TRAVEL BEHAVIOUR AND ATTITUDES OF YOUNG PEOPLE IN THE JOHANNESBURG METROPOLITAN AREA, SOUTH AFRICA

GJ HEYNS[1*] and R LUKE[1]**

[1]University of Johannesburg, PO Box 524, Johannesburg, 2006
*Tel: 011 559 4952; Email: gjheyns@uj.ac.za
**Tel: 011 559 4951; Email: rluke@uj.ac.za

ABSTRACT

The travel behaviour of millennials, young adults under the age 34, have received increased attention over recent years. As millennials represent approximately 40% of the South African population, the push factors that motivate their travel behaviour is important for transport service providers and planners. This article investigates the travel behaviour of millennials in the Johannesburg metropolitan area by identifying their preferred mode choice for different trip purposes, their service quality perceptions of different transport modes, their views on how to encourage the use of public transport and their private car ownership intentions. This research utilises a quantitative research design and empirical data were collected from a convenience sample of 630 millennials in the Johannesburg area. The research instrument was a self-administered online survey. The results indicate that young people tend to use public transport options for work and educational trips and are more inclined to make use of private car and ride-hailing services (Uber/Bolt)) for leisure and after-hours trips. Most millennials indicate that they intend to procure a private car as soon as they can afford it. These intentions are essentially determined by their opinion that the quality of public transport is inadequate and unsafe.

Keywords: Travel behaviour, young people, public transport, urban mobility, millennials, South Africa.

1. BACKGROUND

Millennials, aged between 16 and 34, represent approximately 35% of the South African population (StatsSA, 2019). According to this report, 61% of the Gauteng population are under 35 years of age, with millennials comprising 38% of the total population. Given that this segment of the population is large and can generally be considered to be very active from a transport perspective, travelling for work, education and other purposes, it is important to understand their movement patterns.

Literature is divided on the travel patterns of millennials and this appears to differ considerably between developed and developing countries, as well as from author to author. In Germany, Kuhnjimhoff, Buehler, Wirtz and Kalinowska (2012) suggest that there has been an overall decrease in car travel by young people and an associated increase in travel by other transport modes. Hjorthol (2016) indicates that the percentage of young people obtaining licences fell during the 90s and has stagnated since 2000. Oakil, Manting and Nijland (2016) assert that car ownership has decreased for young adults in the Netherlands. In Canada, Newbold and Scott (2018) suggest that millennials are more likely to use public transport than older cohorts.

The reason for the declining car use and ownership observed in these studies tend to vary. Hjorthol (2016) asserts that young people are increasingly concentrated in large cities, where there is much less need for a car than in rural areas. Wilde (2019) believes that increasing urbanisation, increasing ride-sharing apps and driverless cars are all likely to drive private car ownership down. Verma, Manoj and Verma (2016) assert that car ownership intentions are driven by aspects such as car ownership in the family, household income, location, provision of public transport, non-motorised transport infrastructure, car ownership taxes and pro-sustainability mindset. Oakil, Manting and Nijland (2016, p. 229) suggest that their results could imply that "increasing urbanisation and postponement of parenthood could reduce future car ownership among young adults in general." Melia, Chatterjee and Stokes (2018) also found that urbanisation contributed to decreased car ownership and increased public transport use. Garikapatia, Pendyalaa, Morris, Mokhtariana and McDonald (2016, p. 558) and Klein and Smart (2017) suggest that economic recession and the accompanying "lag in adopting the activity patterns of predecessor generations due to delayed lifecycle milestones (e.g. completing their education, getting jobs, marrying, and having children)" may have impacted car ownership patterns. This suggests that discussions regarding "peak car" or car ownership intentions should be approached with caution, as these could be linked to economic conditions, which could reverse in recent years (Klein & Smart, 2017). Furthermore, car ownership intentions are also purported to be associated with becoming economically active. Declining car ownership amongst millennials may be associated with the lag in these events, however does not imply less intention to car ownership, but rather a delay. Schoenduwe, Mueller, Peters and Lanzendorf (2015) find significant effects "for key events [over the life course] such as relocation, change of job, birth of first child, separation/divorce, moving in with partner and retirement. Delbosc and Nakanishi (2017, p. 319) further this argument by stating that " as millennials approach adult milestones such as having children, the difficulty in finding suitable housing near transit may push some of them into neighbourhoods where sustainable transport is no longer a practical option." Declining car ownership therefore appears to be conditional upon life stages, availability of suitable public transport and economic conditions and may thus change over time. Even in countries where declining car ownership is recorded, it is asserted that millennials still want a car (Jacobs, n.d.) or access to a car (EMBARQ, 2017). It is thus clear that travel behaviour, attitudes towards transit and car ownership intentions are influenced by a myriad of factors and that cities looking to reduce car ownership and congestion need to understand millennials' travel behaviour and the factors that drive this.

In South Africa, where millennials form such a large proportion of the current and future travelling population, little work has been done to describe travel behaviour. The National Household Travel Survey (StatsSA, 2013) offers some indication of the numbers of people who undertook trips as well as the main reasons people had for not undertaking travel per age category. The survey also provides a lot of information on travel behaviour for educational trips. These are however the only categories that provide information on young people's travel behaviour. Reasons for using or not using particular modes of transport are discussed, but not according to age categories. In the province, the Gauteng Household Travel survey provides a demographic breakdown of the age profile within the province, however no further transport information is analysed according to age categories. Earlier work by Luke (2018) considered car ownership intentions amongst South African students, however little is known about the general travel behaviour and intentions of South African millennials. This paper therefore seeks to analyse the travel behaviour and attitudes to public and private transport in a bid to provide information to planners and other authorities on future travel patterns in major metropolitan areas.

2. RESEARCH METHODOLOGY

The intent of this paper is to gauge the travel behaviour of millennials, young adults between the age of 18-34, in the Johannesburg metropolitan area. In this research a quantitative research design was utilised to obtain an informed understanding of the travel motivation and behaviour of young people. The research instrument was developed after consideration and review of relevant, albeit limited literature. The structured self-administered online questionnaire consisted of four distinct segments. The first part requested demographical information of the respondents, including gender, age group, student and employment status; the second segment assessed the respondents' preferred modal choices and daily travel behaviour; the third segment measured the respondents' service quality perceptions of the various transport operators; and the last segment considered the respondents' attitudes and intentions regarding private transport. To obtain the respondents' level of agreement with the various perceptions statements, a five-point Likert-type scale, anchored by *strongly disagree* (1) and *strongly agree* (5), was used.

In this cross-sectional study, convenience sampling (or availability sampling) was used to obtain the research data owing to the geographical proximity, accessibility, availability, the relative simplicity of collection and the willingness of respondents to take part in the survey (Etikan, Musa & Sunu, 2016; Saunders, Lewis & Thornhill, 2019). A constraint of convenience sampling is that it tends to be bias (Sedgwick, 2013; Saunders et al., 2019) and generalised interpretations from the research results must be treated with prudence (Zikmund, Babin, Carr & Griffen, 2013; Sedgwick, 2014; Saunders et al., 2019).

The data collection campaign generated 630 usable responses. The profile of these respondents is shown in Table 1 below. While the sample size could be regarded as a weakness of the study, the authors are of the opinion that the results provide a significant contribution in describing the travel behaviour of young people in the metropolitan area of Johannesburg, South Africa. The survey data was analysed using SPSS for Windows version 25.

Table 1: Respondent profile

Characteristics	**Respondents**			
Gender	Male	46%	Female	54%
Age	18 - 24 years	66%	25 - 34 years	34%
Highest qualification	Matric	47%	Degree	13%
	Certificate	9%	Advanced diploma	10%
	Diploma	15%	Post-graduate degree	6%
Employment status	Full time employed	23%	Not currently working	66%
	Part-time employed	11%		

3. RESULTS

The survey data was analysed using the Statistical Package for the Social Sciences (SPSS) for Windows version 25. The reliability of the measurement scale was evaluated to determine the internal consistency. Internal consistency was assessed for the service quality variables and the private transport perception segments, indicating overall Cronbach's α values of 0.851 and 0.826 respectively, which suggests that the survey is reliable (Field, 2018).

To obtain an indication of the daily travel behaviour of young people, respondents were ask to indicate the preferred access, main and egress modes used to get to and from their place of work / study. Table 2 indicates the respondents' modal choices and average travel times for their typical daily journeys.

Table 2: Modal choice for a typical trip

Access trip						
Mode	**Frequency**	**Travel time**				
		< 15 min	**16 - 30 min**	**31 - 45 min**	**46 - 60 min**	**> 60 min**
Walk	57.1%	87.3%	10.5%	1.0%	1.3%	0.0%
Taxi	16.3%	27.8%	31.1%	17.8%	16.7%	6.7%
Car - driver	12.8%	32.4%	29.6%	22.5%	11.3%	4.2%
Car - passenger	5.4%	17.2%	41.4%	13.8%	20.7%	6.9%
Other	8.3%	37.0%	13.0%	17.4%	15.2%	17.4%

Main trip						
Mode	**Frequency**	**Travel time**				
		< 15 min	**16 - 30 min**	**31 - 45 min**	**46 - 60 min**	**> 60 min**
Taxi	34.9%	15.4%	26.7%	26.7%	20.0%	11.3%
Walk	20.3%	69.6%	23.5%	5.2%	0.0%	1.7%
Car - driver	16.7%	14.7%	27.4%	31.6%	12.6%	13.7%
Car - passenger	7.1%	17.9%	25.6%	20.5%	12.8%	23.1%
Rea Vaya	9.8%	20.0%	25.5%	23.6%	16.4%	14.5%
Other	11.2%	21.3%	23.0%	21.3%	8.2%	26.2%

Egress trip						
Mode	**Frequency**	**Travel time**				
		< 15 min	**16 - 30 min**	**31 - 45 min**	**46 - 60 min**	**> 60 min**
Walk	50.3%	85.2%	11.1%	2.6%	1.1%	0.0%
Taxi	21.1%	24.1%	34.8%	22.3%	10.7%	8.0%
Car - driver	12.9%	24.3%	31.4%	31.4%	10.0%	2.9%
Car - passenger	5.2%	33.3%	25.9%	11.1%	18.5%	11.1%
Other	10.5%	26.3%	22.8%	26.3%	17.5%	7.0%

From the results it is evident that the five most common modes for typical trips are (in no particular order):

- Walk all the way.
- Car (driver) all the way.
- Car (passenger) all the way.
- Walk ⇨ Taxi ⇨ Walk.
- Walk ⇨ Rea Vaya ⇨ Walk.

The high incidence of walking may partially be explained by the large number of students in the sample who tend to stay close to their place of study. Of concern is the high level of car use, either as passenger or driver. Taxis remain the most important and popular form of public transport. Due to the proximity of the Rea Vaya network to the university were a large portion of the respondents were based, Rea Vaya featured as an important mode of transport. Most walking trips were under 15 minutes, as is expected were place of residence is close to place of work / study. Where walking is used for access and egress to other modes, walking times are generally low, suggesting relatively good connectivity. Whereas Table 2 indicated typical daily trips, Table 3 shows the results of respondents' indication of their preferred mode choice for different trip purposes. Utilisation frequency was classified as "regular" (commuter-type use, i.e. use for work, education, etc. purposes) or "occasionally" (use from time to time, but no discernible pattern of use).

Table 3: Modal preferences for various trip types

Trip type	Mode	Total	Utilisation frequency	
			Regular	Occasionally
Work	Taxi	32.6%	84.0%	16.0%
	Car - driver	28.0%	87.9%	12.1%
	Rea Vaya	15.4%	94.0%	6.0%
	Other	24.0%	80.8%	19.2%
Educational	Taxi	31.1%	82.4%	17.6%
	Walk	27.6%	96.3%	3.7%
	Car - driver	14.8%	69.9%	30.1%
	Other	26.4%	86.9%	13.1%
Visiting Friends & Relatives	Taxi	39.0%	27.5%	70.4%
	Car - driver	18.4%	47.8%	52.2%
	Car - passenger	15.8%	38.1%	60.8%
	Other	26.8%	56.4%	43.0%
Sport	Taxi	23.4%	44.8%	55.2%
	Walk	20.7%	61.0%	39.0%
	Car - driver	12.6%	59.6%	40.4%
	Car - passenger	11.3%	45.2%	54.8%
	Other	32.0%	49.6%	50.4%
Leisure	Car - passenger	28.8%	28.8%	71.2%
	Taxi	23.1%	32.0%	68.0%
	Uber/Bolt	15.9%	19.8%	80.2%
	Car - driver	15.0%	39.5%	60.5%
	Other	17.2%	32.3%	67.7%
Shopping	Taxi	26.3%	36.5%	63.5%
	Car - driver	17.4%	44.8%	55.2%
	Car - passenger	17.2%	39.4%	60.6%
	Uber/Bolt	15.1%	26.4%	73.6%
	Other	24.0%	46.9%	53.1%

For work and educational trips taxis are the most preferred mode choice, as also indicated in Table 2. This pattern is also relevant for other common trips such as Visiting Friends and Relatives (VFR). Although taxis and walking are most preferred modes of transport for sports trips, very few respondents (30%) indicated that they regularly (at least once a week) participated in sporting activities. For leisure trips, which tend to take place after hours or over weekends, car use (as driver, as passenger or with ride-hailing services) accounts for almost 60 per cent of these trips. Whilst e-hailing services were offered as options in all other questions, leisure trips were the only trips where e-hailing services were used to the extent that they warranted inclusion as a separate item in Table 3. Shopping trips are also dominated by car-based trips, expected because of the additional loads.

Respondents were asked to rate the perceived service quality of various common modes of transport. The results are shown in Table 4. Green highlights represent the top performers, whilst red represents the lowest performers in the category.

Table 4: Perceptions of service quality

Mode	Reliability		Extent of service		Safety		Comfort		Affordability	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Taxi	3.09	0.985	2.79	0.909	2.47	1.013	2.35	0.980	3.79	1.037
Metrobus	3.23	0.862	3.12	0.875	3.29	0.843	3.28	0.769	3.53	0.826
PUTCO	2.55	0.867	2.60	0.828	2.71	0.901	2.68	0.848	3.39	0.922
Rea Vaya	3.54	0.888	3.45	0.842	3.56	0.869	3.51	0.886	3.65	0.885
Gautrain	4.12	1.026	4.08	0.960	4.26	0.817	4.26	0.824	2.85	1.108
Metrorail	2.38	1.015	2.44	1.014	2.37	1.078	2.36	1.038	3.73	1.072
Car	4.33	0.936	4.27	0.912	4.20	0.907	4.48	0.766	3.32	1.253

Taxis are rated as one of the most affordable modes of transport, although respondents do not believe they have a good safety record and are not a comfortable mode of travel. Extent of service is lower than expected, but may possibly be explained by limited operating hours. The perception of all service quality dimensions for Metrobus are positive (above the mid-point value of 3), however it does not tend to be the mode of choice for the majority of trip types, as shown in Table 2 and Table 3. This may imply that Metrobus services do not cover areas where respondents travel. PUTCO is regarded as an affordable mode of transport, however all other service quality dimensions are regarded as negative, thus explaining the low uptake of this service as a preferred mode of travel. Rea Vaya shows similar positive ratings of all service quality dimensions as Metrobus, however the uptake of Rea Vaya may be higher due to the proximity of the majority of respondents to their place of residence. Gautrain rates very high in most service quality dimensions, the exception being affordability, which may partially explain the relatively low service utilisation. Metrorail, similarly to PUTCO, is regarded as an affordable but poor service. For most service quality dimensions (reliability, extent of service and comfort) cars are regarded as the highest rated transport mode. Safety has a surprisingly high rating, considering the high accident levels in the country, however this may also reflect security concerns. Respondents unexpectedly view this mode as relatively affordable, possibly due to the lack of familiarity with the real costs of car ownership.

Young people revealed their attitudes and intentions regarding car ownership by rating a number of car related statements. The results are shown in Table 5. Some of the highest rated statements regarding car ownership correspond directly to the failures of public transport identified in Table 4. For example, "*A private car will allow me to travel to more places I wish to go"* and *"A private car will allow me to travel further"* address the issue highlighted for most modes of transport that the extent of service is insufficient. Comfort and safety in taxis, the most utilised form of public transport, were poorly rated (Table 4) which could explain the high value respondents place on these items (M=4.49; SD=0.913 and M=3.65; SD=1.167 respectively). Table 5 appears to reflect some of the frustrations and constraints experienced with public transport, with respondents highlighting key areas such as convenience, extent of service and limited modal characteristics (for example, space). The results also reflect the perceived inevitability of car ownership with most respondents indicating that they intend to purchase a private vehicle as soon as they have the means and within a short period of time. This is supported by the high ratings of items such as "*Having a car will be necessary in the future*", "*Cars are a part of modern life*" and "*I will need to have a car to get a job in the future*".

Table 5: Perceptions of private car ownership

Statement	Mean	Std. Dev
A private car will allow me to travel to more places I wish to go	4.56	0.860
A private car will allow me to travel more comfortably	4.49	0.913
A private car will allow me to travel further	4.46	0.917
When I have the financial means, I will buy a car	4.30	0.970
Having a car will be necessary in the future	4.28	1.011
I intend to own a car within the next 5 years	4.27	1.016
A private car is more convenient than using public transport	4.27	0.948
A private car will give me greater freedom / independence	4.20	1.071
Cars are a part of modern life	4.19	0.962
It's important to have a driver's licence to get a job in the future	4.07	1.024
A private car will allow me to transport more items	4.01	1.136
A private car will make me feel more in control of my life	3.74	1.225
Using a private car is safer than using public transport	3.65	1.167
A private car is less environmentally friendly than using public transport	3.45	1.363
A private car is a symbol of success in my life	3.38	1.374
A private car will allow me to transport more people	3.37	1.280
I will need to have a car to get a job in the future	3.13	1.362
Using a private car is cheaper than using public transport	2.75	1.315

The results further reveal limitations of public transport by highlighting the importance respondents placed on items such as "*A private car will give me greater freedom / independence*" and "*A private car will make me feel more in control of my life*". Of interest is the relatively low rating of private cars being less environmentally friendly than public transport, where the expectation might be considerably higher.

Whilst perceptions on car ownership highlighted limitations of public transport, respondents were asked to specifically indicate the changes they would like to see in order to make more use of public transport. The results are shown in Figure 1.

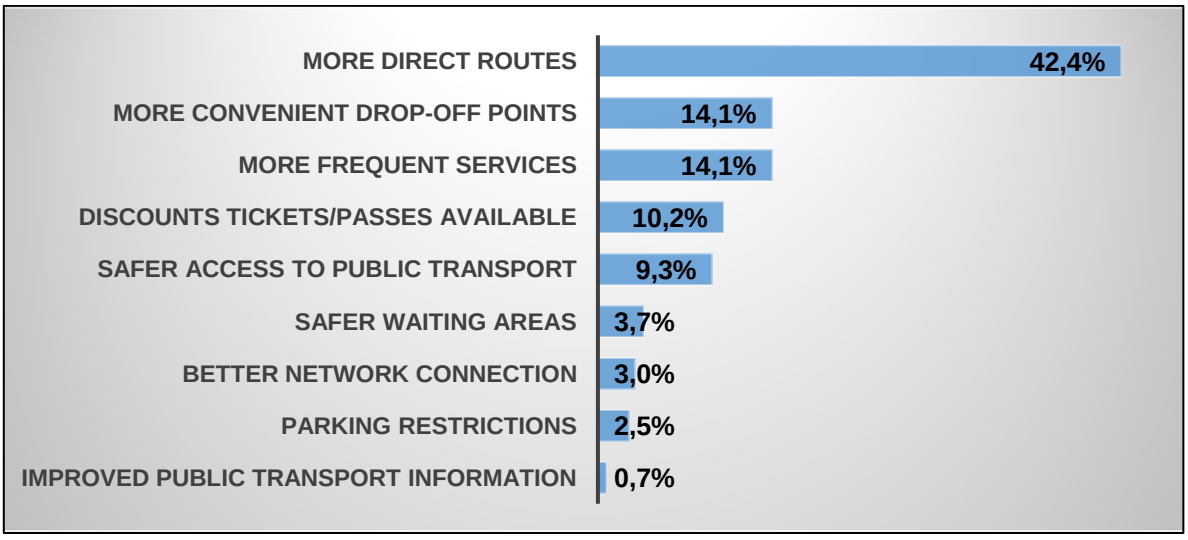

Figure 1: Public transport service improvements

Figure 1 again highlights the most pressing transport issues, which appear to be the extent of transport services; network coverage and frequencies. Price and safety are also key

concerns. Information on public transport services is unexpectedly low, which may be a reflection on the lack of familiarity with the benefits that this type of information can provide.

4. CONCLUSION

The purpose of this research is to analyse the travel behaviour and attitudes of millennials to public and private transport. Typical daily trips tend to be made by walking, car or selected forms of public transport. In general, the most commonly used forms of public transport used by the respondents are taxis and Rea Vaya. The latter however appears to be function of the demographic profile of the respondents, who are largely situated near the university where this study was undertaken. The common use of taxis as a form of public transport is however a reflection of public transport usage in the country, as reflected in the NHTS (2013). According to Table 4, respondents indicated that this was likely due to the affordability of the service, however as this is not the cheapest form of public transport, it is more likely to reflect the perceived value of other benefits of the service such as accessibility and flexibility. The low use of government-subsidised public transport modes suggests that government is not providing services that meet the needs of the young people in this sample, as reflected in the low ratings of service quality aspects for PUTCO and Metrorail. As many of the respondents were students or young working adults in a major metropolitan area, this indicates that local planners have not adequately ascertained the mobility needs of millennials in this demographic group. Planners need to undertake more research to ensure that movement requirements of the city's population are understood so that services can be tailored to better meet their needs.

The results also reflect that, whilst young people tend to use public transport needs to meet their daily travel requirements, trips outside normal commuting times, or where there are greater space / safety requirements, such as for shopping, tend to be made with private vehicles, whether as driver, passenger or using ride-hailing services. This reflects that, despite the latest public transport initiatives, young people believe that private cars are the best method of meeting mobility needs for any but the most basic trips. Whilst lack of car ownership may be reflective of their life stages or income levels, it is of concern that most respondents intend to purchase private cars in the near future. Planners should consider methods of reducing car ownership intentions, by improving public transport service quality to provide viable car alternatives.

Perceptions of public transport service quality were tested and the results show that, as expected, the Gautrain, as a new and modern transport service, is perceived to be an excellent service, albeit too expensive for the general commuting public. The most affordable public transport services, namely Metrorail and PUTCO, are also perceived as being very poor across all other service dimensions. Whilst Metrobus is perceived as offering a reasonably good overall service, the low uptake suggests that the service does not meet the mobility needs of this section of the commuting population. Safety and comfort are identified as concerns in public transport, which is also reflected in the perceptions of car ownership, where these are highlighted as reasons to own private vehicles.

A limitation to this study is the demographic profile of the sample, which is mainly students and young working adults around the university where the research was conducted. Additionally, an online survey requires access to hardware and the internet, and cost of mobile data could be a barrier to some in undertaking the online survey. The results therefore do not reflect the opinions of other young people, for example the large

population of unemployed non-student millennials. It nonetheless provides some insight into the travel behaviour, perceptions of transport and commuting intentions of young people in an urban environment.

Future research should focus on expanding the research to other young people across the city to determine whether mobility requirements differ across demographic groups. This could then also explain whether there are differences across geographical areas within the city. This could be used to meet specific transport needs. The research could further be expanded to other urban areas as well as rural areas to establish differing mobility needs.

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