

# Restoring Confidence in Public Transport post Delta COVID-19 Lockdowns: Identifying User Segments and Policies to Restore Confidence

Matthew J. Beck  
John D. Nelson  
David A. Hensher  
Institute of Transport and Logistics Studies (ITLS)  
The University of Sydney Business School  
Sydney NSW Australia 2006  
[Matthew.Beck@sydney.edu.au](mailto:Matthew.Beck@sydney.edu.au)  
[John.Nelson@sydney.edu.au](mailto:John.Nelson@sydney.edu.au)  
[David.Hensher@sydney.edu.au](mailto:David.Hensher@sydney.edu.au)

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## Abstract

The COVID-19 pandemic has had a significant impact on the propensity to use public transport, with many countries seeing a decline in patronage to as low as 20% of the pre-pandemic levels. Although public transport use is recovering with 60% of pre-COVID-19 levels being a common statistic, there is a view that it could take many years to fully recover if at all. This paper presents evidence on societal perceptions and attitudes about the use and return to public transport that were obtained from surveys undertaken during COVID-19 at a period in early 2021 in which there were no lockdowns, and during a subsequent period of varying durations of lockdowns in the Greater Sydney Metropolitan Area and South East Queensland. Together with views on future plans, this paper offers policy useful evidence on the challenges that the public transport sector currently face, and are likely to continue to face, in developing a plan to support a return to using public transport. The focus of the paper is on an analysis of attitudinal and open ended qualitative responses using a mixture of descriptive interpretation and analytical methods of factor and cluster analysis to identify the spectrum of attitudes and concern about using public transport as a way of guiding future messaging.

**Key Words:** public transport; attitudes during lockdown; case study; factor analysis; cluster analysis

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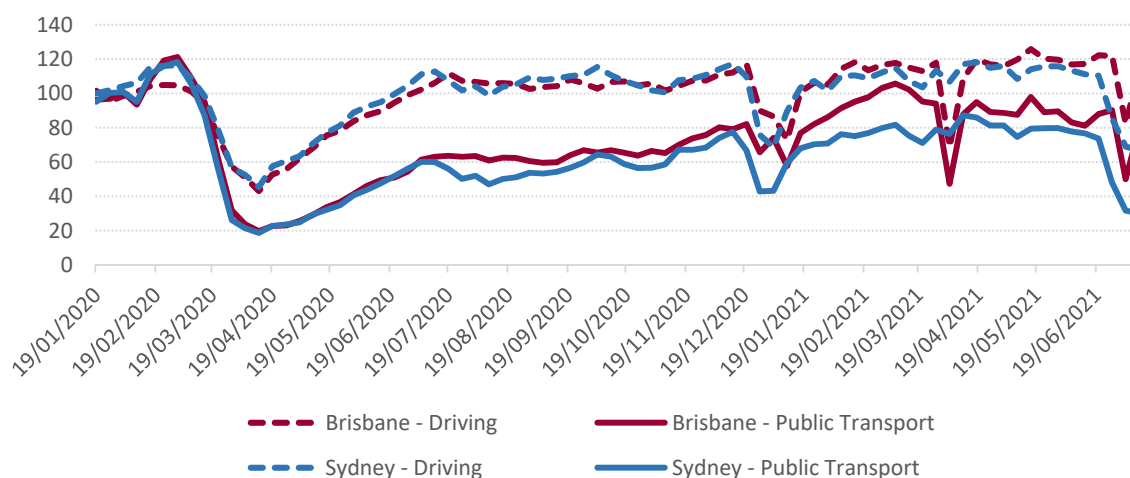
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## 1. Introduction

With the onset of the global COVID-19 pandemic in March 2020, public transport patronage in most jurisdictions worldwide collapsed, in many cases to as low as 20% of the pre-pandemic levels. The period since has been one of slow recovery that has been hampered by repeated lockdowns and ongoing concerns around the safety of public transport. While several studies have specifically focussed on the relationship between level of concern with public transport and actual and intended use of public transport (see for example Jenelius and Cebecauer, 2020; Beck et al, 2021) less attention has been given to deriving segments of public transport user by level of concern.

This paper presents evidence from Greater Sydney Metropolitan Area (GSMA; comprising, Sydney, Newcastle and Wollongong) and South East Queensland (SEQ; comprising Brisbane, The Sunshine Coast and the Gold Coast) on societal perceptions and attitudes about the use and return to public transport. Results were obtained from surveys undertaken during COVID-19 in mid-2021 as two major metropolitan areas were in the very early stages of re-entering lockdowns. The two metropolitan areas provide an interesting contrast in terms of the influence of COVID-19 outbreaks and lockdowns on public transport patronage (Figure 1). By the first quarter of 2021, public transport use was returning in SEQ at a faster rate than in Sydney and had almost returned to pre-pandemic levels. In the GSMA, by end of March 2021 patronage overall had surpassed 70 per cent of the pre-pandemic level only to collapse again with the implementation of what became a 107-day lockdown from 26<sup>th</sup> June (by mid-July patronage had fallen to about 8% of pre-COVID levels - levels not seen since the 1800s). Also, in late June, South East Queensland was placed into a short snap lockdown.



**Figure 1: Apple Mobility Data on Driving and Public Transport Use**

The paper is organised as follows. The next section provides the literature context with reference to measures that have been introduced to encourage confidence, and studies which have explored aspects of levels of concern and customer satisfaction with public transport during the pandemic. This is followed by a description of the sample used in the paper. Results presented identify levels of concern prior to the lockdown, concern about hygiene and numbers of users during the lockdown, and likelihood of use after the lockdown. A detailed examination of the concerns of workers identifies a number of different segments of public transport concern which are useful in determining where

effort should be placed by operators and authorities in alleviating concerns associated with using public transport.

## 2. Public Transport and the Pandemic

The responses of public transport operators and authorities to the COVID-19 pandemic have been extensively documented (see for example, Beck et al. 2021; McKinsey & Company, 2021). Examples include: COVID-19 travel advice web pages and Apps and Journey planners with indications of safe passenger capacities on board; “on the ground” measures to support distancing measures, e.g., orderly queuing in stations and concourses and at station and in-vehicle signage such as “No dot, no spot” (as introduced in Sydney), as well as QR codes and stops, stations and in-vehicle. A strong visual presence of cleaning crews at stations and interchanges (with extra hours measured in hundreds of thousands) has been shown to be important. Operationally, there have been frequency changes in service levels. In some cities service levels were reduced, the New York subway service was cut by a quarter early in the first wave. In London the Waterloo and City Underground line which primarily caters for commuters was closed from March 2020 to June 2021 (TfL, 2021). Reductions in service frequencies, while implemented in response to falling demand, had a disproportionate impact on those who need to travel for essential purposes (De Vos, 2020).

A prolonged period of uncertainty inevitably impacts public transport patronage. Jenelius and Cebecauer (2020) note that the decline of public transport ridership can most likely be explained by both restrictions imposed by authorities and travellers' own choices. In seeking to understand the latter several studies have specifically focussed on the relationship between level of concern with public transport (primarily focussed on biosecurity) and actual and intended public transport use during the pandemic and in the “next normal”.

For the case of Australia, Beck et al. (2021), drawing on the findings of an ongoing country-wide study, report that concerns over bio-security issues around public transport are enduring and that even as COVID-19 restrictions are eased, both concern about crowds and hygiene have a significant and negative correlation with public transport use. Dong et al (2020) from a cross-sectional study in China conducted early in the pandemic, but at a time when the virus was considered to be under control (March 2020), confirmed that passengers’ feelings of safety enhanced their overall satisfaction with regard to public transport; in other words, perceived safety had a positive effect on overall satisfaction. They noted in particular that an individual’s subjective experiences and opinions on the pandemic were directly related to confidence in using public transport, thus emphasising the crucial role of operators and authorities in providing reassurance that public transport is safe to use.

Basu and Ferreira (2021), from their survey of 2,200 respondents in metropolitan Boston, report that one in five of zero-car households agreed that COVID-19 had enhanced their intention to purchase a car. They conducted follow-up interviews with ten previously zero-car owning households that had purchased a car subsequently and found that the major reasons for their decisions were primarily threefold. These can be summarised as uncertainty around public transport service frequency; lack of trust in safety measures introduced by the transport authority; and fear of other passengers not adhering to the safety guidelines. This underscores the ongoing concern that many of those lost to public transport as a result of the virus will never return. For example, a study from Poland (Przybylowski et al, 2021) which surveyed 302 public transport users in Gdansk in May and June 2020, found that 25% of respondents did not plan to return to public transport as they doubted that the services will ever be safe.

Emphasising the influence of social distancing policies on everyday movements, De Vos (2020) notes that the very act of social distancing might negatively affect subjective well-being with calls on public transport operators to focus on creating ways to make use of public transport safe, since it is clear that people avoid using public transport when it is viewed as unsafe. In the longer-term, the public transport sector will need to consider ways of futureproofing against virus-driven stresses. Florida et al. 2020 suggest pandemic-proof infrastructure and transport management will likely include the continuation or further development of current measures such as touchless solutions, capacity monitoring and floor markings.

Given the above, it is important to gain a greater understanding of the factors affecting societal perceptions and attitudes about the use and return to public transport. This is the focus of the remainder of this paper which presents evidence from which a better understanding of different segments of public transport concern can be derived that can be used to inform future policy on addressing the challenges that the public transport sector currently faces.

### 3. Sample Description

The public transport data was collected as part of survey Wave 4a (of a series beginning in March 2020), conducted in early July (5<sup>th</sup> to the 7<sup>th</sup>) 2021, during a period when the Delta variant of COVID-19 had meant that the entire Greater Sydney Metropolitan Area had been in a lockdown for a period of a week (which ended up extending until October, a total of 107 days), and small outbreaks of Delta were occurring in Brisbane such that South East Queensland (from the Sunshine Coast through to Brisbane and the Gold Coast - SEQ) was also placed into a short snap lockdown as a circuit-breaker for transmission from 29<sup>th</sup> June – 3<sup>rd</sup> July.

The purpose of the survey was to look at the working from home experience during the latest period of restriction, to gain further understanding of how previous experiences during the pandemic affected preparedness for this lockdown, and whether there has been any change in attitudes and evaluation since the first lockdowns conducted in the previous year (2020). As such, complete data was only collected as an online survey from respondents who were working during the July lockdowns (with a view to collecting a sample of approximately 300 such respondents in each of SEQ and the GSMA respectively).

However, the overall public transport concern questions (prior to the lockdown, concern about hygiene and numbers of users during the lockdown, and likelihood of use after the lockdown) were asked of all respondents during the screening phase, with a total of 1,854 responses obtained (1,153 in SEQ and 701 in the GSMA). Limited demographic data was collected for the majority of these respondents, with only gender and age as part of the other screening questions. With respect to the number of respondents who qualified for the survey and thus from whom full information was collected, there were 329 in SEQ and 387 in the GSMA.

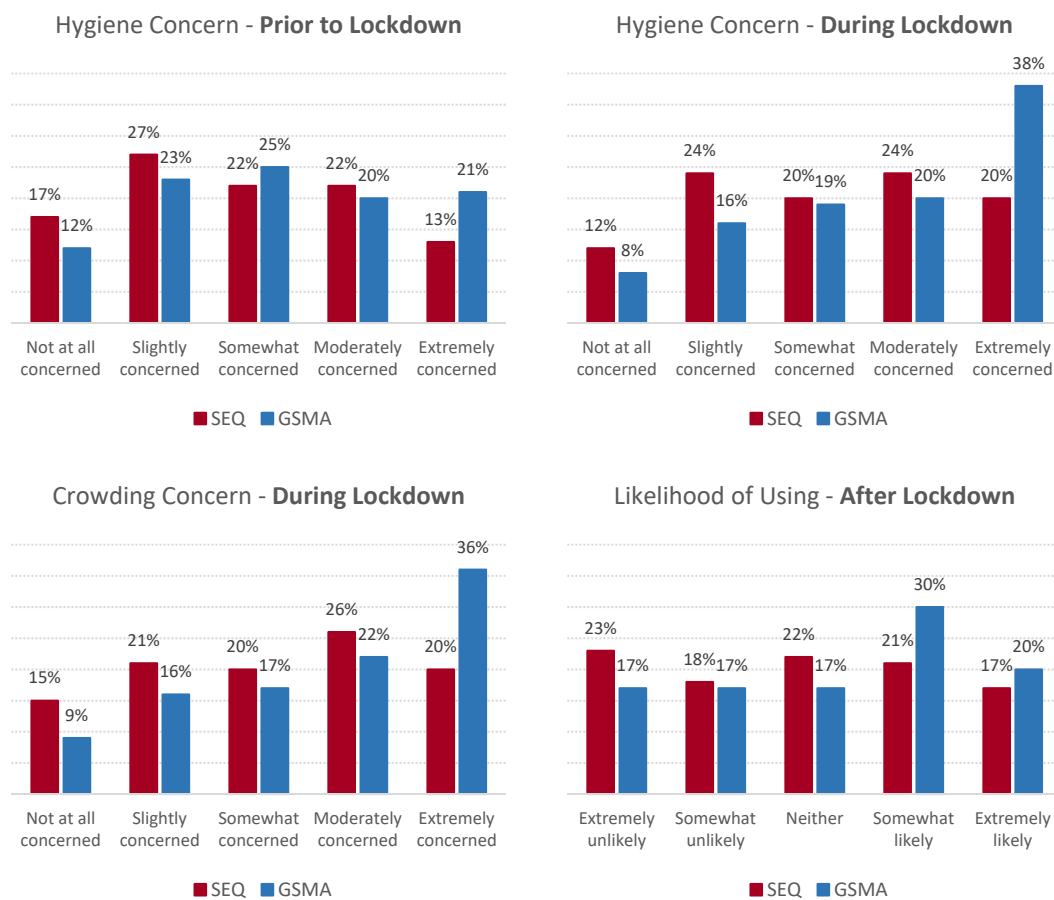
## 4. Analysis of All Survey Respondents

### 4.1. Concern about Public Transport

Concern about hygiene prior to the lockdown still existed, despite a prolonged period of almost extremely low daily case numbers which were mostly contained within hotel quarantine, but at levels well below that observed at the start of the COVID-19 pandemic in March 2020. The average level of concern prior to the lockdown in each jurisdiction was significantly higher in the GSMA (3.2) than in

SEQ (2.9), on a 5-point scale<sup>1</sup> (Figure 2). Mirroring the more severe nature of the outbreak in the GSMA, level of concern about hygiene during the lockdown was also significantly higher in the GSMA (3.6) than SEQ (3.1), as was concern about crowds (GSMA = 3.6, SEQ = 3.1). On the other hand, perhaps also representing the greater experience with COVID-19 outbreaks in the GSMA but also the more reliance on the network, the likelihood of using public transport after lockdown was on average higher in the GSMA (3.2 versus 2.9).

Within SEQ, the average concern about hygiene (3.2) and crowding (3.1) during the lockdown was higher than concern prior (2.9), but there was no difference in the level of concern during the lockdown between hygiene and crowds of other users. The same is true in the GSMA, with average concern being significantly heightened during the lockdown compared to prior (3.2), both with respect to hygiene (3.6) and crowds (3.6), with no difference in average concern during the lockdown with respect to hygiene or crowding.



**Figure 2: Level of Concern and Likelihood of Use – All Respondents**

Table 1 shows that in the SEQ, there was no difference in concern between males and females prior to the lockdown, but after the lockdown females were significantly more concerned about hygiene and crowds, and males were more likely to use public transport again after lockdown. The same pattern is observed in the GSMA, but females were also significantly more concerned prior to the lockdown. In SEQ there were no differences in concern by age or income, however in the GSMA younger respondents<sup>2</sup> report less concern about crowding and a higher average likelihood of using

<sup>1</sup> Note that all the results of the hypothesis testing discussed in-text in this paper are provided in Appendix 1, in order in which they are discussed, for reference.

<sup>2</sup> Age was broken into three categories (18-34 yrs, 35-54 yrs, and 55+ yrs)

public transport after lockdown. There are also differences observed by income group<sup>3</sup> in the GSMA; lower income respondents reported significantly higher levels of average concern prior to the lockdown, and significantly lower likelihood of using after lockdown.

**Table 1: Concern by Gender – All Respondents**

		<b>Male</b>	<b>Female</b>	<b>t-value</b>
<b>SEQ</b>	Concern about Hygiene - Prior	2.73	2.93	1.941
	Concern about Hygiene - During	2.95	3.31	4.416
	Concern about Crowding - During	2.95	3.26	3.796
	Likelihood of Using – After	3.00	2.83	1.976
<b>GSMA</b>	Concern about Hygiene - Prior	2.90	3.29	3.697
	Concern about Hygiene - During	3.31	3.82	4.834
	Concern about Crowding - During	3.32	3.78	4.249
	Likelihood of Using – After	3.37	3.08	2.774

#### 4.2. Barriers to Public Transport Use

Open-ended questions were asked of all respondents before those who were not working and/or who are not commuters were screened out (the primary focus of survey was to look at impact of lockdown on working from home experiences). The sample size of usable comments was 1,761 in total, 1,102 in from SEQ, and 659 from the GSMA. After rating their level of concern about hygiene on public transport and the numbers of people using the mode, respondents were asked what their main barriers were to using public transport at the present moment. There were two themes unrelated to specific barriers: respondents indicating they do not use public transport (without further explanation); or indicating they have no concerns about using public transport at the current time.

For those that are concerned, there were 14 themes emerging from the responses. Being “worried about COVID-19” was stated by a large number of respondents (particularly in NSW), and reference to the Delta variant was made several times. It should be noted that this category was only coded if the respondent made specific reference to COVID-19 in their reply. For example, if a respondent was concerned about other people not wearing a mask but did not state due to COVID-19 (or the virus, disease, pandemic or any other indication it was COVID-19 related) it was not coded. It is likely then, that this category is more common than Figure 3 indicates.

The inability to social distance, and the number of other public transport users not doing so, was also a concern, as was the cleanliness and hygiene status of public transport. With regards to cleanliness, reference was commonly made to the lack of overt sanitising services onboard and the large number of touch points that are required while using public transport (notwithstanding contactless ticketing). While the lack of enforcement of COVID regulations was explicitly mentioned as an issue by a small number of respondents, implicit in concerns about social distancing and mask wearing are concerns about others not following the rules or being made to follow them. Incorrect wearing of masks was as commonly stated a concern as people not wearing masks.

Concerns about the behaviour of other passengers mainly comprised of not being sure of where other people are from or where they have been, general distrust of the hygiene status of other people, and

<sup>3</sup> Personal income was broken into three categories (\$80k or less, \$80k-150k, and more than \$155k)

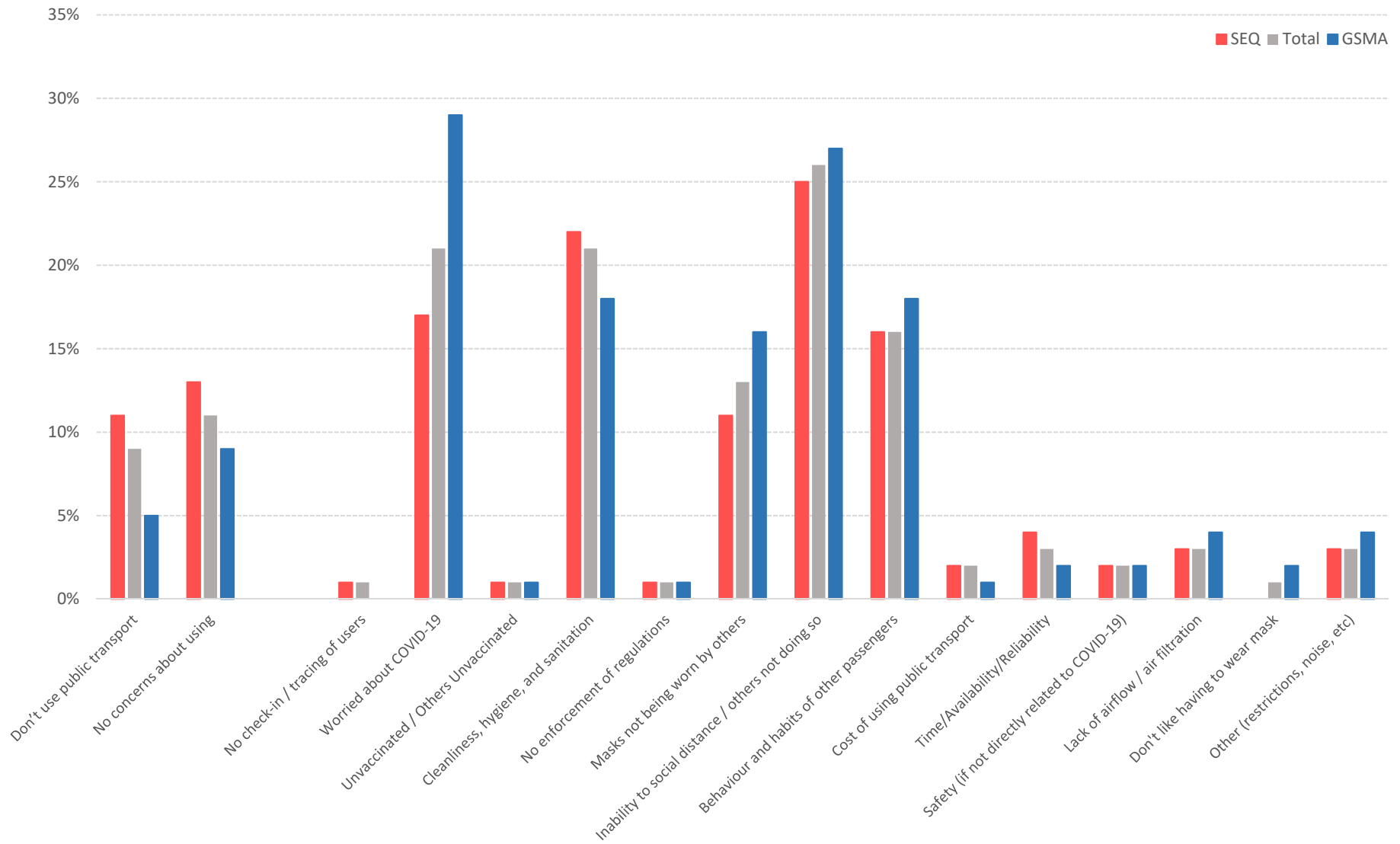
a very clear theme that many feel that people still use public transport when they should otherwise stay home because they are sick (coughing and sneezing, general germs and/or illness not just specific to COVID-19). This category could be described as a distrust of other people and generally thinking of other public transport users as inconsiderate of others. Though not mentioned by many, some were concerned about becoming a close contact and having to isolate for two weeks, and only a very small number of people stated that being forced to wear a mask was an issue affecting their use of public transport.

#### 4.2. Action Required to Restore Confidence

After rating how likely they would be to use public transport after the lockdown, respondents were asked what measures would need to be taken in order to make them feel more confident about using public transport (Figure 4). The most important measure is ongoing cleanliness. Many respondents stated that they had to be able to see that it was being done (either having continuing cleaning being conducted, scented cleaning materials, even an information sheet in the vestibule that informed passengers of when the carriage or bus was last cleaned).

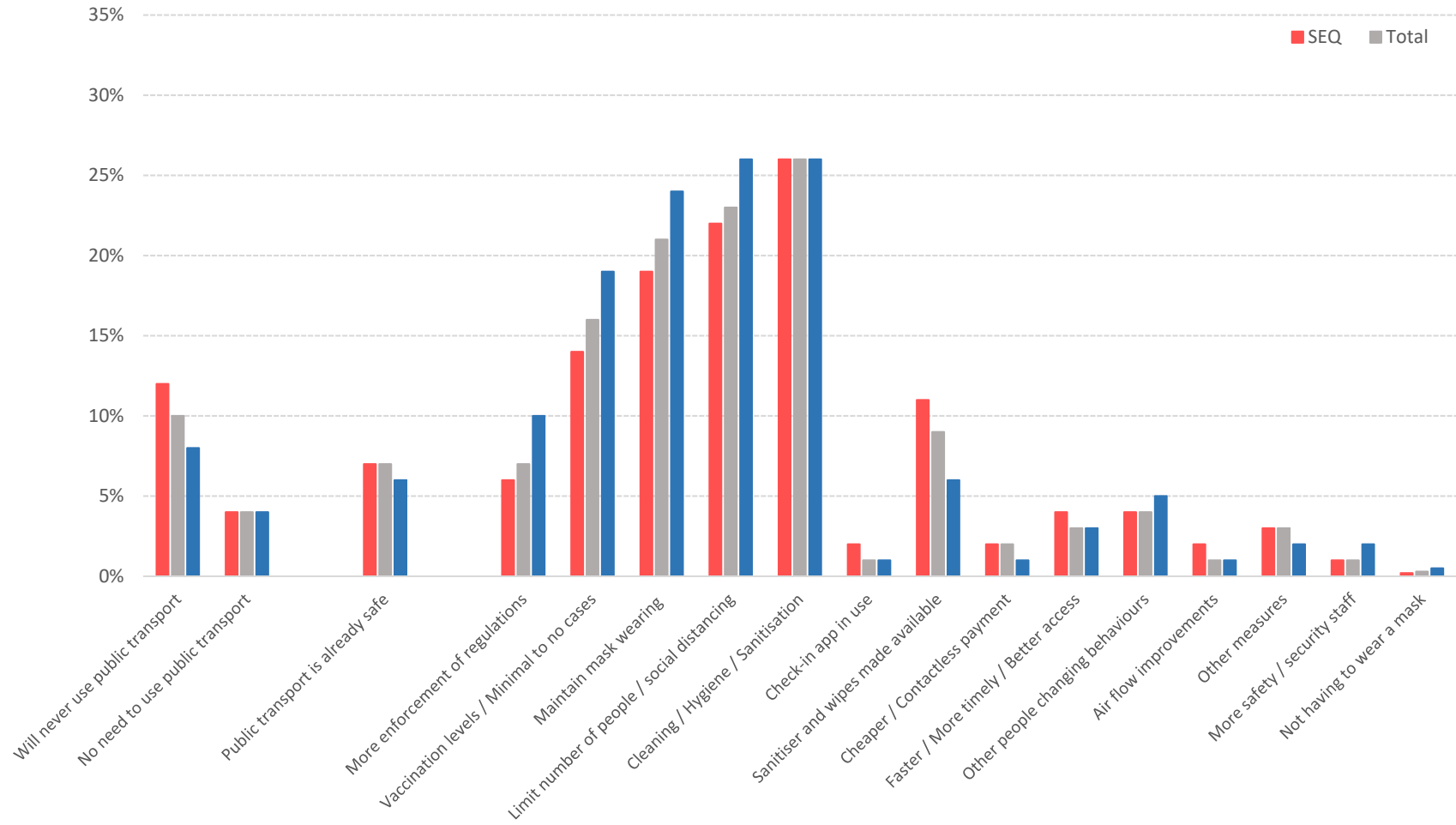
Limits on people using public transport and/or social distancing measures combined with ongoing use of masks were also a commonly stated measures that would increase confidence. Several respondents stated that more services were required to allow for distancing to occur. A smaller number of respondents explicitly stated they wanted more enforcement of regulations, but it should be noted that this response category was only coded if it was explicitly stated by the respondent. Thus, the number of respondents who would like this to occur could be higher, as it might be implicit that the more commonly stated measures of social distancing and mask wearing would need to be enforced.

Vaccination and/or low to no case numbers would be needed for some to return to using public transport. In responses, some suggested that vaccination be mandatory for travel on public transport, and others suggested that there be vaccinated only carriages made available. Respondents in the GSMA were slightly more likely to state that no cases/vaccination would be important, along with ongoing use of masks and social distancing policies. Findings from the Transport Opinion Survey (March 2021), a regular national survey of public opinion on transport-related issues in Australia, found that over 20 percent of Australians will not return to public transport until they or their close household members have been vaccinated. Respondents in SEQ state that having sanitiser stations or antibacterial wipes available for passengers would make them feel more confident, many stating they would be happy to wipe down their own seat if they had wipes.



**Figure 3: Commonly Stated Barriers to Public Transport Use**





**Figure 4: Measures to Increase Confidence in Public Transport**

Though only a small percentage, one measure that would make people feel more confident (particularly given it was a common barrier to use) is behavioural change in other passengers, such as staying at home when sick, proper coughing/sneezing behaviours, even an onboard advertising campaign / posters onboard to emphasise the importance of people doing the right thing by others. Interestingly, airflow improvements did not feature very prominently amongst the responses, given knowledge of how important this is in reducing risk from the virus (Morawska and Milton, 2020).

## 5. Detailed Examination of Concerns of Workers

### 5.1. Concerns about Public Transport among Workers

The objective of the survey was to capture experiences and attitudes towards working from home during the most recent lockdown, as part of a longitudinal study on working from home and commuting being conducted over 2020 and 2021 (see Beck and Hensher 2020a-b, Beck and Hensher 2021a-b). Given budget and time constraints, a sample of approximately 300 respondents was targeted in SEQ and the GSMA, with reference to those people working, in particular typical commuters who have an office job, where they would be able to work from home during the lockdown restrictions. The ultimate sample size for each region was 329 in SEQ and 387 in the GSMA. While these completes are mainly commuters, commuters do represent the largest component of peak demand. Similar patterns were observed within those respondents who completed the full survey. Concern in the GSMA was on average significantly higher both prior to the lockdown and with respect to hygiene and crowding and during the lockdown; however, those in the GSMA stated a significantly higher likelihood to use public transport post the lockdown than those in the SEQ (Figure 5).

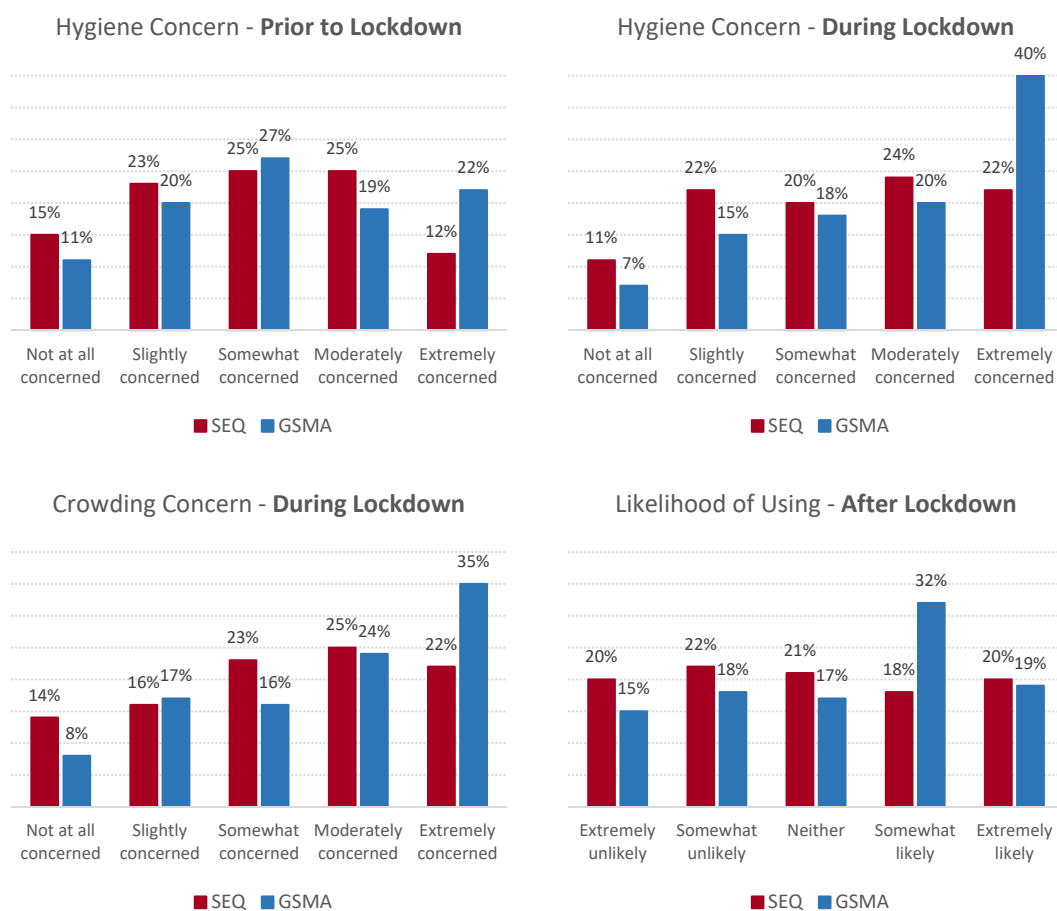


Figure 5: Level of Concern and Likelihood of Use – Completes Only

Within SEQ, the level of concern expressed about both hygiene and crowding is significantly higher during the lockdown than before, as expected. There is no difference between the concern about crowding and hygiene during the lockdown within the SEQ. Within the GSMA, the same is found with respect to heightened concerns about hygiene and crowding, but concerns about hygiene are significantly higher than crowding during the pandemic. Within SEQ, there are no differences across gender, age or income. In the GSMA, however, females are significantly more concerned on all dimensions and are less likely to use public transport after lockdown; lower income respondents were more concerned about public transport prior to the lockdown, and younger people are more likely to use public transport after the lockdown.

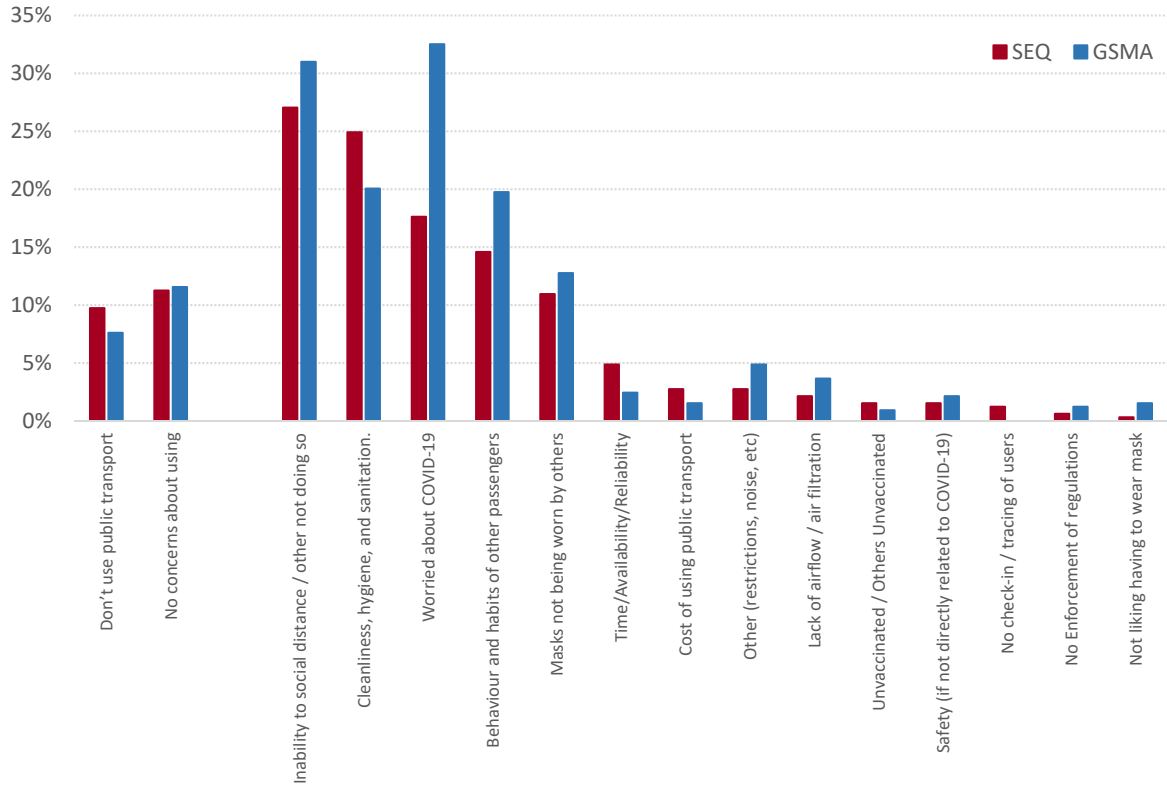
**Table 2: Correlation of Concern Scores – Completes Only**

		Concern about Hygiene - During	Concern about Crowding - During	Likelihood of Using - After
Concern about Hygiene - Prior - SEQ	Corr.	0.719	0.635	-0.151
	Sig	0.000	0.000	0.003
Concern about Hygiene - Prior - GSMA	Corr.	0.712	0.650	-0.142
	Sig	0.000	0.000	0.010

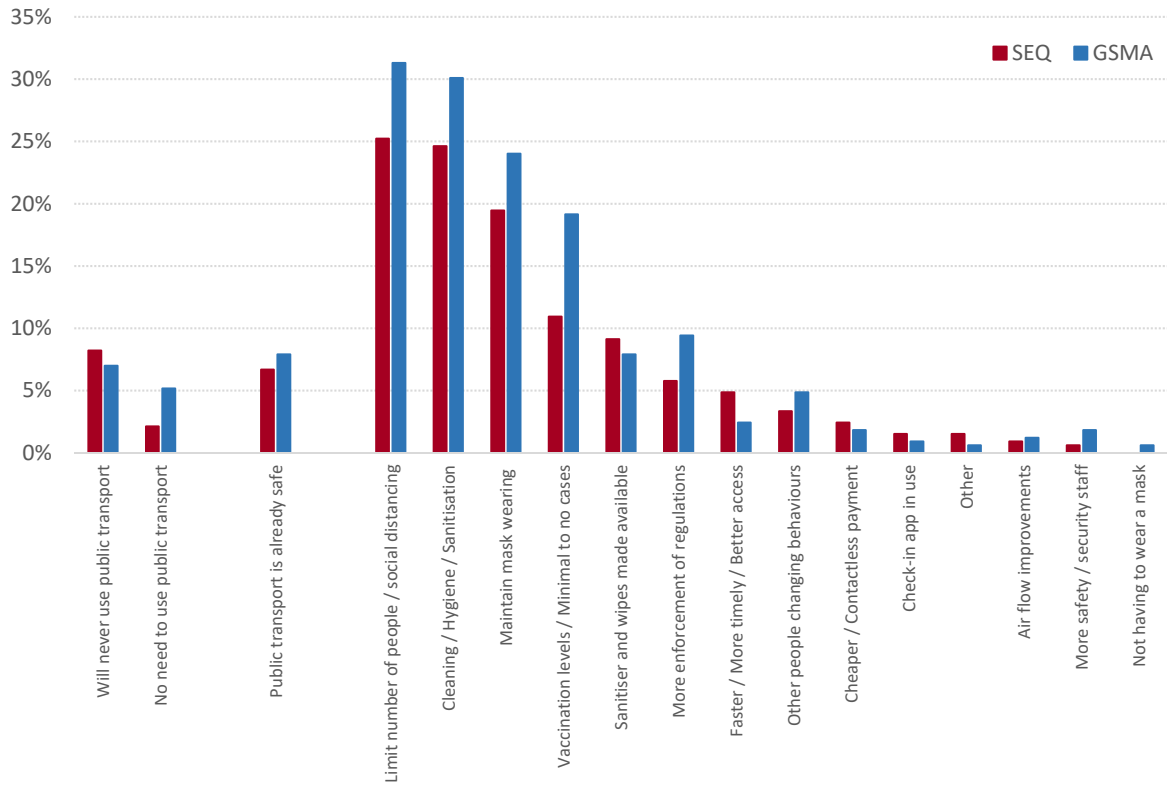
There is no difference in concern expressed by white- or blue-collar occupations in either region, nor between those who are “typical commuters” who commute between home and an office versus other types of workers. Unsurprisingly, in both SEQ and the GSMA, concern during the lockdown is significantly related to level of concern prior to the lockdown, and heightened concern prior to the lockdown also translates to lower likelihood of use after the lockdown ends (see Table 2). Finally, in terms of working from home, higher relative productivity has a significant and positive relationship with concern about public transport prior to the lockdown, and concern about hygiene during the lockdown within SEQ; and is significantly and positively related to concern about hygiene during the lockdown on the GSMA.

## 5.2. Barriers to Use and Actions to Restore Confidence

With regards to the open-ended responses, a larger number of workers in the GSMA stated they are worried about catching COVID-19 on public transport to those in SEQ, which is not surprising given the relative case numbers at the time and the growing realisation of the seriousness of the outbreak. Workers in the GSMA are also slightly more concerned about their ability to maintain social distancing while on public transport, and about the behaviour of other passengers who they may be traveling with (Figure 6). Overt and regular cleaning along with enough space to social distance are the two most stated strategies that are required to increase confidence about using public transport (Figure 7); this is particularly true in the GSMA. Also in the Sydney region, the use of masks and having high vaccination levels and/or low case numbers is also more commonly cited as a requirement than in the SEQ.



**Figure 6: Barriers to Use of Public Transport – Workers**



**Figure 7: Measure to Increase Confidence in Public Transport – Workers**

### 5.3. Relating Attitudes to Levels of Concern

#### 5.3.1. Exploratory Factor Analysis on Attitudes

Respondents were given a battery of attitudinal statements covering four broad topics: attitudes towards working from home; how comfortable they felt completing selected day-to-day activities; their overall attitude to the way in which the pandemic has been handled; and their attitudes towards COVID-19 vaccination. In total there are 42 attitudinal statements, so exploratory factor analysis was conducted to reduce this to the underlying psychological constructs driving responses to the attitudinal indicators.

This was undertaken for SEQ and the GSMA respondents separately and the factor analysis results (KMO and Bartlett's Test) indicate that three of the four attitudinal subsets were meritorious for factor analysis, the exception being the vaccination attitudinal scale which was passable in both regional samples. Appendix A2 summarises the results of the factor analysis for each set of attitudinal questions.

- With respect to attitudes towards working from home, in SEQ the nine attitudinal statements reduced to two underlying constructs: experience with working from home (*WFH\_Experience<sub>SEQ</sub>*) and the impact of working from home on commuting (*WFH\_Travel<sub>SEQ</sub>*). In the GSMA, the work from home attitudes reduced to one global construct (*WFH\_All<sub>GSMA</sub>*).
- For comfort in completing day-to-day activities, in SEQ the 13 statements can be reduced to one underlying construct (*Comfort\_All<sub>SEQ</sub>*), whereas in the GSMA there are two dimensions: comfort with activities involving large gatherings (*Comfort\_Large<sub>GSMA</sub>*); and an underlying dimension that is driving attitudes towards necessary activities (*Comfort\_Needs<sub>GSMA</sub>*).
- On the 13 attitudinal statements related to the impact of, and response to, COVID-19 in SEQ, there are two drivers: the response of institutions and people to COVID-19 (*COVID\_Response<sub>SEQ</sub>*) and the impact COVID-19 will have (*COVID\_Impact<sub>SEQ</sub>*). In the GSMA, perhaps in response to the level of community transmission occurring at the time of data collection, there are three underlying drivers: the response of institutions (*COVID\_Institution<sub>GSMA</sub>*); the response of the community (*COVID\_Community<sub>GSMA</sub>*); and the impact of COVID-19 (*COVID\_Impact<sub>GSMA</sub>*).
- For the seven attitudinal responses gauging attitudes towards vaccination, both in SEQ and the GSMA, these responses are driven by two underlying latent constructs: vaccination being needed and impactful (*Vacc\_Needed<sub>SEQ</sub>*, *Vacc\_Needed<sub>GSMA</sub>*); and concerns about the vaccination (*Vacc\_Concern<sub>SEQ</sub>*, *Vacc\_Concern<sub>GSMA</sub>*).

Factor scores were calculated using the regression method for use in further analysis, and the interrelationships between attitudes and concern about public transport differ between SEQ and the GSMA, so results are presented in sub-sections specific to each region.

#### 5.3.2. Attitudes and Concern in SEQ

Within SEQ, neither *WFH\_Experience<sub>SEQ</sub>* nor *WFH\_Travel<sub>SEQ</sub>* were correlated with the level of concern about public transport prior to the lockdown, concern about hygiene or crowds during the lockdown, nor likelihood to use public transport after the lockdown ended. Unsurprisingly, *Comfort\_All<sub>SEQ</sub>* had significant negative correlations with concern prior, concern about hygiene and crowds during the lockdown and is positively correlated with the likelihood of using public transport after lockdown; more comfort around completing activities is associated with lower concern about public transport

and a greater likelihood of using public transport after the lockdown. Scores for *COVID\_Response<sub>SEQ</sub>* were negatively correlated with concerns about hygiene during the lockdown; indicating that those that thought the response of institutions were appropriate were less concerned. Scores for *COVID\_Impact<sub>SEQ</sub>* were positively correlated with concern prior, hygiene and crowding concern during lockdown, and negatively correlated with likelihood of use after lockdown; indicating those that felt COVID-19 has a bigger impact on society and the economy are more concerned about public transport and are less likely to use public transport when the lockdown ends.

Lastly, on attitudes towards vaccination, *Vacc\_Needed<sub>SEQ</sub>* is positively correlated with concern about hygiene during the lockdown; indicating that those who feel people who believe the vaccine to be needed and impactful are more concerned about using public transport. The *Vacc\_Concern<sub>SEQ</sub>* variable is also positively correlated with concern about hygiene and crowding during the lockdown. Interestingly, vaccination attitudes are not correlated with the intention to use public transport after lockdown, possibly because the number of people vaccinated was increasing exponentially despite the fact that 59% of respondents indicated that they were currently unvaccinated, 25% had received one vaccination injection, 17% had received both doses. Being vaccinated or not has no impact on concern about public transport nor on likelihood to use for those in the SEQ.

### 5.3.3. Attitudes and Concern in the GSMA

Within the GSMA we see a difference between attitudes and concern in using public transport. In the GSMA, the single *WFH\_All<sub>GSMA</sub>* latent variable that is driving evaluation of working from home attitudes, is positively correlated with concern about hygiene and crowding during the pandemic; indicating those with a more positive work from home experience are more concerned with public transport overall. The *Comfort\_Large<sub>GSMA</sub>* construct is negatively correlated with concern prior to the lockdown, concern about hygiene and crowding during lockdown, and positively correlated with likelihood to use public transport after lockdown; indicating that those who express more comfort in engaging in activities involving larger groups of people are less concerned about public transport and more likely to use it. The same pattern is observed for the *Comfort\_Need<sub>GSMA</sub>* latent construct with concern prior, about hygiene and crowding during lockdown, and likelihood to use public transport after lockdown. With regards to attitudes towards the impact of COVID-19 and the response towards the pandemic, only the *COVID\_Impact<sub>GSMA</sub>* construct is correlated with concern about using public transport, specifically those who believe that COVID-19 has a larger impact on society and the economy are also more concerned about public transport prior to the lockdown, and towards hygiene and crowding during the lockdown.

In the GSMA, vaccination attitudes play a larger role than in SEQ, with the *Vacc\_Needed<sub>GSMA</sub>* construct being positively correlated with prior concern, and hygiene and crowding concern during lockdown; those who feel the vaccine is needed and impactful express higher concern about using public transport. The *Vacc\_Concern<sub>GSMA</sub>* latent variable is positively correlated with prior concern only. Again, it is interesting to note that vaccination attitudes are not correlated with intention to use public transport after lockdown. It should be noted that 60% of respondents indicated that they were currently unvaccinated, 26% had received one vaccination injection, 14% had received both doses. Being vaccinated or not has no impact on concern about public transport nor on likelihood to use for those in the GSMA; it is relevant to note though that this was early in the Delta outbreak and the virulence of the virus strain was probably not yet appreciated.

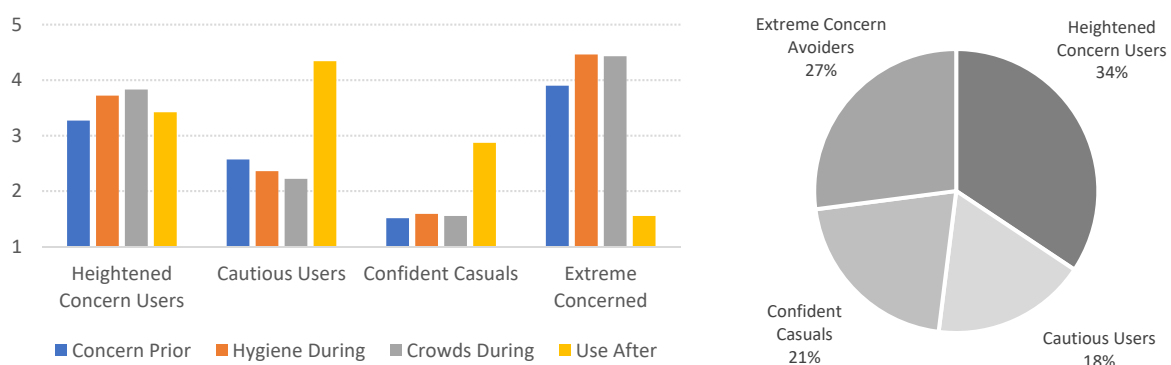
### 5.4. Segments of Concern and Likely Use

To better understand different segments of public transport concern that exist within the two metropolitan regions, the four measures of concern (prior to the lockdown, hygiene and crowding

during lockdown, and likelihood to using public transport after lockdown) were jointly analysed in a  $k$ -means clustering process whereby  $n$  observations are partitioned into  $k$  clusters, with each observation belonging to the cluster with the closest cluster average. This process allows for the identification of non-overlapping segments of respondents in the data such that each respondent belongs to only one cluster. To determine the appropriate number of clusters, multiple trials with different cluster numbers are implemented, ultimately seeking to identify the solution that provided the largest number of cluster segments while maintaining significant differences between the inputs across each cluster. As with the previous analysis, SEQ and the GSMA were analysed independently of each other, but in both regions, there were four clusters that best segmented respondents based on levels of concern and likelihood of use (see Appendix A3 for tables of average response for each statement).

#### 5.4.1. Defining Segments in SEQ

For SEQ, the average response to each statement from respondents in each segment is significantly different to the average attitude expressed by all other segments, indicating strong discrimination between the segments. Figure 8 summarises each of the four clusters identified in SEQ. “*Heightened Concern Users*” whose level of concern with public transport prior to the lockdown, hygiene and crowding during, averages between somewhat to moderate concern, but whose intention to use public transport after the lockdown is between neutral and somewhat likely. This segment accounts for 34% of respondents. “*Cautious Users*” whose average concern with public transport prior to the lockdown, hygiene and crowding during, is around slightly concerned, but have a likelihood to use public transport after lockdown that is between somewhat and extremely likely. This segment is 18% of respondents. “*Confident Casuals*” who express the lowest level of concern and report a neutral average likelihood to use public transport after lockdown. This segment accounts for 21% of respondents. Lastly, “*Extreme Concern Avoiders*” account for 27% of the sample and are a group that report the highest levels of concern with public transport and the lowest intention to use after the lockdown.



**Figure 8: Segments of Concern in South East Queensland**

Once the clusters were identified, further analysis was conducted to understand differences in characteristics. In South East Queensland, the composition of each segment was identical with respect to gender, proportion of “typical” commuters<sup>4</sup>, occupation (white/blue-collar), age, income,

<sup>4</sup> A “typical” commute is defined as someone who regularly travelled between home and an office or single work location (e.g., a warehouse, hospital). Given the sample focus, 70% of workers in the SEQ and 74% in the GSMA meet this definition.

possession of a driver’s license, vaccination status, and productivity while working from home. In other words, socio-demographics do not explain differences in the segments, rather attitudes and behaviours are what delineates between the clusters. Table A4.1 (see Appendix A4) highlights the variables from the survey that differed significantly across the segments. Table 3 summarises the key components that define the make-up of each segment.

**Table 3: Segments of Public Transport User by Level of Concern - SEQ**

<b>Heightened Concern Users</b> <b>34%</b>	<b>Cautious Users</b> <b>18%</b>	<b>Confident Casuals</b> <b>21%</b>	<b>Extreme Concern Avoiders</b> <b>27%</b>
Uncomfortable completing day to day activities	Comfortable completing day to day activities	Comfortable completing day to day activities	Uncomfortable completing day to day activities
Heightened sense of COVID-19 risk to health and economy	Believe COVID-19 of to be less of a risk than other segments	Believe COVID-19 of to be less risk than other segments	Heightened sense of COVID risk to health and economy
Higher degree of anxiousness	Less positive about WFH experience	View COVID-19 as not as serious a health concern	Higher degree of anxiousness
Believe lockdown was implemented too slowly	Lower desire to WFH more in the future	Lower agreement with drastic actions to combat COVID-19	Agree more that people not isolating appropriately
Concerned about spread of COVID-19 on PT	More influenced by vaccine incentives	Lower belief in need to be vaccinated	Stronger belief in need for and efficacy of vaccination
Worried about cleanliness and distancing	Primarily worried about distancing	Likely to have no concerns about public transport	Believe lockdown was implemented too slowly
Need to observe cleaning taking place	What limits on users and regular cleaning	More likely to not be users of public transport	Concerned about spread of COVID-19 on PT
Want to know there is space for social distancing	Would also like sanitiser and wipes provided to passengers	Want better services in order to use public transport	Particularly worried about cleanliness
			Need vaccinations and/or minimal cases
			Need limits on people and regular visible cleaning

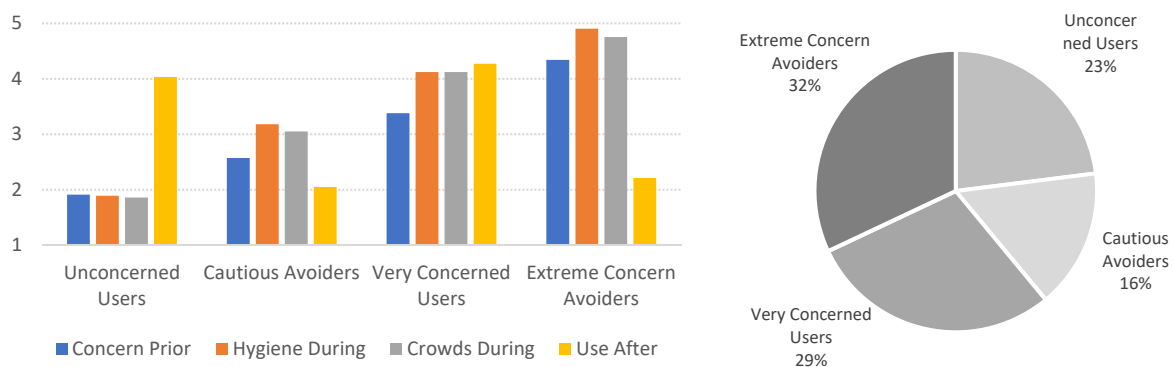
- *“Heightened Concern Users”* (34%) segment are generally uneasy about COVID-19 and the impact of the virus, as a result are anxious and worried about catching the virus on public transport. To avoid this, they would like to see observable cleaning being conducted on a regular basis and to know clearly that they will be able to social distance whilst onboard.
- *“Cautious Users”* (18%) express more comfort in being in public completing day to day activities, have a lower risk perception of COVID-19, are seemingly open to incentives to be vaccinated, and have a largest problem with distancing while on public transport. Interestingly, it is also this group that predominately wants to see sanitising facilities made available to passengers on board or at stops/stations.
- *“Confident Casuals”* (21%) are also comfortable being out and about, also have a lower relative risk perception of COVID-19, and thus have no concerns about using public transport other than wanting better access to services in order to use more frequently.



- “Extreme Concern Avoiders” (27%) are more concerned about COVID-19, exhibit higher levels of anxiousness, believe in vaccination and would need to see mass vaccination levels and or low/case numbers in particular, to be confident in using public transport again.

#### 5.4.2. Defining Segments in the GSMA

In determining the clusters for the GSMA also using the four measures of concern about public transport, each segment displays an average score on these measures that are significantly different to the average scores by respondents in the other segments, with the exception of likelihood of future use of public transport, where there are only two groups of significantly different average likelihood of use score: users versus avoiders. Nonetheless, there is still strong discrimination between the segments. Figure 9 summarises each of the four clusters identified in the GSMA. The “*Unconcerned Users*” segment accounts for 23% of respondents and is comprised of those who have only slight concern about public transport, and a relatively high likelihood of using public transport after the lockdown. At 16% of the sample, “*Cautious Avoiders*” are those with slight to somewhat concern about public transport but are somewhat unlikely to use after lockdown. “*Very Concerned Users*” account for 29% of respondents and have moderate concern about public transport but are also likely to use these modes again after lockdown. Finally, the largest segment identified are the “*Extreme Concern Avoiders*” who have moderate to extreme concern about public transport and report being somewhat unlikely to use the mode again once the lockdown ends. Interestingly, and unlike SEQ, there is no segment that is extremely unlikely to use public transport, possibly explained by the size of the network in Sydney and the greater role public transport plays in moving people.



**Figure 9: Segments of Concern the Greater Sydney Metropolitan Area**

Similarly to SEQ, socio-demographics are largely the same within each segment (reinforcing that attitudes and behaviours differentiate between the clusters), however in the GSMA data males are more likely to be “*Unconcerned Users*” and female “*Extreme Concern Avoiders*”; lower income respondents more likely to be in the “*Cautious Avoider*” segment and high income in the “*Very Concerned Users*”; and blue-collar workers are more likely to be in the “*Cautious Avoider*” segment as well. Table A4.2 (see Appendix A4) highlights the variables from the survey that differed significantly across the segments. Table 4 summarises the key components that define the make-up of each segment:

- *“Unconcerned Users”* are generally comfortable completing day to day activities, have a lower risk perception of COVID-19 than other segments, are less anxious, and generally believe public transport to be safe to use. A small percentage of this group don’t like wearing masks.
- *“Cautious Avoiders”* are comfortable completing essential activities, believe COVID-19 will have a lesser impact relative to other segments, have found the work from home experience to be less positive, are less inclined to believe in vaccination compared to other segments, and need social distancing to be maintained along with thorough cleaning to be confident in using public transport.
- *“Very Concerned Users”* are uncomfortable in large group activities, feel COVID-19 will have a larger impact than other segments, are concerned about COVID-19 at the workplace, have found the work from home experience to be positive, believe the lockdown happened too slowly, seemed swayed by vaccination incentives, have a clear emphasis on the need for social distancing to be confident in using public transport
- *“Extreme Concern Avoiders”* have a more pronounced discomfort in interacting in large group environments and a higher perception of the overall risk of COVID-19. They are less likely to be swayed by incentives for vaccination, believe the lockdown happened too slow and have a very low likelihood of using public transport unless social distancing is strictly maintained, and cleaning is regular and observable.

**Table 4: Segments of Public Transport User by Level of Concern - GSMA**

<b>Unconcerned Users</b> <b>23%</b>	<b>Cautious Avoiders</b> <b>16%</b>	<b>Very Concerned Users</b> <b>29%</b>	<b>Extreme Concern Avoiders</b> <b>32%</b>
Higher proportion of males (relative to sample)	Higher proportion of blue-collar workers	Higher average incomes	Higher proportion of females
More comfortable completing large group activities	Lower average incomes	Uncomfortable completing large group activities	Uncomfortable completing large group activities
More comfortable completing needed activities	More comfortable completing needed activities	Higher attitude towards the impact of COVID-19	Uncomfortable completing needed activities
Lower attitude towards the impact of COVID-19	Lower attitude towards the impact of COVID-19	More concern about COVID-19 in the workplace	Lower attitude towards the impact of COVID-19
Allocate more commuting time saved to leisure/family	Lower relative agreement of WFH as a positive experience	WFH experience means better prepared to WFH	More concern about COVID-19 in the workplace
Low perception of risk of COVID-19 to own health	Lower belief that COVID-19 will affect how people travel	Heightened sense of COVID-19 risk to health and economy	Heightened sense of COVID-19 risk to health and economy
Lower degree of anxiousness	Less belief that combatting COVID-19 needs drastic action	View WFH as a positive experience	Less open to incentives for vaccination
More open to incentives for vaccination	Lower belief in vaccination	More open to incentives for vaccination	Believe lockdown happened too slowly
Have no concerns about using public transport	Most worried about inability to social distance on PT	Believe lockdown happened too slowly	More concerned about COVID-19 on public transport
Believe public transport to be safe already	Need social distancing and cleaning to be confident	Emphasis on social distancing to be confident in using PT	Need space for social distancing in order to use PT
		Still need cleaning to occur to be confident about using PT	Need observable cleaning to occur on public transport

## 6. Discussion and Conclusions

The focus of the paper has been to identify the spectrum of attitudes and concerns about using public transport in two metropolitan areas (GSMA and SEQ) using a mixture of descriptive interpretation and analytical methods of factor and cluster analysis. This section summarises the key findings and their relevance in developing plans to support a return to using public transport.

While concerns over the use of public transport remain, from the survey of all respondents we found evidence that the likelihood of using public transport after lockdown was on average higher in the GSMA than SEQ. This implies a potential learning experience since the GSMA has greater experience with COVID-19. A frequently stated barrier to public transport use was the inability to social distance and the number of other public transport users not doing so was also a concern, as was the cleanliness and hygiene status of public transport. The reference made to the lack of overt sanitising services onboard is an aspect that operators could address directly. Similarly, reducing the number of touch points required while using public transport should be a future focus. Enforcement of COVID regulations is important to citizens but responsibility for this remains something of a grey area. Generally, operators have found it easier to “enforce” social distancing than mask wearing (Dzisi and Dei, 2020).

A different pattern of attitude drivers and their differing relationships to public transport concern show different experiences with the virus within the two metro areas as shown by the segments of concern that emerge. Interestingly, with the exception of a limited number of variables in the GSMA, the segments of user concern revealed do not vary by socio-demographics, emphasising the potential challenges faced by public transport operators in responding to a pandemic that has affected all societal groups equally. Indeed, the predominant variables that enable operators to delineate between segments of concern are attitudes towards responses by institutions and the general public, vaccinations, public transport behaviour, and most crucially, what segments have identified as being important measures that would work towards restoring some degree of confidence in public transport.

To restore confidence in SEQ, it is likely that operators will have most success targeting those in the “Heightened Concerned User” segment (accounting for one third of potential users) through observable cleaning and sensible distancing measures. As vaccinations roll-out and efficacy becomes more certain, attempts could then be made to target the “Extreme Concern Avoiders”. In the GSMA it is notable that 23% of respondents identify as “Unconcerned Users” giving operators some hope that patronage will return, but operators in this metropolitan area might seek to target the “Very Concerned Users” with the highlighted strategies in Table 4, particularly again as vaccination effectiveness emerges. It is interesting to note that in the two metropolitan region there are subtle different segments, suggesting that different policies may be required, but that the GSMA experience may give insight into what SEQ might experience should virus numbers grow.

When looking at factors of concern vaccination attitudes (at the time of survey) were not linked to future use of public transport directly in either location, although it remains to be seen if that becomes of more importance now that vaccination rates of 90% have been achieved. The only factors correlated with future use of public transport are level of comfort in completing day to day activities; this again likely represents a more positive attitude associated with living with the virus.

As noted earlier, while several studies have specifically focussed on the relationship between level of concern with public transport and actual and intended use of public transport, less attention has been

given to deriving segments of public transport user by level of concern. Thus, the development of market segments is useful in determining where effort should be placed by operators and authorities in alleviating concerns associated with using public transport during lockdown and as we learn to live with COVID-19. Findings indicate that while attitudes and concern are different, and these attributes are related in different ways, ultimately the same set of strategies to restore confidence in public transport will generally work for those with extreme aversion, but more importantly for those in the middle who are willing to use, but have concern about COVID-19 and the risk public transport poses.

For a large percentage of people it seems like distancing and really quite observable cleaning will be needed. As noted vaccination attitudes are not linked to future use directly, so it seems this form of deterrent needs to prove itself. Unless there is a long period of time with control or (no) case numbers, or the vaccine proves its effectiveness in suppressing numbers and in particular hospitalisations, cleaning and distancing is the policy that should be promoted by public transport operators. This is typified by the dominant “Heightened Concern Users” segment in SEQ who would like to see observable cleaning being conducted on a regular basis and to know clearly that they will be able to social distance whilst onboard. Similarly, in GSMA the “Cautious Avoiders”, while comfortable completing essential activities, need social distancing to be maintained along with thorough cleaning to be confident in using public transport. However, by late 2021 NSW has relaxed distancing measures with public transport capacity raised to 75% and a reliance on people to use common sense when it comes to distancing. Whilst this is consistent with a return to normality there remains the risk of disenfranchising those vulnerable users who need public transport. That both locations have an “Extreme Concern Avoiders” segment who are highly unlikely to use public transport unless social distancing is strictly maintained, and cleaning is regular and observable, suggests that this is where the focus of awareness campaigns that “public transport is safe” needs to be.

Ultimately, to paraphrase Jenelius and Cebecauer (2020), the return to public transport ridership will most likely be influenced by both restrictions imposed by authorities and travellers' own choices; this implies the need to be responsive to the concerns of travellers.

Appendix A1

**Table A1: Results of Hypothesis Testing (discussion in text)**

Test	Statistic	Value	Sig
GSMA vs SEQ prior concern	t-value	4.352	---
GSMA vs SEQ crowding concern	t-value	7.227	---
GSMA vs SEQ hygiene concern	t-value	7.158	---
GSMA vs SEQ usage likelihood after	t-value	4.201	---
SEQ hygiene concern vs prior concern	t-value	9.972	---
SEQ crowding concern vs prior concern	t-value	8.385	---
SEQ hygiene concern vs crowding concern	t-value	1.201	---
GSMA hygiene concern vs prior concern	t-value	12.489	---
GSMA crowding concern vs prior concern	t-value	10.979	---
GSMA hygiene concern vs crowding concern	t-value	0.862	---
GSMA Age vs crowding concern	F-value	3.632	0.027
GSMA Age vs usage likelihood after	F-value	6.685	0.001
GSMA Income vs prior concern	F-value	3.283	0.039
GSMA Income vs usage likelihood after	F-value	3.079	0.047
GSMA vs SEQ Workers prior concern	t-value	2.814	---
GSMA vs SEQ Workers hygiene concern	t-value	4.752	---
GSMA vs SEQ Workers crowding concern	t-value	3.950	---
GSMA vs SEQ Workers usage likelihood after	t-value	2.467	---
SEQ Workers hygiene concern vs prior concern	t-value	5.373	---
SEQ Workers crowding concern vs prior concern	t-value	4.784	---
SEQ Workers hygiene concern vs crowding concern	t-value	0.074	---
GSMA Workers hygiene concern vs prior concern	t-value	9.832	---
GSMA Workers crowding concern vs prior concern	t-value	7.314	---
GSMA Workers hygiene concern vs crowding concern	t-value	2.131	---
GSMA Female Workers prior concern	t-value	2.500	---
GSMA Female Workers hygiene concern	t-value	4.218	---
GSMA Female Workers crowding concern	t-value	3.608	---
GSMA Female Workers usage likelihood after	t-value	1.993	---
GMSA Income vs prior concern	F-value	3.287	0.038
GMSA Age vs usage likelihood after	F-value	3.341	0.031

**Table A1 (cont.): Results of Hypothesis Testing (discussion in text)**

SEQ WFH productivity and prior concern	corr.	0.153	0.031
SEQ WFH productivity and hygiene concern	corr.	0.165	0.020
GSMA WFH productivity and hygiene concern	corr.	0.144	0.035
<i>Comfort_All</i> <sub>SEQ</sub> vs prior concern	corr.	-0.325	0.000
<i>Comfort_All</i> <sub>SEQ</sub> vs hygiene concern	corr.	-0.432	0.000
<i>Comfort_All</i> <sub>SEQ</sub> vs crowding concern	corr.	-0.436	0.000
<i>Comfort_All</i> <sub>SEQ</sub> vs usage likelihood after	corr.	0.196	0.000
<i>COVID_Response</i> <sub>SEQ</sub> vs hygiene concern	corr.	-0.118	0.034
<i>COVID_Impact</i> <sub>SEQ</sub> vs prior concern	corr.	-0.182	0.000
<i>COVID_Impact</i> <sub>SEQ</sub> vs hygiene concern	corr.	-0.291	0.000
<i>COVID_Impact</i> <sub>SEQ</sub> vs crowding concern	corr.	-0.269	0.000
<i>COVID_Impact</i> <sub>SEQ</sub> vs usage likelihood after	corr.	-0.127	0.022
<i>Vacc_Needed</i> <sub>SEQ</sub> vs hygiene concern	corr.	0.115	0.036
<i>Vacc_Concern</i> <sub>SEQ</sub> vs hygiene concern	corr.	0.116	0.036
<i>Vacc_Concern</i> <sub>SEQ</sub> vs crowding concern	corr.	0.117	0.034
<i>WFH_All</i> <sub>GMSA</sub> vs hygiene concern	corr.	0.171	0.012
<i>WFH_All</i> <sub>GMSA</sub> vs crowding concern	corr.	0.166	0.015
<i>Comfort_Large</i> <sub>GMSA</sub> vs prior concern	corr.	-0.247	0.000
<i>Comfort_Large</i> <sub>GMSA</sub> vs hygiene concern	corr.	-0.344	0.000
<i>Comfort_Large</i> <sub>GMSA</sub> vs crowding concern	corr.	-0.310	0.000
<i>Comfort_Large</i> <sub>GMSA</sub> vs usage likelihood after	corr.	0.139	0.006
<i>Comfort_Need</i> <sub>GMSA</sub> vs prior concern	corr.	-0.172	0.000
<i>Comfort_Need</i> <sub>GMSA</sub> vs hygiene concern	corr.	-0.232	0.000
<i>Comfort_Need</i> <sub>GMSA</sub> vs crowding concern	corr.	-0.247	0.000
<i>Comfort_Need</i> <sub>GMSA</sub> vs usage likelihood after	corr.	0.108	0.035
<i>COVID_Impact</i> <sub>GMSA</sub> vs prior concern	corr.	0.143	0.005
<i>COVID_Impact</i> <sub>GMSA</sub> vs hygiene concern	corr.	0.251	0.000
<i>COVID_Impact</i> <sub>GMSA</sub> vs crowding concern	corr.	0.240	0.000
<i>Vacc_Needed</i> <sub>GMSA</sub> vs prior concern	corr.	0.144	0.005
<i>Vacc_Needed</i> <sub>GMSA</sub> vs hygiene concern	corr.	0.180	0.000
<i>Vacc_Needed</i> <sub>GMSA</sub> vs crowding concern	corr.	0.189	0.000
<i>Vacc_Concern</i> <sub>GMSA</sub> vs prior concern	corr.	0.133	0.009

## Appendix A2

**Table A2.1: Working from Home Factor Loadings**

Attitudes toward Working from Home	SEQ		GSMA
	<i>WFH_Experience</i>	<i>WFH_Travel</i>	<i>WFH_All</i>
WFH has been a positive experience for me	<b>0.764</b>	0.351	0.7750
Like to WFH more often in the future	<b>0.766</b>	0.400	0.8170
Like more flexible starting and finishing times in the future	0.218	<b>0.830</b>	0.7220
Commute at less busy times in the future if I could	0.112	<b>0.846</b>	0.5180
Appropriate space to work from home	<b>0.726</b>	0.267	0.7430
Find a balance between paid work and unpaid work	<b>0.851</b>	0.112	0.8230
Balance time working versus not working	<b>0.847</b>	0.056	0.8020
Appropriate equipment / technology to WFH	<b>0.869</b>	0.166	0.7700
Overall I have everything I need to WFH well	<b>0.877</b>	0.136	0.7990

	SEQ	GSMA
KMO Test of Sphericity	0.877	0.864
Bartlett's Chi-square	2210.732	121.533
Bartlett's Sig.	0.000	0.000

**Table A2.2: Comfort with Activities Factor Loadings**

Comfort with Activities	SEQ	GSMA	
	<i>Comfort_All</i>	<i>Comfort_Large</i>	<i>Comfort_Needs</i>
Meeting with friends	0.715	0.222	<b>0.847</b>
Visiting restaurants	0.846	0.456	<b>0.775</b>
Going to the shops	0.819	0.376	<b>0.804</b>
Going to the movies	0.78	Cross-loaded so removed	
Going to pubs or bars	0.888	<b>0.706</b>	0.563
Gyms and exercise groups	0.836	<b>0.775</b>	0.358
Doctor's appointments	0.685	0.332	<b>0.685</b>
Attending professional sporting events	0.886	<b>0.843</b>	0.33
Attending music events	0.875	<b>0.896</b>	0.286
Attending live entertainment	0.888	<b>0.897</b>	0.315
Attending schools and/or childcare	0.799	Cross-loaded so removed	
Playing organised sport	0.855	<b>0.762</b>	0.379
Attending work functions	0.574	<b>0.739</b>	0.454

	SEQ	GSMA
KMO Test of Sphericity	0.949	0.945
Bartlett's Chi-square	4557.517	5151.777
Bartlett's Sig.	0.000	0.000

**Table A2.3: Attitudes towards COVID-19 Factor Loadings**

Attitudes toward COVID-19 Impact and Response	SEQ		GSMA		
	COVID_Response	COVID_Impact	COVID_Institution	COVID_Community	COVID_Impact
COVID-19 will continue to affect the way people travel	0.019	<b>0.677</b>	-0.031	0.080	<b>0.648</b>
Federal government response to COVID-19 has been appropriate	<b>0.596</b>	0.226	<b>0.846</b>	0.147	0.048
State government response to COVID-19 has been appropriate	<i>Cross-loaded so removed</i>		<b>0.827</b>	0.138	0.182
Business response to COVID-19 has been appropriate	<b>0.685</b>	0.29	<b>0.672</b>	0.331	0.159
Wider community response to COVID-19 has been appropriate	<b>0.817</b>	0.118	<i>Cross-loaded so removed</i>		
COVID-19 is a serious public health concern	0.088	<b>0.864</b>	0.272	-0.026	<b>0.869</b>
Combatting COVID-19 requires drastic measures to be taken	0.143	<b>0.856</b>	0.267	-0.008	<b>0.814</b>
People appropriately social distancing to combat COVID-19	<b>0.819</b>	-0.118	0.354	<b>0.796</b>	-0.061
People appropriately self-isolating to combat COVID-19	<b>0.824</b>	-0.114	0.392	<b>0.761</b>	-0.059
Trust governments to respond to COVID-19 in the future	<b>0.72</b>	0.334	<b>0.784</b>	0.308	0.167
Trust business to respond to COVID-19 in the future	<b>0.735</b>	0.274	<i>Cross-loaded so removed</i>		
Trust other people to respond to COVID-19 in the future	<b>0.825</b>	-0.058	0.400	<b>0.721</b>	0.022
Go to work from time to time to avoid too much social isolation	<i>Cross-loaded so removed</i>		-0.186	<b>0.554</b>	0.358

	SEQ	GSMA
KMO Test of Sphericity	0.839	0.836
Bartlett's Chi-square	2210.732	2763.677
Sig.	0.000	0.000



**Table A2.4: Attitudes towards Vaccination Factor Loadings**

Attitudes toward Vaccination	SEQ		GSMA	
	<i>Vacc_Needed</i>	<i>Vacc_Concern</i>	<i>Vacc_Needed</i>	<i>Vacc_Concern</i>
People have a duty to protect themselves and others	<b>0.757</b>	-0.007	<b>0.773</b>	0.115
I believe in vaccinations and science	<b>0.870</b>	-0.220	<b>0.827</b>	-0.364
Vaccinations help stop the spread of the virus	<b>0.824</b>	-0.244	<b>0.810</b>	-0.380
I am concerned about the safety of the vaccine in its development	-0.205	<b>0.899</b>	-0.061	<b>0.913</b>
I am concerned about the potential side-effects of vaccines	-0.173	<b>0.911</b>	-0.012	<b>0.914</b>
I just want life to return to normal as quickly as possible	<b>0.473</b>	0.385	<b>0.477</b>	0.236
People should get vaccinated against COVID-19	<b>0.399</b>	-0.232	<b>0.395</b>	-0.334

		SEQ	GSMA
KMO Test of Sphericity		0.679	0.681
Bartlett's	Chi-square	937.905	1120.611
	Sig.	0.000	0.000

Appendix A3

**Table A3.1: Cluster Averages for SEQ**

	<b>Heightened Concern Users</b>	<b>Cautious Users</b>	<b>Confident Casuals</b>	<b>Extreme Concern Avoiders</b>		
<i>n allocated</i>	34%	18%	21%	27%	<b>F</b>	<b>Sig.</b>
<i>Concern Prior</i>	3.27	2.57	1.51	3.90	99.379	0.000
<i>Hygiene During</i>	3.72	2.36	1.59	4.46	233.253	0.000
<i>Crowds During</i>	3.83	2.22	1.55	4.43	270.741	0.000
<i>Use After</i>	3.42	4.34	2.87	1.55	99.907	0.000

**Table A3.2: Cluster Averages for GSMA**

	<b>Unconcerned Users</b>	<b>Cautious Avoiders</b>	<b>Very Concerned Users</b>	<b>Extreme Concern Avoiders</b>		
<i>n allocated</i>	23%	16%	29%	32%	<b>F</b>	<b>Sig.</b>
<i>Concern Prior</i>	1.91	2.57	3.38	4.34	99.379	0.000
<i>Hygiene During</i>	1.89	3.18	4.12	4.90	233.253	0.000
<i>Crowds During</i>	1.86	3.05	4.12	4.75	270.741	0.000
<i>Use After</i>	4.03 <sup>b</sup>	2.05 <sup>a</sup>	4.27 <sup>b</sup>	2.21 <sup>a</sup>	99.907	0.000

Table A4.1: Cluster Composition in South East Queensland

SEQ CLUSTER COMPOSITION	Heightened Concern Users	Cautious Users	Confident Casuals	Extreme Concern Avoiders	F-stat / Chi-square	Sig.
<i>Comfort_AllSEQ</i>	-0.57	0.64	0.53	-0.40	9.266	0.000
Concern about COVID-19 in workplace	2.9	2.0	1.6	3.0	33.080	0.000
Hours of work per week during lockdown	33.1	27.8	34.9	31.9	2.706	0.045
Risk of COVID-19 to my health	6.3	5.1	4.2	6.5	16.777	0.000
Risk of COVID-19 to health of someone known	7.2	6.2	5.1	7.2	14.293	0.000
Risk of COVID-19 to the general public	7.1	6.2	5.1	7.1	18.618	0.000
Risk of COVID-19 to the economy	8.1	7.2	7.3	7.7	3.361	0.019
How anxious did you feel yesterday	4.6	3.6	4.1	5.0	3.343	0.020
Work from home has been a positive experience	5.7	5.0	5.7	5.9	2.872	0.038
I would like to work from home more often	5.7	5.0	5.8	5.7	2.773	0.043
Community response to COVID-19 appropriate	4.7	5.0	4.5	4.3	2.778	0.401
COVID-19 is a serious health concern	6.0	5.9	5.2	6.3	8.926	0.000
Combatting COVID-19 requires drastic measures	5.7	5.3	4.7	5.8	8.502	0.000
People appropriately self-isolating	4.3	4.6	4.5	3.8	3.483	0.016
Trust others to respond in the future	4.6	4.7	4.5	4.0	3.391	0.018
Go to work to avoid isolation	5.0	5.3	4.6	4.6	3.021	0.022
People have a duty to protect themselves & others	6.0	6.1	5.6	6.3	4.815	0.003
I believe in vaccinations and science	5.9	6.3	5.6	6.2	4.268	0.003
Vaccinations stop spread of virus	5.6	6.0	5.3	5.9	3.387	0.018
Vaccination Incentive - Travel within Australia	3.4	3.9	3.1	3.5	2.941	0.034
Vaccination Incentive - Travel International	3.3	4.1	3.1	3.3	4.789	0.003
<b>Speed at Which Lockdown was Implemented</b>						
Lockdown happened to quickly	9%	9%	19%	7%	20.211	0.017
Timing of lockdown appropriate	43%	55%	44%	38%		
Lockdown happened to slowly	47%	29%	29%	49%		
Lockdown is not needed	2%	7%	9%	6%		
<b>Barriers to the Use of Public Transport</b>						
No concerns about using	4%	16%	33%	0%	51.329	0.000
Worried about COVID-19	20%	7%	12%	27%	11.938	0.008
Cleanliness, hygiene, and sanitation	31%	16%	4%	39%	30.430	0.000
Inability to social distance / others not doing so	30%	40%	9%	29%	17.189	0.001
Behaviour and habits of other passengers	15%	16%	4%	21%	9.130	0.028
Don't use public transport	5%	7%	22%	8%	14.731	0.002
Lack of airflow / air filtration	0%	0%	0%	8%	19.287	0.000
<b>Strategies to Increase Confidence in Public Transport</b>						
Will never use public transport	4%	7%	16%	9%	8.952	0.030
Public transport is already safe	3%	10%	17%	1%	21.273	0.000
Vaccination levels / Minimal to no cases	7%	10%	7%	19%	8.798	0.032
Limit number of people / social distancing	34%	28%	10%	25%	12.732	0.005
Cleaning / Hygiene / Sanitisation	29%	26%	10%	29%	10.129	0.017
Sanitiser and wipes made available	6%	21%	7%	8%	11.435	0.010
Faster / More timely / Better access	2%	7%	13%	1%	15.525	0.001
Other people changing behaviours	7%	2%	0%	2%	8.069	0.045

**Table A4.2: Cluster Composition in the Greater Sydney Metropolitan Region**

<b>GSMA CLUSTER COMPOSITION</b>	<b>Unconcerned Users</b>	<b>Cautious Avoiders</b>	<b>Very Concerned Users</b>	<b>Extreme Concern Avoiders</b>	<b>F-stat / Chi-square</b>	<b>Sig.</b>
Female	44%	59%	61%	68%	12.417	0.006
White-collar	91%	79%	89%	92%	7.935	0.047
Personal Income (\$,000)	95.4	77.9	102.4	80.8	3.4	0.019
<i>Comfort_Large<sub>GSMA</sub></i>	0.59	0.00	-0.22	-0.50	6.884	0.000
<i>Comfort_Need<sub>GSMA</sub></i>	0.48	0.51	0.17	-0.13	2.723	0.044
<i>COVID_Impact<sub>GSMA</sub></i>	-0.20	-0.47	0.42	0.25	3.876	0.009
Saved commute time allocated to leisure (%)	66%	46%	52%	47%	3.016	0.031
Concern about COVID-19 in workplace	2.0	2.5	3.2	3.5	36.663	0.000
WFH experience means better prepared to WFH	3.8	3.6	4.0	3.9	3.556	0.015
Risk of COVID-19 to my health	4.1	5.6	6.5	6.6	28.064	0.000
Risk of COVID-19 to health of someone known	5.2	6.4	7.4	7.4	22.658	0.000
Risk of COVID-19 to general public	5.3	6.2	7.2	7.3	26.187	0.000
Risk of COVID-19 to the economy	7.2	7.4	7.8	8.1	4.064	0.007
How anxious did you feel yesterday	3.5	5.0	5.0	4.8	5.791	0.001
Work from home has been a positive experience	5.3	4.9	5.7	5.3	2.714	0.046
COVID-19 will affect the way people travel	5.7	5.2	5.8	5.9	5.989	0.001
COVID-19 is a serious public health concern	5.2	5.0	6.0	6.1	14.865	0.000
Combatting COVID-19 requires drastic action	4.9	4.8	5.9	5.8	14.798	0.000
People have a duty to protect themselves & others	5.8	5.4	6.1	6.2	7.058	0.000
I believe in vaccinations and science	5.7	5.1	5.9	5.9	5.868	0.001
Vaccinations stop spread of virus	5.5	5.1	5.8	5.8	3.353	0.019
Concerned about potential vaccine side-effects	4.5	5.0	5.0	5.2	2.797	0.040
Vaccination Incentive - Attend large groups	2.9	2.6	3.1	2.6	3.965	0.009
Vaccination Incentive - Travel within Australia	3.4	2.9	3.6	3.2	3.607	0.014
Vaccination Incentive - Travel International	3.4	2.7	3.7	3.2	6.355	0.000
Vaccination Incentive - Tax rebate or stimulus	3.2	3.1	3.8	3.1	4.788	0.003
<b>Speed at Which Lockdown was Implemented</b>						
Lockdown happened to quickly	8%	10%	6%	4%	23.683	0.005
Timing of lockdown appropriate	39%	34%	39%	35%	23.683	0.005
Lockdown happened to slowly	42%	41%	53%	58%	23.683	0.005
Lockdown is not needed	11%	15%	2%	3%	23.683	0.005
<b>Barriers to the Use of Public Transport</b>						
No concerns about using	32%	7%	2%	3%	67.321	0.000
Worried about COVID-19	17%	21%	35%	33%	10.904	0.012
Others not wearing mask	8%	2%	15%	14%	9.459	0.024
Inability to social distance / others not doing so	11%	26%	35%	30%	16.134	0.000
Behaviour and habits of other passengers	4%	13%	14%	30%	26.908	0.000
Don't use public transport	10%	15%	2%	4%	14.017	0.003
I have to wear a mask	4%	2%	0%	0%	10.121	0.018
<b>Strategies to Increase Confidence in Public Transport</b>						
No need to use public transport	3%	16%	2%	2%	25.149	0.000
Public transport is already safe	26%	2%	2%	0%	66.511	0.000
Limit number of people / social distancing	17%	21%	40%	25%	15.761	0.001
Cleaning / Hygiene / Sanitisation	16%	20%	34%	29%	10.315	0.016

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