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Research paper

# Gender gap in travel time and trip Purpose: Pre-, during and post Covid19 evidence

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ABSTRACT

We investigate the gender gap in the travel time pre-, during and post-COVID19 pandemic in Gauteng, South Africa over the period 2015–2023. We use four rounds of the Gauteng City-Region Observatory Quality of Life (GCRO QoL) surveys. Results indicate that while women spend less time travelling compared to men across the study period, the gap has increased since the pandemic. Additionally, other socio-economic and demographic factors such as race, age, household size, dwelling type and car ownership also significantly affected travel times.

Further, using Oaxaca-Blinder decomposition, the study found that household maintenance trips like shopping and chauffeuring contributed positively to the gender travel time gap consistently over the period. The increasing gender gap observed in travel time since COVID19, is explained by fewer women (compared to men) being employed during and since the pandemic, rather than more employed women travelling shorter time or telecommuting compared to employed men. This is expected as more women lost their employment during the pandemic, and men have regained employment more effectively than women during the post-pandemic recovery. The study also found fewer women investing in travel for job search compared to men in the post-pandemic period, further exacerbating the gender gap in travel time.

## 1. Introduction

Extant literature on commuting patterns is broadly in agreement that travel patterns (in terms of number of trips, distance covered, time taken, mode and purpose of trip) differ across gender groups in almost all contexts (Beige & Axhausen, 2017; Havet et al., 2021; Kwan & Kotsev, 2015; Patterson et al., 2005; Zhang et al., 2008). The gender-based variation in travel behaviour is explainable by the differing societal expectations on the economic and social roles of men and women (Havet et al., 2021; Wachs, 1997). Women tend to undertake a dual role where they balance their participation in the labour force with their responsibilities in household management which leads to complex trip chains and more localized travel patterns (Boarnet & Hsu, 2015; Hjorthol et al., 2010; Sarmiento, 1998; Turner & Niemeier, 1997).

Women also tend to rely more on low-carbon, cheaper and slower modes of transport, such as walking and public transport, due to lower levels of car/bike ownership compared to men (Best & Lanzendorf, 2005; Havet et al., 2021; Polk, 2004; Pooley et al., 2006). The disparity enhances the differences in commute time, distances and travel patterns between the two genders, resulting in women making shorter yet more frequent trips while men travel greater distances (Boarnet & Hsu, 2015; Havet et al., 2021; Motte-Baumvol et al., 2017).

Further, gender differences are accentuated in households with children. Boarnet and Hsu (2015) found that women make more than 300% childcare-related chauffeuring trips than men, especially in households where the man works full-time. When women's income-earning potential increases, compared to men, their chauffeuring burden decreases (Hsu, 2013). This indicates that the intersection between economic factors and gender is crucial in shaping travel behaviour (Boarnet & Hsu, 2015).

From the evidence on travel patterns before COVID19, the influence of economic factors and societal expectations of women's dual role in both paid work and unpaid household responsibilities is clear. Modern research therefore focuses on the trends in the gender gap and whether 'gender' remains an important determinant of how one travels and how long it takes as women's role in society changes (Havet et al., 2021). Studies like Kwon & Akar (2015) and Crane (2007) are important in this regard because they show that although women generally have shorter

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commute distances compared to men, the gap has been narrowing over time in some contexts in the US. Along similar lines, Vanderschuren et al. (2019) did not find significant differences in travel distances or travel times between South African females and males.

Within this backdrop, the advent of COVID19 pandemic disrupted commute behaviour across the world because of the lockdown measures that restricted movement and also the widespread adoption of technology that allowed for remote working possibilities in many sectors (Balbontin et al., 2024; Huang et al., 2023). There has also been a significant decline in public transport usage, with many commuters switching to private cars, bikes, or walking due to perceived safety concerns during the pandemic (Dingil & Esztergár-Kiss, 2021; Ecke et al., 2022; Liu et al., 2023; Pourmoradnasseri et al., 2023, pp. 5–8).

Moreover, despite the relaxation of the movement restrictions and the end of the pandemic, commute behaviour has not reverted to pre-pandemic status due to multiple reasons. The altered employment status, and also the work arrangements among the employed, with many organizations adopting hybrid or remote work models have shifted the commute patterns beyond the period of the pandemic (Chalabi & Dia, 2024; Iogansen et al., 2024). The pandemic accelerated the adoption of telecommuting, with many employees shifting to work from home, this trend is expected to persist, with a preference for remote work (Chalabi & Dia, 2024; Iogansen et al., 2024; Sucheran & Olanrewaju, 2021, pp. 2–5).

It is key to understand the COVID19 related shifts using a gendered lens because changes brought about by the pandemic may affect men and women differently due to disparities in job recovery, job types, caregiving roles within the household, and access to flexible work considering the variations in employment sectors that women and men are predominantly employed in. Moreover, women, who have been generally more dependent on public transport pre-pandemic, are more likely to be affected by shifts to private transport observed during the pandemic (Teixeira & Cunha, 2023). Therefore, it is necessary to explore whether the disruption entrenched or further dissipated gender differences in commute patterns.

While several studies explored the effect of COVID19 on commute patterns, very few of these have analysed the gendered impact of the pandemic (Bulteau et al., 2023; Kanimozhee & Srikanth, 2023). For instance, Iogansen et al. (2024) highlighted the heterogeneity in the adoption of remote/hybrid work across different types of workers and sociodemographic groups, but stopped short of identifying gender as a contributor to this. According to the study, remote/hybrid working that reduces commute time is prominently driven by those at the higher end of the socio-economic distribution (high-income earners, highly educated individuals, urban residents, full-time workers, and those with white-collar, STEM (science, technology, engineering, and mathematics), and government jobs). Other studies like Singh and Gupta (2023) are restricted to a sample of women only, once again limiting the possibility of exploring gender differences.

The most relevant study that addresses the issue has been Bulteau et al. (2023) that explored the gendered mobility pattern in France during the lockdown period in 2020 and post-lockdown (a curfew period: January–February 2021). The study found that women travelled fewer trips and less distance compared to men during the lockdown period. However, post lockdown women were found to travel more trips and the gender difference in distance travelled was no longer significant. The study found that the gender difference in the degree of mobility was particularly sensitive to access to a car. Another pertinent study is Kanimozhee and Srikanth (2023), undertaken in the context of Bangalore city in India, the study found that gender and ownership of two-wheeler vehicles were significant characteristics of travel behaviour before the COVID-19 outbreak (February 2020), but both ceased as significant characteristics of travel behaviour after the COVID-19 restrictions were lifted in December 2020.

This study aims to analyze the gender gap in travel times before, during, and after the COVID-19 pandemic, with a focus on understanding the role of trip purpose in shaping this trend. The differences in trip purposes between men and women are largely influenced by their societal roles, and this study seeks to explore the extent to which these roles contribute to the observed travel time gap. This study provides key additional insights in relation to Bulteau et al. (2023): firstly, the study explores the gendered effect on travel time which is not covered by Bulteau et al. (2023). Travel time is relevant because the same distance covered can take different time depending on the mode of transport which is established in literature to differ according to gender. Secondly, this study covers a longer period (2015–2023) which enables it to assess the patterns before, during and after COVID19 pandemic more effectively (in a general population representative dataset). Thirdly, the study undertakes a decomposition analysis to explain the source of gender differences in commute time before and after COVID19. Lastly, the South African context of the study makes it the first of its kind analysis in the African and one of the first in a developing country context.

The current study is contextualised in the most populated province of South Africa accounting for one-third of its population (Kubheka, 2023). South Africa's spatial inequality, deeply rooted in apartheid-era geographical segregation, presents a distinct context for understanding inequities in travel times and patterns. The legacy of apartheid spatial planning continues to shape access to economic opportunities, essential services, and overall quality of life. People in wealthier, more centrally located neighbourhoods have better access to healthcare, education, and employment, while residents of urban townships and rural areas remain isolated from these resources. Therefore, the time required to commute is related to the racial composition of locations, with residents from historically black-majority areas having to commute longer distances to their place of employment (Culwick et al., 2015). In addition, this also correlates with residents from lower average socio-economic locations having to spend more time and money on daily commute (Kerr, 2017). Further, public transportation systems are often unreliable, overcrowded, and expensive, which burdens low-income and women commuters who cannot afford private vehicles (Chakwizira et al., 2018).

Within this context of high spatial and socio-economic inequalities, the disruption to daily activities presented by the strict lockdown measures, imposed in the country's response to COVID19, has given further impetus to explore possible shifts in commute patterns across men and women in Gauteng across the period before, during and after COVID19. Investigating these dynamics will provide a greater understanding of gender disparities in travel and aims to provide insights for policymakers addressing mobility issues in the developing country context.

The rest of the paper is organized as follows, section 2 presents the data and methodology, section 3 presents the results, section 4 discusses the results and its implication while section 5 concludes.

## 2. Data and methodology

### 2.1. Data

The analysis is based on 4 of the 7 rounds of the Gauteng City-Region Observatory Quality of Life (GCRO QoL) surveys, conducted between 2015 and 2023. The GCRO QoL is a repeated cross-sectional sample survey of the Gauteng province of South Africa. It is conducted by the by the research institute GCRO formed by the following partner institutions; University of Johannesburg (UJ), the University of the Witwatersrand (Wits), the Gauteng Provincial Government (GPG), and several Gauteng municipalities (organised local government – South African Local Government Association – SALGA) in South Africa. The survey was first collected in 2019 and has been collected biennial since then. It collects information about living and socio-economic

circumstances, opinions about service delivery and government, and experiences, perceptions and opinions on a broad range of personal, social and political issues.[1] All rounds of data (including the one collected during the pandemic) are based on face-to-face interviews (De Kadt et al., 2021).[2] The data is freely available from the Data First repository (https://www.datafirst.uct.ac.za/). Rounds 4 & 5 represent pre-pandemic data (2015/2016 and 2017/2018), round 6 represents during-pandemic data (2020/2021) while round 7 represents post-pandemic data (2023/2024). Gauteng is the largest province in South Africa accounting for one-third of its population (Kubheka, 2023) and containing 3 of the 8 metropolitan municipalities in South Africa (City of Johannesburg, City of Tshwane, and Ekurhuleni). The QoL surveys use a multi-stage stratified cluster sampling, with wards as the primary sampling unit and dwelling units randomly selected within wards. The data includes survey weights that make inference provincially representative of the population of the Gauteng province of South Africa.

The survey includes 30,200, 24,889, 13,616 and 13,795 completed interviews in rounds 4 to 7 (conducted in 2015/2016, 2017/2018, 2020/2021 and 2023/2024). After dealing with non-responses in the variables of interest we are left with 29,350, 23,924, 13,304 and 13,615 observations for rounds 4 through 7. The outcome of interest captures commute duration in 5 categories "0–15 min", "16–30 min", "31–45 min", "46–60 min" and "more than 1 h"[3] (the survey first ask the about the trip purpose of respondent's most frequent trip, then ask "Last time you made this trip how long did it take you to reach your destination"). The independent variable of interest is the gender dummy which is 1 if the respondent is female and zero otherwise. We control for several covariates that are expected to be correlated with travel time or/and gender. These include individual characteristics (age, the square of age, race, disability status, whether the respondent has a partner, education, employment status, cohabitation with children, household size, whether the household is renting, type of housing, household income, car ownership and whether the respondent has ever been a crime victim). The controls also include the municipality of the respondent, mode of transport and trip purpose. Tables 1 and 2 show the weighted summary statistics of the outcome and covariates by the gender of the respondent. Table 1 shows the combined summary for the pre-pandemic period (2015/2016, 2017/2018), while Table 2 shows a similar summary for the during and post-pandemic period (2020/2021 and 2023/2024).

Tables 1 and 2 show that females are significantly more likely to travel shorter distances (less than 30min) while males are more likely to travel longer distances (more than 30min) and the difference is statistically significant in both tables. Comparing pre-pandemic with post-pandemic proportion of employed shows that the proportion of employed individuals has reduced by 1 % (50 % vs 49 %). However, the reduction in proportion employed vary by gender 2% amongst females and 1 % amongst males. Note that this statistic is average over 4 years and does not capture the immediate impact of the pandemic or the pace of recovery. For example, in 2020 only 42 % of respondents were employed and gender disaggregation shows that 50 % of males were employed while only 34 % of females were employed. Men also report more tertiary education on either side of the pandemic. Lastly, there is evidence of gender roles in the distribution of trip purposes where men are significantly more likely to travel for work or in search of work, but women are more likely to travel for shopping or to chauffer kids.

**Table 1**
Weighted Summary statistics (pre-pandemic, 2015 and 2018).

| | all | women | men | Difference | p-value |
|---|---|---|---|---|---|
| **Travel time in categories** | | | | | |
| Travel time 0–15min | 0.23 | 0.24 | 0.23 | 0.01 | 0.00 |
| Travel time 16–30min | 0.40 | 0.41 | 0.38 | 0.02 | 0.00 |
| Travel time 31–45min | 0.22 | 0.22 | 0.23 | −0.01 | 0.00 |
| Travel time 46–60min | 0.10 | 0.09 | 0.11 | −0.02 | 0.00 |
| Travel time 61–90min | 0.04 | 0.03 | 0.04 | −0.01 | 0.00 |
| Travel time more than 91min | 0.01 | 0.01 | 0.01 | 0.00 | 0.02 |
| **Individual characteristics** | | | | | |
| Age | 39.20 | 39.53 | 38.82 | 0.71 | 0.00 |
| Age squared | 1753.35 | 1792.65 | 1708.64 | 84.01 | 0.00 |
| Race (African dummy) | 0.81 | 0.82 | 0.80 | 0.02 | 0.00 |
| Disabled (dummy) | 0.05 | 0.05 | 0.05 | 0.00 | 0.09 |
| Has a Partner | 0.76 | 0.73 | 0.79 | −0.06 | 0.00 |
| Tertiary education | 0.23 | 0.22 | 0.25 | −0.03 | 0.00 |
| Unspecified education | 0.02 | 0.02 | 0.02 | 0.00 | 0.01 |
| School unavailable in location | 0.13 | 0.12 | 0.14 | −0.02 | 0.00 |
| Cohabit with children | 0.57 | 0.65 | 0.47 | 0.19 | 0.00 |
| Household size | 3.62 | 3.88 | 3.33 | 0.55 | 0.00 |
| Renting | 0.26 | 0.24 | 0.28 | −0.04 | 0.00 |
| Informal housing | 0.14 | 0.14 | 0.14 | 0.00 | 0.22 |
| Employed | 0.50 | 0.42 | 0.59 | −0.18 | 0.00 |
| Low income | 0.32 | 0.34 | 0.29 | 0.05 | 0.00 |
| Missing income | 0.34 | 0.34 | 0.34 | 0.00 | 0.96 |
| Own car | 0.36 | 0.34 | 0.39 | −0.05 | 0.00 |
| Crime victim | 0.20 | 0.19 | 0.21 | −0.02 | 0.00 |
| **Municipality** | | | | | |
| Johannesburg | 0.37 | 0.36 | 0.38 | −0.02 | 0.00 |
| Tshwane | 0.23 | 0.24 | 0.23 | 0.01 | 0.02 |
| Mogale | 0.03 | 0.03 | 0.03 | 0.01 | 0.00 |
| Ekurhuleni | 0.26 | 0.26 | 0.26 | 0.00 | 0.43 |
| Emfuleni | 0.06 | 0.06 | 0.05 | 0.01 | 0.00 |
| Lesedi | 0.01 | 0.01 | 0.01 | 0.00 | 0.94 |
| Merafong | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 |
| Midvaal | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| Rand_West | 0.02 | 0.02 | 0.02 | 0.00 | 0.30 |
| **Mode of transport** | | | | | |
| Walk | 0.16 | 0.17 | 0.15 | 0.02 | 0.00 |
| Bicycle | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| motorbike | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Car | 0.27 | 0.24 | 0.31 | −0.07 | 0.00 |
| Taxi | 0.46 | 0.50 | 0.42 | 0.08 | 0.00 |
| Train | 0.06 | 0.04 | 0.07 | −0.02 | 0.00 |
| Gautrain | 0.01 | 0.01 | 0.01 | 0.00 | 0.21 |
| ReaVaya | 0.03 | 0.03 | 0.03 | 0.00 | 0.29 |
| Bus | 0.02 | 0.02 | 0.02 | 0.00 | 0.01 |
| Other transport | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 |
| **Trip purpose** | | | | | |
| Work trip | 0.36 | 0.29 | 0.43 | −0.15 | 0.00 |
| Work search trip | 0.09 | 0.08 | 0.10 | −0.02 | 0.00 |
| Entertainment | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 |
| Study | 0.05 | 0.05 | 0.06 | 0.00 | 0.70 |
| Chauffer kids | 0.02 | 0.03 | 0.02 | 0.01 | 0.00 |
| Shopping | 0.34 | 0.40 | 0.26 | 0.15 | 0.00 |
| Other trips | 0.12 | 0.12 | 0.11 | 0.01 | 0.00 |
| No movement | <0.01 | <0.01 | <0.01 | <0.01 | 1.00 |

### 2.2. Method

We regress travel time on gender using the ordered logistic model. The assumption is that the observed travel time category for individual $i$ denoted $y_i$ is a function of a latent index $y_i^*$ that depends linearly on the covariates i.e.

$$y_i^* = female\lambda + x_i'\beta + \varepsilon_i \quad (1)$$

where $x_i'$ is the vector of covariates for individual $i$, $\beta$ is a vector of parameters that capture the relationship between travel time and other covariates and $\varepsilon_i$ is a random error assumed to follow a standard logistic distribution. Further, *female* is the gender dummy and $\lambda$ is the coefficient

[1] See https://gcro.ac.za/research/project/detail/overview-quality-life-survey/for more details.

[2] See https://cdn.gcro.ac.za/media/documents/2022.02.22_QoL_6_Fieldwork_report.pdf.

[3] While the variable is a continuous in rounds 6 and 7, it is collected as a categorical variable in rounds 4 and 5, for uniformity recategorize the variables in rounds 6 and 7 and model the variable as a categorical variable.

**Table 2**
Weighted Summary statistics (during and post-pandemic, 2020 and 2023).

| | all | women | men | Difference | p-value |
|---|---|---|---|---|---|
| **Travel time in categories** | | | | | |
| Travel time 0–15min | 0.29 | 0.31 | 0.27 | 0.04 | 0.00 |
| Travel time 16–30min | 0.38 | 0.38 | 0.37 | 0.01 | 0.06 |
| Travel time 31–45min | 0.15 | 0.14 | 0.17 | −0.02 | 0.00 |
| Travel time 46–60min | 0.11 | 0.10 | 0.11 | −0.01 | 0.04 |
| Travel time 61–90min | 0.04 | 0.04 | 0.05 | −0.01 | 0.00 |
| Travel time more than 91min | 0.03 | 0.02 | 0.03 | −0.01 | 0.00 |
| **Individual characteristics** | | | | | |
| Age | 41.78 | 42.69 | 40.88 | 1.82 | 0.00 |
| Age squared | 1989.88 | 2085.94 | 1896.00 | 189.94 | 0.00 |
| Race (African dummy) | 0.83 | 0.82 | 0.84 | −0.02 | 0.00 |
| Disabled (dummy) | 0.09 | 0.10 | 0.08 | 0.02 | 0.00 |
| Has a partner | 0.66 | 0.62 | 0.70 | −0.08 | 0.00 |
| Tertiary education | 0.25 | 0.25 | 0.26 | −0.01 | 0.03 |
| Unspecified education | 0.01 | 0.00 | 0.01 | 0.00 | 0.02 |
| School unavailable in location | 0.13 | 0.11 | 0.15 | −0.05 | 0.00 |
| Cohabit with children | 0.56 | 0.68 | 0.44 | 0.23 | 0.00 |
| Household size | 3.62 | 4.01 | 3.23 | 0.78 | 0.00 |
| Renting | 0.22 | 0.22 | 0.22 | 0.01 | 0.26 |
| Informal housing | 0.16 | 0.14 | 0.17 | −0.03 | 0.00 |
| Employed | 0.49 | 0.40 | 0.58 | −0.18 | 0.00 |
| Missing employment status | 0.49 | 0.40 | 0.58 | −0.18 | 0.00 |
| Low income | 0.26 | 0.28 | 0.24 | 0.04 | 0.00 |
| Missing income | 0.29 | 0.29 | 0.29 | 0.00 | 0.94 |
| Own car | 0.40 | 0.39 | 0.42 | −0.04 | 0.00 |
| Crime victim | 0.21 | 0.21 | 0.22 | −0.02 | 0.00 |
| **Municipality** | | | | | |
| Johannesburg | 0.32 | 0.32 | 0.32 | 0.00 | 0.75 |
| Tshwane | 0.27 | 0.27 | 0.27 | 0.00 | 0.54 |
| Mogale | 0.03 | 0.03 | 0.03 | 0.00 | 0.73 |
| Ekurhuleni | 0.27 | 0.27 | 0.28 | −0.01 | 0.12 |
| Emfuleni | 0.06 | 0.06 | 0.06 | 0.00 | 0.30 |
| Lesedi | 0.01 | 0.01 | 0.01 | 0.00 | 0.84 |
| Merafong | 0.01 | 0.01 | 0.01 | 0.00 | 0.78 |
| Midvaal | 0.01 | 0.01 | 0.01 | 0.00 | 0.93 |
| Rand_West | 0.02 | 0.02 | 0.02 | 0.00 | 0.91 |
| **Mode of transport** | | | | | |
| Walk | 0.22 | 0.22 | 0.23 | 0.00 | 0.79 |
| Bicycle | 0.00 | 0.00 | 0.01 | −0.01 | 0.00 |
| motorbike | 0.00 | 0.00 | 0.00 | 0.00 | 0.52 |
| Car | 0.32 | 0.29 | 0.36 | −0.07 | 0.00 |
| Taxi | 0.41 | 0.45 | 0.37 | 0.08 | 0.00 |
| Train | 0.01 | 0.00 | 0.01 | −0.01 | 0.00 |
| Gautrain | 0.00 | 0.00 | 0.00 | 0.00 | 0.20 |
| ReaVaya | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bus | 0.01 | 0.01 | 0.01 | 0.00 | 0.12 |
| Other transport | 0.02 | 0.02 | 0.01 | 0.01 | 0.00 |
| **Trip purpose** | | | | | |
| Work trip | 0.33 | 0.26 | 0.40 | −0.13 | 0.00 |
| Work search trip | 0.10 | 0.07 | 0.12 | −0.05 | 0.00 |
| Entertainment | 0.01 | 0.01 | 0.02 | −0.01 | 0.00 |
| Study | 0.05 | 0.06 | 0.05 | 0.01 | 0.01 |
| Chauffer kids | 0.02 | 0.03 | 0.01 | 0.01 | 0.00 |
| Shopping | 0.34 | 0.40 | 0.28 | 0.12 | 0.00 |
| Other trips | 0.15 | 0.17 | 0.12 | 0.05 | 0.00 |
| No movement | <0.01 | <0.01 | <0.01 | <0.01 | 0.04 |

of interest. The relationship between $y_i^*$ and $y_i$ can be written as

$$y_i = 1 \text{ if } \quad y_i^* \leq 0$$

$$y_i = 2 \text{ if } \ 0 \leq y_i^* \leq \mu_1$$

$$y_i = 3 \text{ if } \ \mu_1 \leq y_i^* \leq \mu_2$$

$$y_i = 4 \text{ if } \ \mu_2 \leq y_i^* \leq \mu_3$$

$$y_i = 5 \text{ if } \quad y_i^* \geq \mu_3$$

where $\mu_j$ are unknown threshold parameters to be estimated. Parameter $\lambda$ provides the odds of being in a particular category, to get a sense of the magnitude of change we present the marginal effect of the parameter $\lambda$. Of interest to this paper is the significance, size and sign of $\lambda$ particularly we are interested in changes in the significance, size and sign of $\lambda$ from before (2015/2016 and 2017/2018) to during (2020/2021) and after the COVID-19 pandemic (2023/2024). Noting that gender roles influence trip purpose and trip purpose in turn influences travel time, we run equation (1) with and without trip purpose. Then we examine changes in $\lambda$ across time to see if the COVID-19 pandemic influenced the relationship between travel time and gender.

Further, to understand how the pandemic influenced travel behaviour we decompose the gender gap in each year using the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973). Under this approach, we are interested in what explains gender differences in travel time from before to after the pandemic. We therefore write the gender difference in travel time across rounds as

$$\lambda = \overline{M}_{Mt} - \overline{M}_{Ft} = \overline{X}_{Mt}\widehat{\beta}_{Mt} - \overline{X}_{Ft}\widehat{\beta}_{Ft} \tag{2}$$

where $\overline{M}_{Mt} = \overline{X}_{Mt}\widehat{\beta}_{Mt}$ is the estimate of the average travel time among males at time $t$ and $\overline{M}_{Ft} = \overline{X}_{Ft}\widehat{\beta}_{Ft}$ is the estimate of the average travel time among females at time $t$. The implication is that $\lambda$ derives from differences in characteristics between males and females $\overline{X}_{Mt} \neq \overline{X}_{Ft}$ (the endowment effect) and differences in returns to these characteristics $\widehat{\beta}_{Mt} \neq \widehat{\beta}_{Ft}$ (the structural or unexplained effect). To see this, we add and subtract the mean travel time $\overline{X}_{Ft}\widehat{\beta}_{Mt}$ to equation (2). This quantity represents the counterfactual mean outcome of females if they have males' returns (or beta).

$$\overline{M}_{Mt} - \overline{M}_{Ft} = \overline{X}_{Mt}\widehat{\beta}_{Mt} - \overline{X}_{Ft}\widehat{\beta}_{Mt} + \overline{X}_{Ft}\widehat{\beta}_{Mt} - \overline{X}_{F}\widehat{\beta}_{F} \tag{3}$$

$$\overline{M}_{Mt} - \overline{M}_{Ft} = (\overline{X}_{Mt} - \overline{X}_{Ft})\widehat{\beta}_{Mt} + (\widehat{\beta}_{Mt} - \widehat{\beta}_{Ft})\overline{X}_{Mt} \tag{4}$$

Written this way, the first term in equation (4) is the endowment effect since it is a function of differences in characteristics between the two groups, and the second term is the structural or unexplained effect since it is a function of differences in returns to the covariates. We also present detailed decomposition results that show the contribution of each covariate to gender differences in travel time across the rounds of data.

Our outcome is modelled as an ordinal variable even though the Oaxaca-Blinder decomposition method is typically used for a continuous variable. As shown by Wu and Kaplan (2024), it turns out that OLS-based Blinder–Oaxaca decomposition of an ordinal variable has a cardinalization-robust interpretation i.e. the result is numerically equivalent to decomposing the survival function associated with the ordinal variable. Further applying OLS-based Blinder–Oaxaca decomposition to ordinal variables is common in the literature and provides robust results, for example, see Pan et al. (2015) and Churchill et al. (2020).

## 3. Results

### 3.1. COVID-19 pandemic and gender gap in travel time

We start with the ordered logit regression that excludes trip purpose, Table 3 shows the beta estimates. The coefficient of the female dummy is negative, consistent with expectations this indicates that females spend less time travelling compared to males. However, the coefficient is smaller before the COVID-19 pandemic (2015/2016 and 2017/2018) compared to during (2020/2021) and post (2023/2024) the pandemic. Specifically, since the pandemic began, the size of the gender gap in travel time appears to have doubled. Table 4 shows results that include trip purpose, there are two important points to note. First, the estimates have a smaller size irrespective of round/year when the trip purpose is

**Table 3**
Ordered logit regression of the relationship between gender and travel time (excluding trip purpose).

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | 2015/2016 | 2017/2018 | 2020/2021 | 2023/2024 |
| **Individual characteristics** | | | | |
| Female | −0.10*** | −0.11*** | −0.24*** | −0.21*** |
| | (0.02) | (0.03) | (0.04) | (0.05) |
| Age | 0.01*** | 0.01*** | 0.03*** | 0.03*** |
| | (0.00) | (0.01) | (0.01) | (0.01) |
| Age squared | −0.00*** | −0.00*** | −0.00*** | −0.00*** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| African | 0.19*** | 0.27*** | 0.54*** | 0.37*** |
| | (0.03) | (0.04) | (0.07) | (0.07) |
| Disabled | −0.05 | 0.07 | 0.20* | 0.12 |
| | (0.05) | (0.06) | (0.10) | (0.08) |
| Partner | −0.04 | 0.09*** | −0.03 | −0.01 |
| | (0.03) | (0.03) | (0.05) | (0.05) |
| Tertiary education | 0.04 | 0.06 | −0.07 | 0.08 |
| | (0.03) | (0.04) | (0.05) | (0.06) |
| Unspecified education | 0.08 | 0.11 | 0.36 | 0.10 |
| | (0.07) | (0.10) | (0.31) | (0.31) |
| School unavailable in location | | 0.02 | −0.01 | 0.00 |
| | | (0.04) | (0.06) | (0.10) |
| Cohabit with children | 0.20*** | 0.01 | 0.03 | 0.16** |
| | (0.03) | (0.03) | (0.06) | (0.07) |
| Household size | 0.00 | 0.03*** | 0.02* | 0.03* |
| | (0.01) | (0.01) | (0.01) | (0.02) |
| Renting | −0.35*** | −0.09*** | −0.23*** | −0.32*** |
| | (0.03) | (0.03) | (0.05) | (0.05) |
| Informal housing | 0.23*** | 0.25*** | 0.19*** | 0.21** |
| | (0.04) | (0.04) | (0.06) | (0.09) |
| Employed | 0.33*** | 0.08*** | 0.49*** | 0.46*** |
| | (0.03) | (0.03) | (0.05) | (0.06) |
| Low income | −0.01 | −0.06* | −0.04 | −0.04 |
| | (0.03) | (0.04) | (0.05) | (0.07) |
| Missing income | −0.10*** | −0.04 | −0.10* | −0.08 |
| | (0.03) | (0.03) | (0.05) | (0.06) |
| Own car | −0.06* | −0.08** | −0.18*** | −0.27*** |
| | (0.03) | (0.04) | (0.06) | (0.06) |
| Crime victim | 0.03 | 0.07** | 0.11* | −0.03 |
| | (0.03) | (0.03) | (0.06) | (0.06) |
| **Municipality** | | | | |
| Johannesburg | 1.08*** | 0.35*** | 0.28*** | 0.53*** |
| | (0.07) | (0.06) | (0.09) | (0.10) |
| Tshwane | 1.20*** | 0.31*** | 0.29*** | 0.59*** |
| | (0.07) | (0.07) | (0.10) | (0.10) |
| Mogale | 0.92*** | 0.56*** | 0.09 | 0.36*** |
| | (0.09) | (0.08) | (0.11) | (0.12) |
| Ekurhuleni | 1.01*** | 0.34*** | 0.09 | 0.34*** |
| | (0.07) | (0.06) | (0.09) | (0.10) |
| Emfuleni | 0.59*** | 0.21*** | 0.06 | 0.35*** |
| | (0.08) | (0.07) | (0.11) | (0.11) |
| Lesedi | 0.66*** | −0.08 | 0.02 | 0.43*** |
| | (0.12) | (0.11) | (0.12) | (0.13) |
| Merafong | 0.37*** | −0.21** | −0.35*** | −0.08 |
| | (0.09) | (0.09) | (0.12) | (0.14) |
| Midvaal | 0.61*** | 0.22** | 0.40*** | 0.68*** |
| | (0.12) | (0.10) | (0.13) | (0.15) |
| **Mode of transport** | | | | |
| Walk | −0.50 | −1.58*** | −0.70*** | −0.27 |
| | (0.75) | (0.11) | (0.16) | (0.20) |
| Bicycle | −0.12 | −0.29 | 0.04 | 1.43*** |
| | (0.79) | (0.34) | (0.70) | (0.46) |
| Motorbike | 0.37 | −1.35*** | 0.54 | −0.05 |
| | (0.79) | (0.35) | (0.54) | (0.52) |
| Car | 0.02 | −0.24** | −0.29* | 0.35* |
| | (0.75) | (0.11) | (0.16) | (0.20) |
| Taxi | 0.07 | −0.02 | 0.37** | 0.89*** |
| | (0.75) | (0.10) | (0.15) | (0.20) |
| Train | 0.90 | 0.84*** | 2.10*** | 1.66*** |
| | (0.75) | (0.12) | (0.35) | (0.41) |
| Gautrain | 0.01 | 1.10*** | 1.67* | 1.20*** |
| | (0.76) | (0.27) | (0.86) | (0.38) |
| ReaVaya | 0.11 | 0.58*** | 0.87*** | 1.50*** |
| | (0.75) | (0.16) | (0.28) | (0.27) |
| Bus | 1.06 | 1.73*** | 1.70*** | 1.88*** |
| | (0.75) | (0.16) | (0.23) | (0.32) |
| /cut1 | 0.27 | −0.88*** | 0.38 | 0.86*** |
| | (0.76) | (0.16) | (0.25) | (0.29) |
| /cut2 | 2.09*** | 0.86*** | 2.08*** | 2.64*** |
| | (0.76) | (0.16) | (0.25) | (0.29) |
| /cut3 | 3.37*** | 1.92*** | 2.97*** | 3.55*** |
| | (0.76) | (0.16) | (0.25) | (0.29) |
| /cut4 | 4.64*** | 2.90*** | 4.07*** | 4.63*** |
| | (0.76) | (0.16) | (0.25) | (0.29) |
| /cut5 | 6.06*** | 3.53*** | 5.03*** | 5.65*** |
| | (0.76) | (0.17) | (0.26) | (0.29) |
| Observations | 29,350 | 23,924 | 13,304 | 13,615 |

Robust standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

accounted for in the model. This is consistent with extant literature that suggests that trip purpose influences travel behaviour and travel time. Second, while the beta estimate for the female dummy remains negative it is only significant in 2020/2021 and 2023/2024. This suggests that the COVID-19 pandemic may have impacted the relationship between gender and travel time.

Figs. 1 and 2 show that marginal effect of gender on travel time based on the regression that excludes and includes trip purpose (Tables 1 and 2 respectively). Fig. 1 shows that women have a positive marginal effect of being in the lowest 2 categories of travel time (≤ 30min) (females are 2 % more likely to be in the lowest category (≤ 15min)). Further, the marginal effect of being in the highest 4 categories (>30) is negative and significant. This marginal effect doubled for the last category (≤ 15min) during and after the pandemic (compared to before the pandemic 0.02 versus 0.04). Fig. 2 confirms the result in Table 4 ie the relationship between travel time and gender is null when trip purpose is included in the analysis but only before the pandemic. Further the size of the estimate in the first two categories (≤ 30min) is smaller when compared to the result that excludes travel time. These results suggest that the pandemic has impacted the relationship between gender and travel time, it also suggests that the impact is related to trip purpose.

Other results are largely consistent with expectations. Age is non-linear in travel time, as people age, the odds of travelling longer distances start to decrease - perhaps due to retirement or mobility challenges. This is in line with literature which finds that older individuals travel less and make shorter trips due to the physical and cognitive challenges which restrict mobility (Sundling et al., 2016). Africans travel longer distances compared to other race groups, this persistent inequality is a reflection of the legacy left by apartheid, where Black people live far from economic hubs thus requiring them to travel further than the other races to access opportunities (Hamann, 2024). Co-habiting with children and household size is generally positively correlated with travel time. Larger households are often multi-generational, and women in these households may face additional caregiving responsibilities, thus influencing their travel patterns (Sarmiento, 1998). The impact of informal housing further emphasizes the legacy left by apartheid as individuals, who live in informal settlements are more likely to be black or/and poor and they face significantly longer travel times. These results are reflective of the spatial inequalities imposed during apartheid. Renting is associated with shorter travel times. Renters typically have more flexibility to live closer to where they work, which is relevant given the high turnover rate in employment in South Africa (Khoele & Daya, 2014), access to public transport, and the ability to relocate more easily. Proximity to services further reduces

**Table 4**
Ordered logit regression of the relationship between gender and travel time (including trip purpose).

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | 2015/2016 | 2017/2018 | 2020/2021 | 2023/2024 |
| **Individual characteristics** | | | | |
| Female | −0.02 | −0.00 | −0.10** | −0.11** |
| | (0.02) | (0.03) | (0.05) | (0.05) |
| Age | 0.02*** | 0.02*** | 0.04*** | 0.04*** |
| | (0.00) | (0.01) | (0.01) | (0.01) |
| Age squared | −0.00*** | −0.00*** | −0.00*** | −0.00*** |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| African | 0.17*** | 0.24*** | 0.47*** | 0.32*** |
| | (0.04) | (0.04) | (0.07) | (0.07) |
| Disabled | −0.06 | 0.06 | 0.19* | 0.13 |
| | (0.05) | (0.06) | (0.10) | (0.09) |
| Partner | −0.02 | 0.11*** | 0.02 | −0.02 |
| | (0.03) | (0.03) | (0.05) | (0.05) |
| Tertiary education | −0.04 | −0.01 | −0.17*** | 0.01 |
| | (0.03) | (0.04) | (0.05) | (0.06) |
| Unspecified education | −0.01 | 0.09 | 0.22 | 0.02 |
| | (0.07) | (0.10) | (0.31) | (0.33) |
| School unavailable in location | | 0.04 | 0.05 | −0.01 |
| | | (0.04) | (0.06) | (0.10) |
| Cohabit with children | 0.23*** | 0.02 | 0.05 | 0.16** |
| | (0.03) | (0.03) | (0.06) | (0.07) |
| Household size | 0.00 | 0.03*** | 0.02 | 0.03 |
| | (0.01) | (0.01) | (0.01) | (0.02) |
| Renting | −0.39*** | −0.12*** | −0.33*** | −0.39*** |
| | (0.03) | (0.03) | (0.05) | (0.06) |
| Informal housing | 0.19*** | 0.26*** | 0.16** | 0.17* |
| | (0.04) | (0.04) | (0.06) | (0.09) |
| Employed | 0.05 | −0.07** | 0.10* | −0.05 |
| | (0.03) | (0.03) | (0.05) | (0.08) |
| Low income | 0.02 | −0.02 | 0.07 | 0.03 |
| | (0.03) | (0.04) | (0.06) | (0.07) |
| Missing income | −0.11*** | −0.04 | −0.02 | −0.08 |
| | (0.03) | (0.03) | (0.05) | (0.06) |
| Own car | −0.07** | −0.06 | −0.17*** | −0.31*** |
| | (0.03) | (0.04) | (0.06) | (0.07) |
| Crime victim | 0.02 | 0.08** | 0.09* | −0.02 |
| | (0.03) | (0.03) | (0.06) | (0.06) |
| **Municipality** | | | | |
| Johannesburg | 0.95*** | 0.30*** | 0.25*** | 0.46*** |
| | (0.07) | (0.06) | (0.09) | (0.10) |
| Tshwane | 1.11*** | 0.29*** | 0.27*** | 0.55*** |
| | (0.07) | (0.07) | (0.10) | (0.10) |
| Mogale | 0.84*** | 0.58*** | 0.08 | 0.37*** |
| | (0.09) | (0.08) | (0.11) | (0.12) |
| Ekurhuleni | 0.90*** | 0.28*** | 0.03 | 0.25** |
| | (0.07) | (0.06) | (0.09) | (0.10) |
| Emfuleni | 0.52*** | 0.24*** | 0.11 | 0.27** |
| | (0.08) | (0.07) | (0.11) | (0.12) |
| Lesedi | 0.63*** | −0.11 | 0.02 | 0.31** |
| | (0.12) | (0.12) | (0.12) | (0.13) |
| Merafong | 0.28*** | −0.22** | −0.21* | −0.03 |
| | (0.10) | (0.09) | (0.12) | (0.14) |
| Midvaal | 0.62*** | 0.20* | 0.47*** | 0.64*** |
| | (0.12) | (0.10) | (0.13) | (0.15) |
| **Mode of transport** | | | | |
| Walk | −0.48 | −1.56*** | −0.77*** | −0.24 |
| | (0.69) | (0.11) | (0.16) | (0.21) |
| Bicycle | −0.20 | −0.37 | −0.16 | 1.56*** |
| | (0.74) | (0.35) | (0.79) | (0.34) |
| Motorbike | 0.18 | −1.39*** | 0.32 | −0.08 |
| | (0.74) | (0.36) | (0.74) | (0.47) |
| Car | 0.01 | −0.27** | −0.41*** | 0.35 |
| | (0.69) | (0.11) | (0.16) | (0.22) |
| Taxi | 0.09 | 0.05 | 0.32** | 0.93*** |
| | (0.69) | (0.11) | (0.15) | (0.21) |
| Train | 0.76 | 0.71*** | 1.73*** | 1.48*** |
| | (0.69) | (0.12) | (0.34) | (0.40) |
| Gautrain | −0.09 | 0.96*** | 1.12 | 0.92** |
| | (0.71) | (0.28) | (0.91) | (0.41) |
| ReaVaya | 0.03 | 0.51*** | 0.40 | 1.30*** |
| | (0.70) | (0.17) | (0.30) | (0.29) |
| Bus | 0.98 | 1.65*** | 1.22*** | 1.57*** |
| | (0.70) | (0.16) | (0.24) | (0.34) |
| **Trip purpose** | | | | |
| Work trip | −0.00 | 0.14*** | 0.53*** | 0.70*** |
| | (0.05) | (0.05) | (0.11) | (0.10) |
| Work search trip | 0.19*** | 0.22*** | 0.38*** | 0.65*** |
| | (0.05) | (0.06) | (0.13) | (0.12) |
| Entertainment | 0.03 | 0.25** | −0.20 | −0.38* |
| | (0.10) | (0.12) | (0.18) | (0.23) |
| Study | 0.10 | 0.20*** | 0.53*** | 0.49*** |
| | (0.06) | (0.07) | (0.13) | (0.14) |
| Chauffer kids | −0.95*** | −0.80*** | −0.58*** | −0.50*** |
| | (0.09) | (0.10) | (0.17) | (0.16) |
| Shopping | −0.93*** | −0.70*** | −0.83*** | −0.65*** |
| | (0.04) | (0.04) | (0.10) | (0.08) |
| No movement | | 0.01 | −1.66** | −0.78* |
| | | (0.23) | (0.71) | (0.42) |
| /cut1 | −0.04 | −0.91*** | 0.30 | 0.79** |
| | (0.70) | (0.17) | (0.27) | (0.31) |
| /cut2 | 1.85*** | 0.88*** | 2.12*** | 2.68*** |
| | (0.70) | (0.17) | (0.27) | (0.32) |
| /cut3 | 3.17*** | 1.97*** | 3.06*** | 3.62*** |
| | (0.70) | (0.17) | (0.27) | (0.32) |
| /cut4 | 4.46*** | 2.96*** | 4.19*** | 4.73*** |
| | (0.70) | (0.18) | (0.27) | (0.32) |
| /cut5 | 5.88*** | 3.60*** | 5.15*** | 5.77*** |
| | (0.70) | (0.18) | (0.28) | (0.32) |
| Observations | 29,350 | 23,924 | 13,304 | 13,615 |

Robust standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

commute times compared to homeowners.

### 3.2. How has trip purpose influenced the gender gap due to the COVID-19 pandemic

This section focuses on how trip purpose may have impacted the relationship between gender and travel time. Particularly, we focus on how differences in the distribution of trip purpose and return to trip purpose may have contributed to the gender gap in travel time from before to during and after the pandemic (detailed decomposition results are presented in tables A1 to A4 of the appendix). We note that our result suggests that the gender gap is larger during and after the pandemic (0.14 and 0.15 in 2020/21 and 2023/24 respectively, see tables A3 and A4 in the appendix), compared to before the pandemic (0.08 and 0.11 in 2015/16 and 2017/18, see tables A1 and A2 in the appendix).

Table 5 shows the detailed decomposition results focusing on trip purpose, i.e. the explained and unexplained portions by year. In terms of the explained portion, chauffeuring kids and shopping generally contribute to the gender gap in travel time irrespective of round of data.

This is because these kinds of trips are more likely to be taken by women (see Tables 1 and 2) but these trips are associated with lower travel time (see Table 4). So, if women have the same endowment as men in terms of shopping and chauffeuring kids the gap will be narrower. This pattern did not change across the rounds of data. In terms of work-related trips (work trip and trip undertaken to search for work), these trips are more likely to be taken by men (see Tables 1 and 2) and they are positively correlated with travel time (see Table 4), so these kinds of trips contribute to the gender gap in travel time i.e. if females have the same endowments in terms of work-related trips they will travel more and consequently the gender gap will be narrower. However, the contribution of work-related trips to the gap is either low or

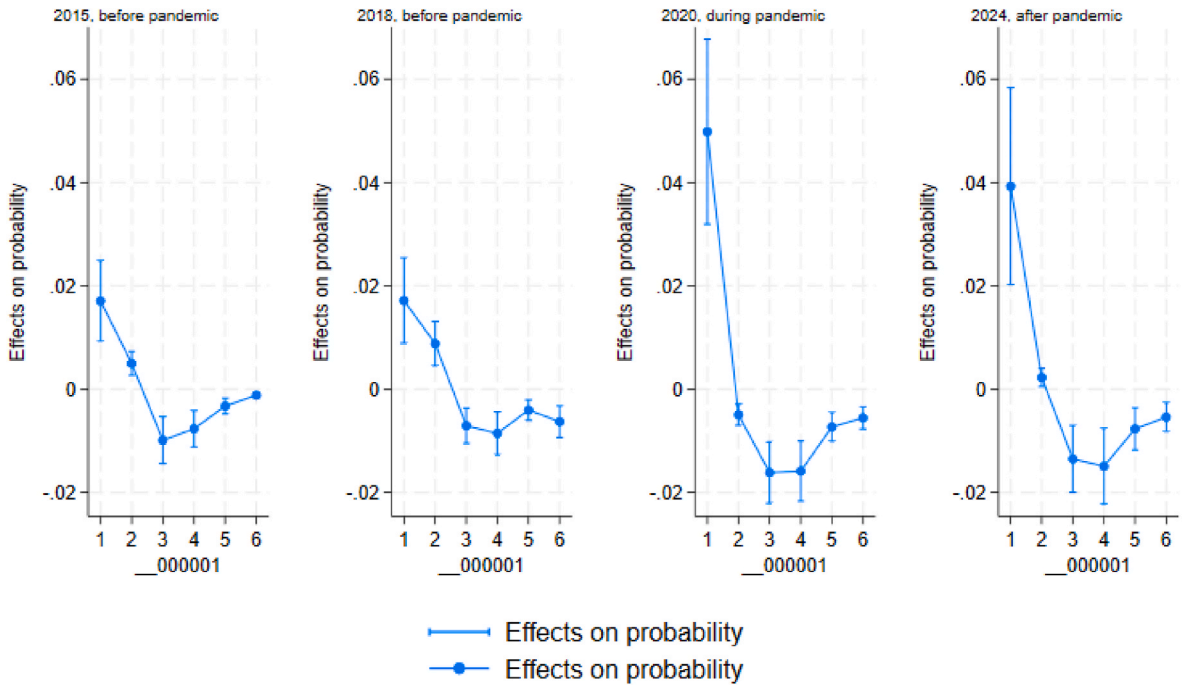


**Fig. 1.** Marginal effect of gender on travel time (excluding trip purpose).

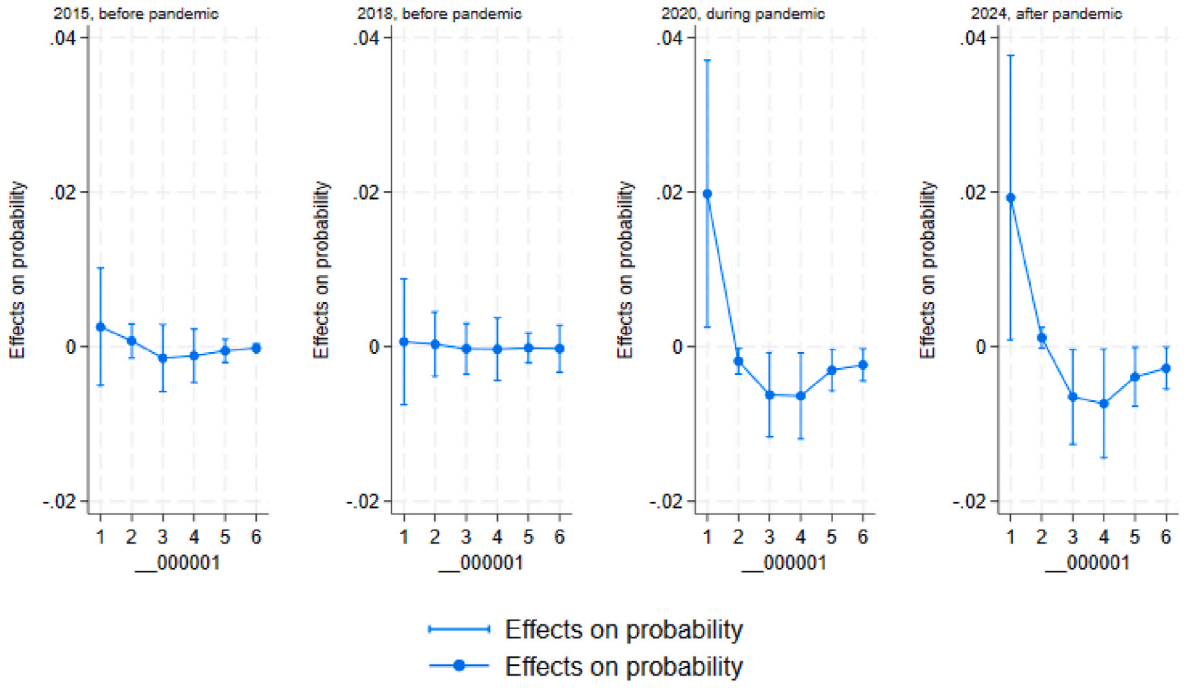


**Fig. 2.** Marginal effect of gender on travel time (including trip purpose).

insignificant (see explained portion of work search trip in 2015/2016 and 2017/2018 of Table 5) before the pandemic. After the pandemic, the contribution is larger and significant at the 1 % level (see the explained portion of work trip in 2020/2021 and 2023/2024 and the work search portion in 2023/20204 of Table 5). The only time the returns to work-related trip is significant is in 2015/2016 and its effect is to narrow the gap (the unexplained portion of work trip in 2015/2016 of Table 5).

The implication is that in the case of trip purpose, the imbalance in the distribution of characteristics (explained portion) is important in explaining the changes in the gender gap in travel time across time[4] (full decomposition tables are presented in tables A1 to A4 of the appendix).

## 4. Discussion

Using a representative population sample for Gauteng province, the

[4] This is evident in the full decomposition tables A1 to A4 in the appendix, the explained portion of the total gap is always significant while the unexplained portion is only significant in the period 2023/2024.

**Table 5**
Detailed decomposition results (trip purpose only).

| | 2015/2016 | | 2017/2018 | | 2020/2021 | | 2023/2024 | |
|---|---|---|---|---|---|---|---|---|
| Trip purpose variables | Explained | Unexplained | Explained | Unexplained | Explained | Unexplained | Explained | Unexplained |
| Work trip | 0.00 | −0.06** | 0.01 | −0.04 | 0.03*** | −0.03 | 0.05*** | −0.01 |
| Work search trip | 0.00** | −0.01 | 0.00* | −0.01 | 0.00 | 0.01 | 0.02*** | −0.01 |
| Entertainment | 0.00 | −0.00 | 0.00*** | −0.01** | 0.01 | −0.02* | −0.00 | −0.00 |
| Study | 0.00 | −0.00 | 0.00 | −0.00 | 0.00 | 0.00 | −0.00 | −0.00 |
| Chauffer kids | 0.01*** | 0.00* | 0.01*** | −0.00 | 0.01*** | −0.00 | 0.01*** | 0.00 |
| Shopping | 0.08*** | −0.01 | 0.07*** | −0.03** | 0.09*** | 0.00 | 0.06*** | 0.03 |

***p < 0.01, **p < 0.05, *p < 0.1.
Note that as mentioned before we have used the OLS-based Oaxaca-Blinder decomposition for the ordinal outcome. To check the robustness of this choice we make use of the continuous travel time variable included in the latest dataset (2023/24). Our result show that using the continuous variable does not change our substantive result.
Source: GCRO (2015, 2018, 2020, 2023).

study explored the trends in gender disparity in travel times before (2015/2016 and 2017/2018), during (2020/2021) and after (2023/2024) the COVID19 pandemic. Women across all the four years, compared to men, had a higher probability of belonging to a shorter travel time category. This is reflective of the findings of past studies, which have found that women tend to make shorter trips, while men make longer trips (Beige & Axhausen, 2017; Havet et al., 2021; Kwan & Kotsev, 2015; Patterson et al., 2005; Zhang et al., 2008).

Moreover, the study found that the effect of gender on travel time ceases to be significant when trip purpose is controlled for in the pre-COVID19 estimations for 2015/2016 and 2017/2018 (first 2 columns of Table 4). This is not surprising as traditional gender roles in South Africa remain a strong determinant of trip purpose for men and women (Havet et al., 2021; Wachs, 1997). Therefore, work-related travel, which typically involves longer commute times, are more common among men whereas, women's trips that are more frequently associated with household maintenance activities like shopping or chauffeuring kids, generally require shorter travel times (Geyer & Molayi, 2018; Turner & Niemeier, 1997). Moreover, many black women in South Africa are employed as domestic workers (De Villiers & Taylor, 2019), a job often done within the local community or as live-in work which reduces the need for long commutes to work. This explains the observed shorter travel times for women compared to men and also why gender differences ceased to be significant upon controlling for travel purpose. These arguments further explain the longer average travel time for men compared to women and why accounting for trip purpose removes the gender difference in travel time.

The surprising finding of this study, which can be seen as a break from the past, is that gender continues to be a significant determinant of travel time in 2020/2021 and 2023/2024 even after controlling for trip purpose (last 2 columns of Table 4). The contributors for this shift from the pre-COVID19 trend was explored further using the decomposition analysis. The analysis also found that the gender time gap has been increasing since the pandemic from 0.08 in 2015 to 0.14 in 2023 (tables A1 to A4 of the appendix). Trip purposes like shopping and chauffeuring children, shorter duration household maintenance related trips mainly undertaken by women, are found to contribute to increasing gender gap consistently across all time points (see Table 5). In the pre-pandemic years, the returns on travel to work-related trips contributed significantly towards decreasing the travel time gap between men and women (column 2 of Table 5). It meant that women spent more amount of time than men travelling to work prior to the pandemic. This can be explained by the findings that women use public transport compared to men, taking more time to travel the same or less distance. In the post-pandemic period, the returns to travel to work is no longer a significant contributor to explaining the gender gap in travel time (see unexplained effect from 2020 in Table 5).

It is notable that in the pre-COVID19 years, gender related travel time inequality is not significantly driven by the endowment effect or the differences in the mean values between men and women travelling to work (columns 1 and 3 of Table 5). This changed drastically in 2020/2021 and 2023/2024, with women recording lower averages compared to men for work travel, indicating that fewer women are travelling for work compared to men. The significance of the endowment effect of travel to work variable (columns 5 and 7 of Table 5) points to the increasing exclusion of women from paid work or that they are prioritising telecommuting or work-from-home arrangements more. Given the growth in popularity of telecommuting since the pandemic, the telecommuting argument had to be explored further as a plausible explanation for the increasing travel time gap between men and women.

It is possible that a larger proportion of women have opted to work from home due to the disproportionate burden of care-work borne by women within the household. As a result of this 'time poverty' urban women have lower overall mobility compared to men, making flexible work arrangements more appealing. This explanation is tested in a decomposition analysis restricted to employed men and employed women. The average commute time does not differ significantly between men and women in the decomposition analysis undertaken within a sub-sample of employed individuals (Tables A5 to A8), indicating that the argument of more employed women working closer to home or telecommuting does not hold as an explanation for the difference in commute time observed in the full-sample of men and women (Tables A1-A4). The most plausible explanation for the significant commute time gap between men and women in the full sample can therefore be attributed to the difference in labour force participation.

This indicates that the argument that more women are being excluded from paid employment is stronger to explain the gender gap in travel time. In addition, the endowment effect of trip to look for work is recorded as significantly contributing to travel time inequality across gender in 2023/2024 (second to the last column of Table 5). The labour force participation rate of women at 56 % compared to 66 % for men (StatsSA, 2024, p0211) validates the argument that more men, compared to women, travelled for the purpose of work or looking for work.

The significance of the economic activity-related trip purposes (travel to work and job search) reflects the job loss pattern during COVID19 and the job recovery trend since the end of the pandemic. Women experienced a higher rate of job losses during the pandemic in South Africa. While women comprised less than half of the employed workforce in February 2020, they accounted for two-thirds of the net job losses between February and April 2020 (Casale & Posel, 2020). Despite this, a higher proportion of men have regained employment during the post-pandemic recovery (Casale & Shepherd, 2022). Therefore, fewer women are travelling to work since 2020 and, by 2023 more women appear to be too discouraged to continue to search for work in the last period of analysis. The lower travel time of women, therefore appears to be due to their lower involvement in paid economic activity during and post COVID19.

It is noteworthy that the relative contribution of household maintenance trips compared to economic activity-related trips in explaining the

gender travel time gap has decreased during and after the pandemic (Table 5). In 2015/16 the explained portion of the gap accounted for by shopping and Chauffer kids is 0.9 (0.1 + 0.8) versus less than 0.001 for work and work search trips, by 2023/2024, the combined explained effect of travel for work and job search (0.7 = 0.5 + 0.2) equalled that of shopping and chauffeuring trips (0.7 = 0.6 + 0.1). This represents a significant shift from the pre-pandemic period, where household care activities overwhelmingly accounted for the trip purpose effect on the gender travel time gap, surpassing economic activities.

The pandemic has highlighted and exacerbated existing gender inequalities in the South African labour market. While men have seen a recovery in employment, women continue to face significant challenges, necessitating focused interventions to support their return to work and address the broader socioeconomic impacts they have experienced. Women also faced increased unpaid care work due to school closures and additional childcare responsibilities, further impacting their ability to remain in or return to the workforce during the pandemic. Post-pandemic, a major barrier in effective job search is also the cost related to travel (Ardington et al., 2016). There is a need for targeted policies to support women through travel subsidies (Franklin, 2018) in overcoming the long-term impacts of the pandemic on their employment and socioeconomic status.

## 5. Conclusion

This paper examines the gender differences in travel times in Gauteng, South Africa, by analysing the influence of trip purposes; before, during and after COVID19 in the context of a developing country. Women report on average shorter travel times compared to men in all the four time points of this study. The study found that prior to COVID19, travel purpose largely accounted for the shorter duration of the trips of women compared to men. The COVID19 pandemic exacerbated the travel time inequities between men and women with the latter spending lesser travel time compared to the former post-pandemic, even after controlling for trip purpose.

The study identified gender-based inequalities in South Africa's labour market as the primary factor contributing to the increasing travel time gap between men and women especially during and since the pandemic. While there is no significant difference in the time spent on travel to work for both men and women, fewer women compared to men are travelling to work since the pandemic. This is expected as more women lost their employment during the pandemic, and men have regained employment more effectively than women during the post-pandemic recovery. This has resulted in fewer women travelling to work during and post-pandemic contributing to their shorter travel time. Women continue to struggle with re-entering the workforce, and this has resulted in women being increasingly demotivated and discouraged from investing in travel time for job search compared to men in the post-pandemic period, further exacerbating the gender gap in travel time.

The results suggest that women are recording less travel time mainly because of increased exclusion from the labour markets during and post-COVID19 pandemic. Aside from gender being a key significant variable in determining travel times, this study also highlighted the deeply entrenched socio-economic and spatial inequalities that mould travel patterns in South Africa. Notably, disparities among different races, socio-economic status and area location continue to have an undeniable impact on travel times. The study recommends targeted policy intervention in the form of travel subsidies for women from disadvantaged socio-economic backgrounds to enable effective job search and overcome the long-term impacts of the pandemic on their employment and socioeconomic status.

It has been established that high transportation cost is a major barrier to job search intensity and finding permanent employment in South Africa (Ardington et al., 2016). Further, a significant portion of South Africans (including learners) rely on walking as their primary mode of transport, especially in peri-urban and rural areas due to the lack of adequate public transport and non-motorized transport (NMT) infrastructure (Mokitimi & Vanderschuren, 2017). While there are existing government run transport services, their coverage is limited (Sekgale & Madonsela, 2020; Walters & Pisa, 2023), and they are particularly absent in areas where those of poorer socioeconomic status live. Therefore, expanding the reach of government-owned transport services can be a way to channel subsidies to women and households that require cheaper transport to enhance their participation in the economy. This could increase employment search activities and consequently permanent and secure employment, particularly for women and low-income earners. It will also enhance the economy by increasing consumption and generating tax revenue for the government.

## CRediT authorship contribution statement

**Adeola Oyenubi:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Umakrishnan Kollamparambil:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Mandisa Ncobo:** Writing – review & editing, Data curation, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## APPENDIX

**Table A1**
Decomposition analysis 2015/2016 (pre-pandemic)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.00** | 0.14* |
| Age squared | | 0.00*** | −0.05 |
| Race (African dummy) | | −0.00*** | −0.05* |
| Disabled (dummy) | | 0.00 | −0.00 |
| Partner | | 0.00 | −0.02 |
| Tertiary education | | −0.00 | 0.00 |
| Unspecified education | | −0.00 | −0.00 |
| Cohabit with children | | −0.01*** | 0.04*** |
| Household size | | −0.00 | −0.03 |

(*continued on next page*)

**Table A1** (*continued*)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Renting | | −0.01*** | 0.01 |
| Informal housing | | −0.00 | 0.01** |
| Employed | | −0.00 | 0.07*** |
| Low income | | −0.00 | −0.00 |
| Missing income | | 0.00 | 0.02** |
| Own car | | 0.00 | −0.04*** |
| Crime victim | | 0.00 | −0.01 |
| Johannesburg | | 0.01*** | −0.00 |
| Tshwane | | −0.00* | −0.00 |
| Mogale | | −0.00** | −0.00 |
| Ekurhuleni | | −0.00 | −0.01 |
| Emfuleni | | −0.00** | 0.00 |
| Lesedi | | −0.00 | 0.00 |
| Merafong | | 0.00* | −0.00 |
| Midvaal | | −0.00** | −0.00 |
| Walk | | −0.00 | −0.16** |
| Bicycle | | 0.00 | −0.01** |
| motorbike | | 0.00 | −0.00 |
| Car | | 0.01 | −0.29* |
| Taxi | | −0.02 | −0.44** |
| Train | | 0.02** | −0.07** |
| Gautrain | | 0.00 | −0.01** |
| ReaVaya | | 0.00 | −0.03* |
| Bus | | −0.00* | −0.03*** |
| Work trip | | 0.00 | −0.06** |
| Work search trip | | 0.00** | −0.01 |
| Entertainment | | 0.00 | −0.00 |
| Study | | 0.00 | −0.00 |
| Chauffer kids | | 0.01*** | 0.00* |
| Shopping | | 0.08*** | −0.01 |
| overall | . | | |
| Male | 2.39*** | | |
| Female | 2.31*** | | |
| difference | 0.08*** | | |
| explained | 0.07*** | | |
| unexplained | 0.01 | | . |
| Constant | | | 1.01* |
| Observations | 29,350 | 29,350 | 29,350 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A2**
Decomposition analysis 2017/2018 (pre-pandemic)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.01** | −0.21 |
| Age squared | | 0.01*** | 0.15* |
| Race (African dummy) | | 0.00** | 0.02 |
| Disabled (dummy) | | −0.00 | −0.00 |
| Partner | | −0.00 | −0.01 |
| Tertiary education | | −0.00 | 0.02 |
| Unspecified education | | 0.00 | −0.00 |
| School unavailable in location | | 0.00 | 0.01 |
| Cohabit with children | | 0.00 | −0.00 |
| Household size | | −0.01** | 0.04 |
| Renting | | −0.00 | −0.01 |
| Informal housing | | 0.00** | 0.02* |
| Employed | | −0.00 | −0.02 |
| Low income | | −0.00 | −0.02** |
| Missing income | | 0.00 | −0.02 |
| Own car | | 0.00 | −0.03 |
| Crime victim | | 0.00 | 0.01 |
| Johannesburg | | 0.00 | 0.04 |
| Tshwane | | 0.00 | 0.03 |
| Mogale | | −0.00 | 0.01* |
| Ekurhuleni | | −0.00 | 0.04* |
| Emfuleni | | 0.00 | 0.02*** |
| Lesedi | | 0.00* | 0.00** |
| Merafong | | −0.00 | −0.00 |

(*continued on next page*)

**Table A2** (*continued*)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Midvaal | | 0.00 | 0.00 |
| Walk | | 0.00 | 0.03 |
| Bicycle | | 0.00 | 0.00 |
| motorbike | | −0.00 | 0.00 |
| Car | | 0.01 | 0.15 |
| Taxi | | −0.03 | 0.19 |
| Train | | 0.03 | 0.01 |
| Gautrain | | −0.00 | 0.00 |
| ReaVaya | | 0.00 | 0.00 |
| Bus | | 0.01 | 0.00 |
| Work trip | | 0.01 | −0.04 |
| Work search trip | | 0.00* | −0.01 |
| Entertainment | | 0.00*** | −0.01** |
| Study | | 0.00 | −0.00 |
| Chauffer kids | | 0.01*** | −0.00 |
| Shopping | | 0.07*** | −0.03** |
| overall | . | | |
| Male | 2.69*** | | |
| Female | 2.58*** | | |
| difference | 0.11*** | | |
| explained | 0.12*** | | |
| unexplained | −0.01 | | . |
| Constant | | | −0.40 |
| Observations | 23,924 | 23,924 | 23,924 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A3**
Decomposition analysis 2020/2021 (during-pandemic)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.01** | 0.17 |
| Age squared | | 0.01** | −0.10 |
| Race (African dummy) | | 0.00 | 0.04 |
| Disabled (dummy) | | 0.00 | −0.00 |
| Partner | | 0.00 | 0.02 |
| Tertiary education | | −0.00** | 0.04** |
| Unspecified education | | −0.00 | 0.00 |
| School unavailable in location | | −0.00 | 0.01 |
| Cohabit with children | | −0.01 | −0.03 |
| Household size | | 0.01* | 0.17*** |
| Renting | | −0.00 | −0.01 |
| Informal housing | | 0.00 | 0.01 |
| Employed | | 0.01* | 0.00 |
| Low income | | 0.00 | 0.03 |
| Missing income | | −0.00 | 0.00 |
| Own car | | −0.00 | −0.03 |
| Crime victim | | 0.00 | −0.01 |
| Johannesburg | | −0.00 | −0.04 |
| Tshwane | | −0.00 | −0.02 |
| Mogale | | 0.00 | −0.00 |
| Ekurhuleni | | 0.00 | −0.02 |
| Emfuleni | | 0.00 | −0.00 |
| Lesedi | | 0.00 | −0.00 |
| Merafong | | −0.00 | −0.00 |
| Midvaal | | 0.00 | −0.00 |
| Walk | | −0.02 | 0.02 |
| Bicycle | | 0.00 | −0.00 |
| motorbike | | −0.00 | 0.00** |
| Car | | −0.07 | 0.12 |
| Taxi | | 0.03 | 0.03 |
| Train | | 0.00 | 0.00 |
| Gautrain | | 0.00 | 0.00 |
| ReaVaya | | −0.00 | −0.00 |
| Bus | | −0.00 | 0.00 |
| Work trip | | 0.03*** | −0.03 |
| Work search trip | | 0.00 | 0.01 |
| Entertainment | | 0.01 | −0.02* |
| Study | | 0.00 | 0.00 |

(*continued on next page*)

**Table A3** (*continued*)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Chauffer kids | | 0.01*** | −0.00 |
| Shopping | | 0.09*** | 0.00 |
| overall | . | | |
| Male | 2.24*** | | |
| Female | 2.09*** | | |
| difference | 0.15*** | | |
| explained | 0.10*** | | |
| unexplained | 0.05 | | . |
| Constant | | | −0.31 |
| Observations | 13,304 | 13,304 | 13,304 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A4**
Decomposition analysis 2023/2024 (post-pandemic)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.02** | −0.05 |
| Age squared | | 0.02** | 0.00 |
| Race (African dummy) | | 0.00 | 0.05 |
| Disabled (dummy) | | −0.00 | 0.00 |
| Partner | | 0.01 | −0.06 |
| Tertiary education | | 0.00 | −0.04* |
| Unspecified education | | 0.00 | −0.00 |
| School unavailable in location | | −0.00 | 0.01 |
| Cohabit with children | | −0.02 | −0.01 |
| Household size | | −0.01 | 0.07 |
| Renting | | 0.00 | −0.02 |
| Informal housing | | 0.00 | −0.00 |
| Employed | | −0.00 | −0.00 |
| Low income | | −0.00* | −0.05** |
| Missing income | | −0.00 | −0.02 |
| Own car | | −0.00 | −0.07** |
| Crime victim | | −0.00 | −0.00 |
| Johannesburg | | −0.00 | 0.04 |
| Tshwane | | −0.00 | 0.04 |
| Mogale | | −0.00 | −0.00 |
| Ekurhuleni | | 0.00 | 0.02 |
| Emfuleni | | −0.00 | 0.01 |
| Lesedi | | 0.00 | 0.00 |
| Merafong | | −0.00 | 0.00 |
| Midvaal | | 0.00 | 0.00 |
| Walk | | −0.00 | 0.16 |
| Bicycle | | 0.00 | 0.01** |
| motorbike | | 0.00 | −0.00 |
| Car | | −0.02 | 0.33** |
| Taxi | | −0.01 | 0.23 |
| Train | | 0.00 | 0.01 |
| Gautrain | | 0.00 | 0.00 |
| ReaVaya | | 0.00 | 0.00 |
| Bus | | −0.00 | 0.00 |
| Work trip | | 0.05*** | −0.01 |
| Work search trip | | 0.02*** | −0.01 |
| Entertainment | | −0.00 | −0.00 |
| Study | | −0.00 | −0.00 |
| Chauffer kids | | 0.01*** | 0.00 |
| Shopping | | 0.06*** | 0.03 |
| overall | . | | |
| Male | 2.38*** | | |
| Female | 2.24*** | | |
| difference | 0.14*** | | |
| explained | 0.08*** | | |
| unexplained | 0.06* | | . |
| Constant | | | −0.61 |
| Observations | 13,615 | 13,615 | 13,615 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A5**
Decomposition analysis 2015/2016 (pre-pandemic, employed sample)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | 0.00 | 0.12 |
| Age squared | | −0.00 | −0.05 |
| Race (African dummy) | | −0.00 | −0.02 |
| Disabled (dummy) | | −0.00 | −0.00 |
| Partner | | −0.00 | 0.01 |
| Tertiary education | | 0.00 | 0.01 |
| Unspecified education | | 0.00 | −0.00* |
| Cohabit with children | | −0.01 | 0.04* |
| Household size | | −0.01 | −0.04 |
| Renting | | −0.01*** | 0.01 |
| Informal housing | | 0.00 | 0.02** |
| Low income | | −0.00 | −0.01 |
| Missing income | | 0.00 | 0.02 |
| Own car | | 0.00 | −0.08*** |
| Crime victim | | 0.00 | −0.01 |
| Johannesburg | | 0.01 | 0.06 |
| Tshwane | | −0.01*** | 0.03 |
| Mogale | | −0.00 | 0.01 |
| Ekurhuleni | | −0.00 | 0.04 |
| Emfuleni | | 0.00 | 0.01 |
| Lesedi | | 0.00 | 0.00** |
| Merafong | | −0.00 | 0.00 |
| Midvaal | | −0.00 | 0.00 |
| Walk | | −0.00 | 0.16 |
| Bicycle | | 0.00 | −0.00 |
| motorbike | | −0.00** | 0.01** |
| Car | | −0.08** | 0.57* |
| Taxi | | 0.08* | 0.46 |
| Train | | −0.02 | 0.09* |
| Gautrain | | 0.00 | 0.01 |
| ReaVaya | | 0.01 | 0.04* |
| Bus | | 0.01 | 0.02 |
| Work trip | | −0.01 | −0.10 |
| Work search trip | | −0.00 | −0.01 |
| Entertainment | | −0.00 | 0.00 |
| Study | | −0.00 | −0.00 |
| Chauffer kids | | 0.01*** | 0.00 |
| Shopping | | 0.04*** | −0.01 |
| overall | . | | |
| Male | 2.47*** | | |
| Female | 2.44*** | | |
| difference | 0.03 | | |
| explained | −0.00 | | |
| unexplained | 0.03 | | . |
| Constant | | | −1.38* |
| Observations | 14,474 | 14,474 | 14,474 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A6**
Decomposition analysis 2017/2018 (pre-pandemic, employed sample)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.00 | −0.46 |
| Age squared | | 0.00 | 0.28 |
| Race (African dummy) | | 0.01** | 0.03 |
| Disabled (dummy) | | 0.00 | −0.00 |
| Partner | | −0.00 | −0.01 |
| Tertiary education | | 0.00 | 0.03 |
| Unspecified education | | 0.00 | −0.00 |
| School unavailable in location | | −0.00 | 0.01 |
| Cohabit with children | | 0.00 | 0.02 |
| Household size | | −0.02* | 0.03 |
| Renting | | −0.00 | −0.03 |
| Informal housing | | 0.00* | 0.02* |
| Low income | | 0.00 | −0.01 |
| Missing income | | −0.00 | −0.00 |

(*continued on next page*)

**Table A6** (*continued*)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Own car | | 0.00 | −0.09** |
| Crime victim | | 0.00 | 0.04** |
| Johannesburg | | 0.00 | −0.05 |
| Tshwane | | −0.01 | −0.05 |
| Mogale | | −0.00 | 0.00 |
| Ekurhuleni | | 0.00 | −0.01 |
| Emfuleni | | −0.00 | 0.01 |
| Lesedi | | 0.00 | 0.00 |
| Merafong | | 0.00 | −0.00 |
| Midvaal | | 0.00 | −0.00 |
| Walk | | −0.00 | 0.11* |
| Bicycle | | 0.00 | 0.00 |
| motorbike | | −0.00** | 0.01** |
| Car | | −0.01 | 0.63** |
| Taxi | | 0.03 | 0.47* |
| Train | | 0.00 | 0.06 |
| Gautrain | | 0.00 | 0.00* |
| ReaVaya | | 0.00 | 0.01* |
| Bus | | 0.00 | 0.02 |
| Work trip | | −0.00 | −0.09 |
| Work search trip | | 0.01** | −0.02** |
| Entertainment | | 0.00* | −0.01 |
| Study | | −0.00 | −0.00 |
| Chauffer kids | | 0.01*** | −0.00 |
| Shopping | | 0.04*** | −0.01 |
| overall | . | | |
| Male | 2.69*** | | |
| Female | 2.66*** | | |
| difference | 0.03 | | |
| explained | 0.07*** | | |
| unexplained | −0.04 | | . |
| Constant | | | −0.99 |
| Observations | 9403 | 9403 | 9403 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A7**
Decomposition analysis 2020/2021 (during-pandemic, employed sample)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.02 | −0.23 |
| Age squared | | 0.01 | 0.09 |
| Race (African dummy) | | 0.00 | 0.10 |
| Disabled (dummy) | | 0.00 | −0.01 |
| Partner | | −0.01* | 0.04 |
| Tertiary education | | 0.01** | 0.07** |
| Unspecified education | | −0.00 | 0.00 |
| School unavailable in location | | −0.00 | 0.03 |
| Cohabit with children | | −0.02 | −0.05 |
| Household size | | 0.01* | 0.26*** |
| Renting | | −0.01* | 0.02 |
| Informal housing | | 0.00 | 0.03 |
| Low income | | 0.00 | 0.03 |
| Missing income | | 0.00 | −0.00 |
| Own car | | −0.00 | −0.03 |
| Crime victim | | 0.00 | 0.00 |
| Johannesburg | | −0.01 | 0.00 |
| Tshwane | | −0.00 | 0.02 |
| Mogale | | 0.00 | 0.01 |
| Ekurhuleni | | 0.00 | 0.01 |
| Emfuleni | | −0.00 | 0.01 |
| Lesedi | | −0.00 | 0.00 |
| Merafong | | −0.00 | 0.00 |
| Midvaal | | −0.00 | −0.00 |
| Walk | | 0.01 | −0.45*** |
| Bicycle | | 0.00 | −0.01* |
| motorbike | | 0.00 | −0.00 |
| Car | | 0.04** | −1.47*** |
| Taxi | | −0.10*** | −1.21*** |

(*continued on next page*)

**Table A7** (*continued*)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Train | | 0.01 | −0.01 |
| Gautrain | | −0.00 | −0.00 |
| ReaVaya | | −0.00 | −0.01*** |
| Bus | | −0.02* | −0.04*** |
| Work trip | | −0.00 | −0.23 |
| Work search trip | | −0.01 | 0.00 |
| Entertainment | | 0.01 | −0.03* |
| Study | | 0.00 | 0.00 |
| Chauffer kids | | 0.01 | −0.01 |
| Shopping | | 0.04** | −0.05 |
| overall | . | | |
| Male | 2.36*** | | |
| Female | 2.31*** | | |
| difference | 0.05 | | |
| explained | −0.04 | | |
| unexplained | 0.09** | | . |
| Constant | | | 3.31*** |
| Observations | 5768 | 5768 | 5768 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

**Table A8**
Decomposition analysis 2023/2024 (post-pandemic, employed sample)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| Age | | −0.01 | −0.52 |
| Age squared | | 0.01 | 0.35 |
| Race (African dummy) | | 0.00 | 0.05 |
| Disabled (dummy) | | −0.00 | −0.01 |
| Partner | | 0.00 | 0.08 |
| Tertiary education | | −0.00 | −0.05 |
| Unspecified education | | 0.00 | −0.00 |
| School unavailable in location | | −0.00 | −0.00 |
| Cohabit with children | | −0.03* | −0.05 |
| Household size | | −0.02 | −0.03 |
| Renting | | 0.00 | −0.03 |
| Informal housing | | 0.01 | −0.02 |
| Low income | | −0.00 | −0.03 |
| Missing income | | 0.00 | −0.04 |
| Own car | | −0.00 | −0.06 |
| Crime victim | | 0.00 | −0.01 |
| Johannesburg | | −0.00 | −0.02 |
| Tshwane | | −0.00 | 0.02 |
| Mogale | | −0.00 | 0.00 |
| Ekurhuleni | | 0.00 | 0.01 |
| Emfuleni | | 0.00 | −0.00 |
| Lesedi | | 0.00 | 0.00 |
| Merafong | | −0.00 | 0.00 |
| Midvaal | | 0.00 | 0.00 |
| Walk | | 0.00 | 0.13* |
| Bicycle | | 0.01 | 0.01 |
| motorbike | | 0.00 | 0.00 |
| Car | | −0.00 | 0.37** |
| Taxi | | −0.02 | 0.21 |
| Train | | 0.01** | 0.00 |
| Gautrain | | 0.00 | 0.00 |
| ReaVaya | | 0.00 | 0.00 |
| Bus | | −0.01** | −0.00 |
| Work trip | | 0.00 | 0.03 |
| Work search trip | | −0.00 | 0.03 |
| Entertainment | | −0.00 | −0.00 |
| Study | | −0.00 | −0.00 |
| Chauffer kids | | 0.01** | 0.00 |
| Shopping | | 0.02** | 0.02 |
| overall | . | | |
| Male | 2.49*** | | |
| Female | 2.44*** | | |
| difference | 0.05 | | |
| explained | −0.02 | | |

(*continued on next page*)

**Table A8** (*continued*)

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | overall | explained | unexplained |
| unexplained | 0.08 | | . |
| Constant | | | −0.38 |
| Observations | 6789 | 6789 | 6789 |

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

## Data availability

Data is freely available from https://www.datafirst.uct.ac.za/

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