1%)	0 (0%)	6 (100%)	
By car	4,209 (76.9%)	839 (19.9%)	3,370 (80.1%)	
By walk	153 (2.8%)	27 (17.6%)	126 (82.4%)	
Car + Public transport	131 (2.4%)	29 (22.1%)	102 (77.9%)	
Cycle	13 (0.2%)	2 (15.4%)	11 (84.6%)	
Ferry	2 (0.1%)	0 (0.0%)	2 (100.0%)	
Others	734 (13.4%)	146 (19.8%)	588 (80.1%)	
Public Transport (Metro, taxi, etc.)	151 (2.8%)	34 (22.5%)	117 (77.5%)	
Van	72 (1.3%)	20 (27.8%)	52 (72.2%)	

(*p*-value = 0.071). Separated partners had the highest proportion reporting low level of SWB of 31.1% (n = 14) as compared to other marital statuses (*p*-value = 0.006). The percentage of commuters presenting low level of SWB was increasing as the commuting time increases among the four categories (15% of commuters for <15 min; 17.8% of commuters for 15–30 min; 23.1% of commuters for 30–60 min; and 27.5% of commuters for >60 min, *p*-value<0.001). SWB level was not statistically different by education level, employment status, distance traveled to work and mode of transportation.

3.2 Reported commuting times

Commuting time was also examined among different categories of the sample as shown in Table 2 (Ereaut and Whiting, 2008). The proportions of participants reporting longer commuting time was higher in males than females. While 21.9% (n = 639) and 23.7% (n = 691) of males reported commuting time >60 min and 30–60 min respectively, 12% (n = 306) and 21.6% (n = 551) of females reported the corresponding commuting times (*p*-value <0.001).

10.3389/fbuil.2023.1257198

TABLE 2 Travel Time for Commuting to work based on Gender, Age, geographic area, monthly income and Marital Status.

Characteristics	Total	Commuting time, min/day to work				*p*-value
		<15 min	15–30 min	31–60 min	>60 min	
Sex						
Men	2,921 (53.3)	572 (19.6%)	1,019 (34.9%)	691 (23.7%)	639 (21.9%)	<0.001
Women	2,555 (46.7)	660 (25.8%)	1,038 (40.6%)	551 (21.6%)	306 (12.0%)	
Age group						
18–29 years	435 (7.9%)	94 (21.6%)	140 (32.2%)	102 (23.4%)	99 (22.8%)	<0.001
30–44 years	3,155 (57.6%)	665 (21.1%)	1,179 (37.4%)	746 (23.6%)	565 (17.9%)	
45–59 years	1,677 (30.6%)	421 (25.1%)	652 (38.9%)	344 (20.5%)	260 (15.5%)	
60+	209 (3.8%)	52 (24.9%)	86 (41.1%)	50 (23.9%)	21 (10.0%)	
Monthly income (AED)						
0–5,000	505 (9.2%)	133 (26.3%)	180 (35.6%)	109 (21.6%)	83 (16.4%)	<0.001
5,001–10,000	1,421 (25.9%)	377 (26.5%)	566 (39.8%)	278 (19.6%)	200 (14.1%)	
10,001–15,000	661 (12.1%)	137 (20.7%)	258 (39.0%)	153 (23.1%)	113 (17.1%)	
15,001–20,000	923 (16.9%)	169 (18.3%)	359 (38.9%)	218 (23.6%)	177 (19.2%)	
20,001 and above	1966 (35.9%)	416 (21.2%)	694 (35.3%)	484 (24.6%)	372 (18.9%)	
Residence						
Abu Dhabi	566 (10.3)	101 (17.8%)	213 (37.6%)	142 (25.1%)	110 (19.4%)	<0.001
Dubai	1,053 (19.2)	157 (14.9%)	454 (43.1%)	281 (26.7%)	161 (15.3%)	
Sharjah	1738 (31.7)	354 (20.4%)	662 (38.1%)	425 (24.5%)	297 (17.1%)	
Ajman	378 (6.9)	58 (15.3%)	142 (37.6%)	106 (28.0%)	72 (19.0%)	
Umm al-Quwain	728 (13.3)	283 (38.9%)	213 (29.3%)	97 (13.3%)	135 (18.5%)	
Ras Al Khaimah	739 (13.5)	173 (23.4%)	290 (39.2%)	136 (18.4%)	140 (18.9%)	
Fujairah	274 (5.0)	106 (38.7%)	83 (30.3%)	55 (20.1%)	30 (10.9%)	
Marital Status						
Single	781 (14.3%)	199 (25.5%)	271 (34.7%)	196 (25.1%)	115 (14.7%)	<0.001
Married	4,422 (80.8%)	971 (22.0%)	1,669 (37.7%)	983 (22.2%)	799 (18.1%)	
Separated	45 (0.8%)	13 (28.9%)	19 (42.2%)	12 (26.7%)	1 (2.2%)	
Divorced	180 (3.3%)	32 (17.8%)	78 (43.3%)	46 (25.6%)	24 (13.3%)	
Widowed	48 (0.9%)	17 (35.4%)	20 (41.7%)	5 (10.4%)	6 (12.5%)	

Commuting time was different among age categories, where higher proportion of younger participants indicated longer commuting time particularly >60 min (22.8% of employees aged 18–29 years reported commuting time >60 min, while only 10% of commuters aged >60 years reporting the same commuting time, *p*-value <0.001). Commuting time was also statistically different among different income levels, emirate of residence and marital status. The proportion of the sample reporting commuting time >60 min was the highest among Abu Dhabi residents, while the lowest was reported among Fujairah residents (19.4% vs. 10.9%). Married population also had the highest percentage of commuters for >60 min (18.1% of all married and 84.55% of all commuters who spent >60 min commuting) (Table 2).

3.3 Logistic regression of SWE on commuting time

Table 3 presents crude and adjusted odds ratios (ORs) of poor subjective wellbeing based on commuting time with their corresponding 95% confidence intervals (CI). The reference category was denoted as 1, and the other categories were compared to this reference. The crude odds ratios of poor SWB

TABLE 3 Odds Ratio of poor subjective wellbeing from logistic regression models.

	Unadjusted OR model A (95%CI)	Adjusted OR model B (95%CI)	Adjusted OR model C (95%CI)	Adjusted OR model D (95%CI)
COMMUTING				
<15 min	1	1	1	1
15–30 min	1.24 (1.03–1.50)[a]	1.24 (1.02–1.49)[a]	1.26 (1.04–1.53)[a]	1.26 (1.04–1.53)[a]
31–60 min	1.68 (1.38–2.06)[b]	1.67 (1.36–2.04)[b]	1.70 (1.39–2.09)[b]	1.70 (1.39–2.10)[b]
>60 min	2.18 (1.77–2.68)[b]	2.17 (1.76–2.68)[b]	2.24 (1.82–2.77)[b]	2.28 (1.84–2.82)[b]
Likelihood-ratio test[c]	--	LR chi2 (6) = 136.64	LR chi2 (19) = 69.15	LR chi2 (17) = 20.54
Prob > chi2		0.000	0.000	0.2474

[a]Statistically significant association, p-value<0.05.
[b]Statistically significant association, p-value<0.01.
[c]Likelihood-ratio test: with assumption that the model is nested within the previous one and null hypothesis that additional variables do not associate with subjective wellbeing, (df: degree of freedom).
Model B adjusted for sex, age categories and medical condition.
Model C adjusted for sex, age categories, medical condition, education, marital status, employment and income level.
Model D adjusted for sex, age categories, medical condition, education, marital status, employment, income level, residence emirate, commuting distance and mean of transportation.

TABLE 4 Odds Ratio of poor subjective wellbeing from logistic regression models by sex.

	Males		Females	
	Unadjusted OR (95%CI)	Adjusted OR (95%CI)	Adjusted OR (95%CI)	Adjusted OR (95%CI)
COMMUTING				
<15 min	1	1	1	1
15–30 min	1.40 (1.05–1.87)[a]	1.42 (1.06–1.92)[a]	1.15 (0.89–1.47)	1.14 (0.89–1.48)
31–60 min	1.76 (1.30–2.38)[b]	1.78 (1.30–2.43)[b]	1.73 (1.32–2.27)[b]	1.68 (1.26–2.23)[b]
>60 min	2.60 (1.93–3.49)[b]	2.53 (1.86–3.43)[b]	1.98 (1.45–2.69)[b]	2.00 (1.45–2.76)[b]

[a]Statistically significant association, p-value<0.05.
[b]Statistically significant association, p-value<0.01.
*Adjustment for sex, age categories, medical condition, education, marital status, employment, income level, residence emirate, commuting distance and mean of transport.

were statistically significantly associated with commuting time. The unadjusted odds ratio of poor SWB was 1.24 times higher (95% CI: 1.03–1.50; p-value<0.05) in individuals commuting 15–30 min, 1.68 times higher (95% CI: 1.38–2.06; p-value<0.01) in individuals commuting 30–60 min, and 2.18 times higher (95% CI: 1.77–2.68; p-value<0.01) in individuals commuting >60 min as compared those commuting <15 min daily.

The adjusted odds ratios of poor subjective wellbeing were similar across all the three logistic models (models B, C and D). While the inclusion of the individual factors such as age, sex, and diseases status in model B (as identified by the WHO model of determinant of health; Wilderink et al., 2022) has contributed to explanation of subjective wellbeing (LR chi2 (6) = 136.64, Prob > chi2 = 0.000), none of these factors confounded the association between the subjective wellbeing and commuting time. Similarly, the addition of the social and working economic factors such as education, marital status, employment and income level in model C has contributed to explanation of subjective wellbeing (LR chi2 (19) = 69.15, Prob > chi2 = 0.000), however none of them confounded the relationship between subjective wellbeing and commuting time. On the other hand, the inclusion of environmental factors such as the emirate of residence, commuting distance and mean of transportation was neither statistically significant in explanation of subjective wellbeing (LR chi2 (17) = 20.54, Prob > chi2 = 0.2474) nor confounding to the association between subjective wellbeing and commuting time as shown in table (Das et al., 2020). Accordingly, Model C was the best model to explain subjective wellbeing in this paper analysis.

Table 4 represents the unadjusted and adjusted odds ratios (OR) of poor wellbeing based on commuting time stratified by gender (males and females). For the commuting categories of 15–30 min and over 60 min, males exhibit a higher statistically significant adjusted odds ratio (aOR) of poor wellbeing compared to females (males' aOR 1.42 *versus* females' aOR 1.14 and males' aOR 2.53 *versus* females' aOR 2.0 respectively). However, for individuals who spend 31–60 min commuting, the OR of poor wellbeing is similar between males and females (males' aOR 1.78 *versus* females' aOR 1.68).

4 Discussion

This study examines the association between the subjective wellbeing and commuting time of the UAE working population

and further examines how this relationship may vary based on contextual disparities and other variables. The findings of this study revealed a positive association between longer commuting times and higher odds of experiencing poor subjective wellbeing. This relationship remained consistent and unaffected by individual, social, economic, and environmental factors that were considered in the analysis models. Thus, the impact of commuting time on subjective wellbeing appears to be robust and independent of other factors included in the study.

The analysis examined the association between commuting times and wellbeing, with a focus on gender differences. The results revealed that longer commuting times were linked to increased odds of poorer wellbeing for both males and females. These associations remained significant even after adjusting for other variables, suggesting that commuting duration could play a significant role in influencing individuals' wellbeing. The increase in commuting time was associated with increased odds ratio of poor subjective wellbeing. The impact of commuting time on subjective wellbeing was stable regardless to the individual, social, economic and environmental factors included in the analysis models.

Generally, people frequently travel to work, or drive to markets, and entertainment, resulting in an abundance of solo travelers spending an enormous amount of time in transit, contributing to traffic congestion, air pollution, and wasted time. Various potential mechanisms can be postulated to explain the relationship between extended commuting time and reduced wellbeing. Firstly, longer commuting times are associated with a decrease in the amount of time available for physically active leisure and social activities (Christian, 2012; Hilbrecht et al., 2014). This lack of time for engaging in hobbies with family or friends can hamper stress relief and have an adverse impact on mental health (Kang et al., 2015). Secondly, long commuting times are correlated with sleep issues (Hansson et al., 2011). Poor sleep quality could be a contributing factor to the negative impact of commuting time on wellbeing. Moreover, being exposed to unpleasant commuting environments such as noise, vibrations, uncomfortable postures, and unwanted physical contact with others can directly cause reduced wellbeing.

The regression analysis conducted in this study explored the relationship between commuting times and subjective wellbeing. The results revealed a significant association between commuting duration and wellbeing, indicating that longer commuting times were associated with poorer subjective wellbeing. Our survey results also revealed interesting patterns regarding commuting time differences between males and females, as well as variations across different age groups. When examining the proportions of participants reporting longer commuting times in our survey, it was observed that a higher percentage of males reported extended commuting durations compared to females. This finding aligns with previous research in highlighting the negative impact of longer commuting time on individuals' wellbeing (Clark et al., 2020). The observed relationship between commuting and wellbeing remained significant even after adjusting for other variables, suggesting that commuting duration has an independent influence on subjective wellbeing. This highlights the importance of considering commuting as a potential determinant of individuals' overall sense of wellbeing (Clark et al., 2020). Our findings also shed light on the differences in commuting behaviors between genders and age groups within our sample. The observed patterns can have implications for transportation planning, workplace policies, and employee wellbeing. Understanding commuting time disparities may help in designing targeted interventions and solutions to alleviate potential burdens associated with longer commutes, ultimately contributing to improved overall wellbeing and work-life balance for individuals across different demographic group.

As cities have grown and suburban living has become more popular, commute times have increased. Unfortunately, longer commutes can have a detrimental effect on wellbeing, in part, because they interfere with social connection. According to Putnam's research in 1995, each extra 10 minutes of daily commuting results in a 10% decrease in social connections. In Australia, a concerning study revealed that a significant portion of working parents spend more time commuting than they spend with their children (Flood and Claire, 2005). Stutzer and Frey (2008) established a more direct link between commuting and wellbeing in their research (Stutzer and Frey, 2008). Using survey data from Germany, they observed that individuals in the highest quartile for commute times had the lowest overall life satisfaction (Stutzer and Frey, 2008). A comprehensive review of the impact of commuting on wellbeing is available in Diener, Lucas, Schimmack, and Helliwell's (Diener et al., 2009) literature review.

Previous studies have mainly concentrated on evaluating and determining life satisfaction (LS) as a measure of subjective wellbeing (SWB). According to Dolan et al. (Dolan et al., 2008) and MacKerron (MacKerron, 2012), extensive literature reviews demonstrate that factors such as unemployment, commuting, ill health, divorce/separation, and widowhood have negative impact on LS, while income, marriage, trust, friendships, group membership, democracy, and belief in God have positive influences on life satisfaction (LS).

The duration of commutes is influenced not only by employment trends but also by zoning and land use policies. Planning cities with mixed-use zoning, which entails building residential areas near commercial and work centers, can result in shorter commutes. This approach not only promotes physical activity, reduces air pollution and reduces carbon emission, but also enhances social connections. Single-use zoning, which restricts specific geographical areas to a particular type of building, was initially developed to improve residents' quality of life by separating commercial and manufacturing activities from residential areas.

In many countries, modern urban expansion has been characterized by the adoption of single-use zoning, which has led to the creation of residential-only districts that are situated far from the city center and other commercial and entertainment areas. As a result, there has been a proliferation of single-family dwellings that are distant from workplaces, shops, and restaurants, leading to longer commuting times. Furthermore, this type of zoning has reduced the opportunities for social interaction and decreased the frequency of spontaneous meetings between neighbors.

Another neighborhood-level initiative that can boost wellbeing, similar to neighborhood watch groups, is the formation of "walking groups." Research suggests that individuals who participate in walking groups are more likely to stick to their exercise routines and experience better health outcomes, as they enjoy the activity (Hanson and Jones, 2015).

According to Evans and Wener's study in 2006, New York rail commuters who had long commutes experienced higher stress and had elevated cortisol levels on commuting days. Due to the negative impact of commuting on Wellbeing, policymakers may need to reconsider the traditional approach of working in a physical office and explore alternative work arrangements, such as telecommuting or flexible working hours, to help employees avoid long commutes (Evans and Wener, 2006). Furthermore, the length of commutes affects energy consumption, emissions, and overall environmental footprint. Additionally, policymakers may consider implementing measures that reduce commute length or improve the commuting experience. In any case, using indicators of SWB can help policymakers make informed decisions.

4.1 Limitation

It is important to note that this study relied on self-reported subjective wellbeing measures and may be subject to certain limitations. While using a valid and reliable tool to measure subjective Wellbeing (SWB) can yield dependable results, the self-reported methodology used in this study leaves respondents susceptible to recall and response bias. Additionally, the cross-sectional design of the study cannot establish causality relationship between dependent and independent variables.

5 Conclusion

This study sheds light on the crucial link between commuting times and subjective wellbeing, specifically within the context of the UAE. The findings underscore the significance of targeted interventions and policies to tackle the potential negative consequences of long commutes on individuals' wellbeing in the region. By recognizing the impact of commuting on subjective wellbeing, policymakers and relevant entities can implement measures to alleviate the associated stress and enhance overall quality of life for commuters in the UAE. This study therefore provides evidence-based insights for policymakers, urban planners, and individuals seeking to make informed decisions regarding sustainable transportation practices or to explore more innovative employment schemes such as hybrid working schemes or other convenient effective employment models. Overall, the study's exploration of the relationship between commuting time and subjective wellbeing in the UAE contributes to the pursuit of multiple Sustainable Development Goals, offering valuable insights for policymakers and planners to create a more sustainable, equitable, and well-being-focused society.

Future research on the environmental implications of commuting should focus on examining the consequences of different transportation modes, exploring how commute length affects energy consumption and emissions, investigating the impact of carpooling and ridesharing initiatives on reducing vehicle numbers and emissions, assessing the influence of infrastructure on promoting eco-friendly commuting, and analyzing the environmental benefits of alternative fuels, electric vehicles, and emerging transportation technologies. By investigating these areas, we can gain valuable insights to inform policies and strategies that promote sustainable transportation practices and mitigate the environmental impact of commuting.

5.1 Recommendations for policymakers

Commuting often impacts the subjective psychological wellbeing over 3-time horizons: (i) during the journey; (ii) directly after the journey; and (iii) over the longer term. Evidences and data gathered in this study points to 6 areas that warrant research and policy action: (i) improving the commute experience; (ii) enhancing commute satisfaction; (iii) dropping the impact of long duration commutes; (iv) meeting commuter preferences; (v) identifying flexibility as well as constraints in commuting routines and (vi) accounting for impacts of SWB with respect to commuting in policy making and appraisal. Several policies which may reduce the costs of commuting may be envisaged. Telematics systems capture and analyze data related to transportation, including vehicle location, driver behavior, fuel consumption, and more. The goal is to improve commuter experiences and reduce traffic congestion, which has a significant economic impact globally. Additional strategies include policies to encourage workers to change jobs or residences, employer assistance with local housing, flexible working practices (including working from home), guaranteed ride home programs for car poolers and public transport riders, financial incentives (e.g., parking cash-out, tax-free bicycle purchase), co-working offices in residential neighborhoods, promotional activities to encourage workers to try new commute options, transport appraisal procedures, and monitoring employee wellbeing. By implementing these measures, we can optimize commuting patterns, reduce congestion, and create a more sustainable transportation system. Another practical action is the creation of walking maps that show distances and routes between locations, promoting walking as a means of transportation. Additionally, implementing initiatives and policies to enhance social connections in neighborhoods, including accessible community-building programs, can be effective. Governments have multiple options to encourage social connections at the neighborhood level. Overall, policymakers should consider implementing measures related to aesthetics, safety, trust, and community engagement.

It appears that the UAE government is making commendable efforts to enhance the subjective wellbeing of its population. Through various initiatives and policies, such as improving transportation infrastructure, providing Wi-Fi on public transport, reducing overcrowding, and creating dedicated green routes for walking and cycling, and promoting active transportation options, the government aims to create a more enjoyable and satisfying commuting experience for individuals. However, further research and analysis are necessary to gain a comprehensive understanding of the overall impact of these measures on subjective wellbeing across different demographic groups and geographic regions within the UAE. By continuing to monitor and evaluate these efforts, the authorities can continue to refine and adapt its strategies to further enhance the wellbeing of its citizens and residents.

Data availability statement

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethical Review Board of the Ministry of Health and Prevention. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

HR: Conceptualization, Data curation, Methodology, Project administration, Supervision, Visualization, Writing–original draft, Writing–review and editing. AE: Data curation, Formal Analysis, Writing–original draft, Writing–review and editing. AH: Funding acquisition, Investigation, Resources, Writing–review and editing, Supervision. MA: Funding acquisition, Supervision, Validation, Writing–review and editing. LA: Funding acquisition, Resources, Supervision, Writing–review and editing. RS: Investigation, Validation, Visualization, Writing–review and editing, Supervision. AA: Resources, Validation, Writing–original draft, Writing–review and editing. HM: Supervision, Writing–review and editing, Conceptualization, Investigation.

Funding

The authors extend their gratitude to the Ministry of Health and Prevention for financial support, enabling the publication of this work.

Acknowledgments

The authors express their gratitude to the leadership of the Ministry of Health and Prevention for their valuable support. AE completed this work while a Master of Public Health degree candidate at the Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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