

The Impact of COVID-19 Pandemic on the Perception of Public Transportation Users in Amman (Jordan)

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Abstract. The global pandemic of COVID-19 has a significant impact on the public transportation (PT) sector and users' perception. This study aimed to assess the public transportation users' perceptions, needs, and preferences during the COVID-19 pandemic in Amman, Jordan. A cross-sectional correlation design was used to recruit 510 participants between March 2020 - October 2020. We used an online survey that included the users' sociodemographic data sheet, frequency of using PT and other traveling modes, and travelers' perception towards PT before and after the pandemic. This study indicated a dramatic decrease in using PT during the pandemic, reaching 50%, and a reduction in the frequency of PT daily usage from 16% to 4%, however, all other traveling modes experienced an increase. In addition, 50% of the participants indicated that social distancing was the most important criterion to choose the mode of traveling during the pandemic, while equally 22% of the participants considered the duration and cost before traveling as an important criterion. A significant correlation between the frequency of using PT during the pandemic and anxiety was observed. However, the frequency of using PT or walking indicated a significant correlation with education levels only before the pandemic. Besides, 50% and 40% of the participants reported that neither public transportation nor walking infrastructure conditions were appropriate, respectively. The study yielded important empirical data that can be employed in PT planning and understanding users' preferences during this pandemic and for anticipated coming waves.

Keywords: Public Transportation · COVID-19 · Amman · Travelers' perception

1 Introduction

Late 2019, a cluster of pneumonia cases with unidentifiable causes was reported in Wuhan, China, which was attributed later to the novel Coronavirus (COVID-19) [1]. On March 11, 2020, the WHO announced the novel COVID-19 virus as "a global pandemic" after the spread of the virus to more than 200 countries, and urged governments to respond promptly to contain the virus spread.

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Accordingly, governments implemented various actions and measures, such as but not limited to, social distancing, closing schools and universities, forcing online education, prohibiting public gathering, closing public places (libraries, religious places, cinemas), restricting private cars usage, constraining public transportation full capacity, banning air traveling, and imposing both: partial and complete lockdown. These measures have imposed unprecedented challenges on healthcare systems, economic, industrial, aviation, and transport sectors on a global scale. During the pandemic, urban traveling and transport sectors have been hit severely due to the enforced restrictions (e.g., reduction of operation capacity, transit stations closure), which aimed to contain the virus transmission. Literature has reported that public transportation was affected the most [2, 3], in which 80% to 90% reduction rate was observed in various major cities [4].

Various studies have highlighted the need for users to walk or cycle more, especially in pandemic areas such as China or Italy [5]. Other studies have promoted the development of strategies to disseminate sustainable and resilient forms of mobility[6, 7]. Furthermore, the need to promote safe public transport use during the current and any possible future pandemics[8], and the need for sustainable and safe forms of shared mobility [9], highlighted the importance of implementing new policies. However, the pandemic also results in a shift in traveling modes, leading to increased use of private transportation than public means. Subsequently, reduced and disrupted service supply has taken place, which in turn led to limited capacity, longer waiting times, and the increasing concerns of unavoidable close contact in public transportation and stations [10]. Figure 1 shows the noticeable variation in using public transportation stations based on Google mobility reports data in 4 cities: Dubai, Amman, Manchester, and Rome [11].

The figure illustrates the percentage changes for each day compared to the median value for the corresponding day of the week over 5 weeks (January 3–February 6, 2020).

The authorities' recommendations for using public transportation during the pandemic varied across the countries based on factors such as cultural habits, the extent of transit usage, the prevalence of the pandemic, and socio-economic factors. For instance, the United Kingdom and Netherland advised the public to avoid using mass transit as possible [12, 13]. Sweden issued a similar statement and operated public transit at or near nominal levels to reduce the infection rate. The USA encouraged employers to offer incentives for using other transportation modes such as bikes, private cars, and walking [14]. New South Wales, Australia reduced the operating capacity dramatically to ensure social distancing [15].

Nonetheless, other countries adopted various adaptation techniques to ensure the availability and continuity of public transportation. In China, the government reduced the buses' capacity to 50% [16], while in South Korea, the buses and metro guidelines required travelers to wear masks at all times, besides, provided auto train operation, and avoided metro stopping at congested stations [17]. Other countries such as Taiwan requested only wearing masks and prohibited travelers from talking to each other to minimize contagious risks [18, 19]. However, in Jordan and United Arab Emirates (UAE), public transit was prohibited during the lockdown and resumed when the lockdown was eased, which took place under two compulsory conditions including: buses operate at 50% capacity, and travelers put on masks at all times [20, 21].

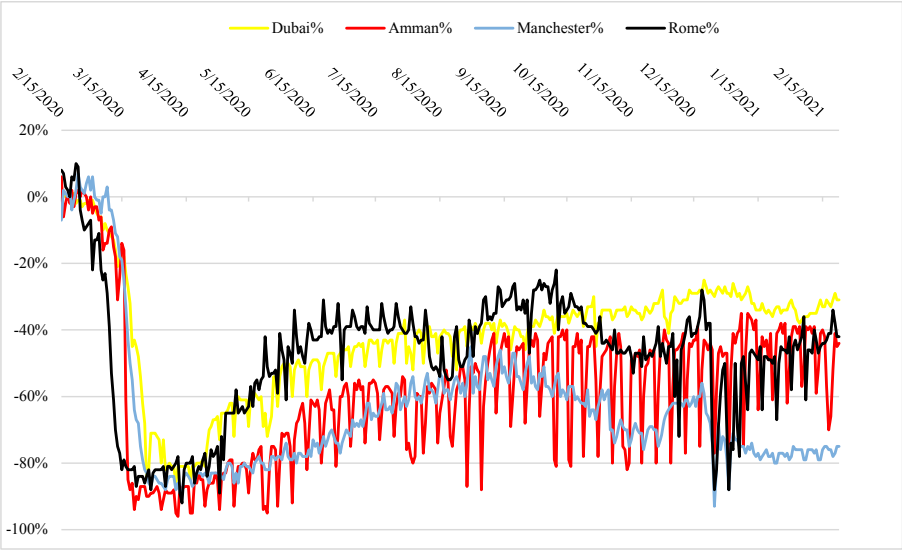

Fig. 1. The percentage changes for each day in using public transportation stations compared to the median value for the corresponding day of the week, over 5 weeks (January 3–February 6, 2020) [11].

In Jordan, the first COVID-19 case was reported on March 2, 2020, followed by several cases [22, 23]. Subsequently, the government established rules and recommendations, including coordinating public campaigns (as from March 6), borders' closure (as from March 17), school and workplace shutdown, complete lockdown, banning private car use, and inter- governorate travel. It is worth mentioning that people were allowed to move out to buy essentials on foot with a time window between 10 am and 6 pm (from March 18) [23]. The complete and strict lockdown lasted in action until late April (April 30). Afterward, the government eased the lockdown and allowed many sectors to resume work except those with large human workforces in which social distancing was difficult to maintain (i.e., schools, universities, gyms, public gatherings, church, and mosque). However, curfew remained active after 6 pm up to 6 am, and on Fridays [24]. Recently, the Jordanian government modified the curfew hours to be from 10 pm to 6 am, while the restriction on the sectors involving large gatherings remained with no change [25]. Furthermore, various actions were imposed on public transportation, such as reducing operating capacity, compulsory mask-wearing policy, social distancing (1–2 m distance), disinfecting vehicles and transportation modes, besides installing transparent barriers between the driver and the passengers in all taxis [25]. Public transportation in Jordan has encountered a wide range of challenges, such as but not limited to a lack of organizational legislation and service providers [26]. The Jordanian government has invested minimal budget in the public transportation sector compared to other sectors. For example, the government has paid more attention to security, defense, education, health, and investment domains [26, 27]. Furthermore, only

13% of the total trips in Amman, the capital and the most populated city in Jordan, are made by public transportation [26, 28]. Moreover, the government policies and regulations have fallen short in terms of supporting and promoting the use of public transportation [26]. Recent reports issued in 2017 stated that the public transportation sector was in need of complete structural reform to overcome major obstacles such as lack of subsidiary system, multiple public entities regulate the sector in Jordan, lack of professional transportation companies, besides the taxation regulations, which support individual ownership rather than large investments and companies [29]. Studies on public transportation in Jordan have concluded that the most challenging issues for public transportation in Jordan were the public sector and its related regulations, and the lack of technical and managerial capacities [26, 27, 29]. During the pandemic, few researchers have assessed the public transportation users patterns and the pandemic impact on the resilience of the transportation sector using either data sets based on aggregated and anonymized data from mobile phones such as Google mobility reports [30], and Apple Mobility reports [31], or national reports issued by local authorities [32]. In Italy, the analysis of a large-scale dataset on de-identified, geo-located smartphone users indicated a reduction of up to 50% of the total trips between Italian provinces, following the lockdown [33]. Beria and Lunkar [34], who used data provided by the "Facebook data for good" program, confirmed the reduction of internal mobility between Italian provinces and reported that there was a noticeable reduction in the number of trips that occurred in the earliest affected regions compared to central and south Italian cities. Tirachini and Cats [10], who investigated governments' response and the future research needs in terms of public transportation to adapt to the COVID-19 pandemic, reported that maintaining public transportation was the most challenging issue during pandemics, besides, the capability of transitioning to post-pandemic conditions would be a concern. Dzisi and Dei [35] indicated that public transportation was still perceived as a risky area for spreading the virus, although there was a high adherence rate from the government and operators to the safety guidelines. In Sicily (Italy), researchers reported that, during the pandemic, people showed positive opinions towards using micromobility (e,g, scooters) rather than shared public transportation[36]. In addition, investigating the ridership variation in public transportation in Sweden [37], the subway system in New York [38], bus ridership in Nashville and Chattanooga [39] confirmed a significant reduction in ridership during the pandemic, and that public health was a matter of concern in public transportations. Since March 2020, the dissemination of online surveys has made it possible to continue investigating travel habits while respecting travel restrictions imposed by some countries [9, 40]. The need to know users' travel habits during the various pandemic phases has led to several studies being carried out, investigating randomly or specific population groups. These activities make it possible to increase the democratic participation of the population in the planning activities of local authorities [41] and in improving the services offered by transport operators [42, 43]. Assessing the impact of the lockdown on population

mobility is important to help characterize the changes in social dynamics that influenced the viral spread. Using travel patterns reconstructed from mobile phone trajectories, travel in France was assessed at both local and national scales [44]. In addition, studies analyzed various socio-demographic variables that have predicted public response to public transportation usages such as educational levels, income, age, workplace types, and gender [45, 46]. Although few studies investigated the pandemic impact on service users' behaviors, most of these studies took place in western communities in which generalizing the results to the Jordanian population could be difficult. Given that, we believe that the ill public transportation sector in Jordan suffers the most during the pandemic, yet, no study has investigated the impact of the pandemic on public transportation from the service users' perspectives. Hence, our study adds to the body of literature in terms of transportation sectors in the developing world. This study aims to investigate the impact of the COVID-19 pandemic and related governmental actions, such as the partial lockdown and social distancing, on the public transportation users' behavior in Amman- Jordan. Therefore, the various variables such as the mode of transportation, the frequency of usage of public transportation, and health variables were assessed using a structured questionnaire. The results of this timely study would be of importance to the authorities to improve public transportation regulations and planning guidelines in Amman, besides understanding users' preferences. In Sect. 2, we present the methods, statistical tools, and data used to explore and analyze public transportation preferences. Subsequently, the results are discussed in Sect. 3. Finally, we present our conclusions and recommendations in Sect. 4.

1.1 The Spread of Transportation Modes in Jordan Before the Pandemic

Jordan's transport systems have spread rapidly and in a heterogeneous manner, mostly favoring private transport. This is due to the fact that public transport has only in recent years been more widespread in the implementation of these services, starting from a condition of almost absence throughout the territory and reduced definition of the routes. The only public transport system consists of collective taxis (known as service taxis) and minibusses, both white in color. There are no timetables, and the buses only leave when they are full.

In general, collective taxis run on fixed routes, which are often not indicated on any 'official' chart at the stops, let alone online. Collective taxis travel only within cities, while minibusses also run short (Amman-Salt, Amman-Madaba, Amman-Irbid, etc.) and long (e.g., Amman-Aqaba) routes outside cities. The cost of collective taxis and minibusses is very low, ranging from about 0.35JD to 4JD. As of 2018, it seems that the public transport situation has improved before the spread of the pandemic. In the city of Amman, a new public bus service called Amman Bus has been introduced, covering the entire area of the capital, right up to the outlying areas. The new buses are larger and more modern than minibusses, and above all have fixed timetables and routes that can be easily consulted on a specific app. The cost of Amman Bus is slightly higher than that of minibusses, but still low. The coaches of the Jett Bus company cover most of the tourist routes in the country. Uber and Careem (Middle Eastern version of Uber) services are available throughout the country, but are much more frequent in Amman.

Finally, yellow taxis (in Amman) and green taxis (in Aqaba) are common. These are private taxis that operate in a similar fashion to taxis in Italy. They take passengers to any destinations, but are obviously much more expensive than collective taxis. The city of Amman has one of the highest rates of car ownership in Jordan (100 cars per 1,000 inhabitants), and the public transport sector has often been little used by the population. However, cuts in government subsidies on fuel prices, failure of the urban infrastructure to match growing demand, pollution, and congestion problems have revealed the need for a change in the city's management. Since 2006, the city has set up a transport planning department whose competencies cover all modes of transport, from private cars to public transport and pedestrians. In addition, a master plan called TMMP was drawn up with a time horizon of 2025, aiming at the deployment of BRT (Bus Rapid Transit) and LRT (Light Rail Transit) with a view to sustainable and resilient mobility. Unfortunately, the pandemic has reduced mobility and led people towards different mobility choices, as explained in the following paragraphs.

2 Methodology

This research aims to investigate the impact of COVID-19 on public transportation users' perceptions and preferences. Various variables representing socio-demographic, frequency of using transportation modes, and perception of transportation users and health variables were collected through a survey.

2.1 Design and Data Collection Procedure

This study used a cross-sectional correlational design, in which a standardized survey [36] was adopted to explore participants' responses toward forms of slow mobility (e.g., Scooters), public transportation (e.g., Taxis), and shared mobility (e.g., Buses) before and during the COVID-19 pandemic.

The survey was circulated online through the random selection of road users using the Google survey platform, bearing in mind that we uploaded a cover page with the survey. We explained the purpose of the study and added the researchers' details for any further questions. Also, we marked it as a required field, so each participant is required to read and sign it before he/she can start answering the survey. We also asked the participants not to write any identifying information to maintain the anonymity of the survey. We also made sure that every participant can submit only one survey, and the system denied more than one trial from the same participants.

2.2 Measurements

This study used a survey which has three sections: sociodemographic data questionnaire (gender, age, city of residence, educational levels, employment, working/education conditions, Average commuting distance), users' behaviors (walking habits and public transportation habits before and after the pandemic, respectively), and perceptions of onboard public transportation users to investigate the health and psychology response during traveling (anxiety, stress, health concerns). Tables 1, 2, and 3 show the questionnaire variables and description of each variables.

Table 1. Variables collected in the survey reflecting the socio-demographic during the COVID-19 pandemic.

Section 1: Sociodemographic variables		
Variable	Description	Value
Gender	Please specify your gender	Male: Female
Age group	Please specify your age group	18–25,26–40,41–55,56–70, 0ver 70
City of Residence	Are you a residence of Amman during Pandemic?	Yes: No
Education	Please specify your education	Primary School, Higher secondary, Bachelor, Master, Ph.D., Other
Employment	Please specify your employment status	Employee, Self Employed, Part-time employee, Unemployed, Student
Working/Education Condition	If you are an employee or a student, how do you work during a pandemic?	remote/online study, at office/school/shop
Average commuting distance	What is your average commuting distance in urban?	Less than 2 km,2–5 km,5–10 km, More than 10 km

2.3 Sample Size

In this research, 510 participants who lived in Amman-Jordan between March/2020 and October/2020 were recruited. The sample size was calculated based on a population of 4,500,000 [47], and to ensure reliable results. The sample size was considered appropriate for a margin of error equals 4.34%, at a significance level of a = 5% [48].

2.4 Statistical Analysis

The data were coded and entered using the Statistical Package for Social Sciences (IMB SPSS) version 21 For statistical analysis. Thereafter, the data were checked for any outliers and deviant cases to assure the data homogeneity. In addition, the Spearman correlation coefficient was applied to assess the direction and the magnitude of the relationship between the study-related variables. A p-value of < 0.5 was considered significant.

Table 2. Variables collected in the survey reflecting pre/post-pandemic travel behavior during the COVID-19 pandemic.

Section 2 Pre/ Post Pandemic traveling behavior		
Variable	Description	Value
Travel pattern and Frequency	How do you prefer to travel to work/leisure before the COVID19 pandemic? How do you prefer to travel to work/leisure during the COVID19 pandemic?	1: Public transport 2: Micromobility (bicycle, scooter) 3: Walking 4: Private car
Walking	Frequency of walking per week before COVID-19 spread? (work/leisure) Frequency of walking per week during COVID-19 spread? (work/leisure)	1: Whole week (seven days) 2: 6 days 3: 5 days 4: Less than 5 days
Private car	Frequency of using private car per week before COVID-19 spread? (work/leisure) Frequency of using private car per week during COVID-19 spread? (work/leisure)	1: Whole week (seven days) 2: 6 days 3: 5 days 4: Less than 5 days
public transport	Frequency using public transport per week before COVID-19 spread? (work/leisure) Frequency using public transport during COVID-19 spread? (work/leisure)	1: Whole week (seven days) 2: 6 days 3: 5 days 4: Less than 5 days
Motivation	What is the main motivation while choosing the travel mode before the pandemic? What is the main motivation while choosing the travel mode during the pandemic?	1: Social distancing 2: Affordability 3: Travel time 4: Environmental concerns

Table 3. Variables collected in the survey reflecting public transportation users perception during the COVID-19 pandemic

Section 3 User Perception		
Variable	Description	Value
Public transportation infrastructure level (conditions inside of the busses and stops)	On a scale from 1 to 5, where 1 corresponds to the best possible score and 5 to the worst, how do you evaluate the level of public transportation infrastructure in your city?	1 2 3 4 5
Health-related safety perception	What is your health-related safety perception on the availability of a healthy environment when using public transport during the COVID-19 pandemic?	1: Not safe 2: Slightly unsafe 3: Moderately safe 4: Safe 5: Very safe
Stress/anxiety	Do you feel stressed/anxious while using public transport during the COVID-19 pandemic?	1: Totally disagree 2: Disagree 3: Neutral 4: Agree 5: Totally agree
Public transportation use	If the PT infrastructure level increases in your city, do you consider using PT more during and after the pandemic?	1: Totally disagree 2: Disagree 3: Neutral 4: Agree 5: Totally agree
Walking infrastructure level	On a scale from 1 to 5, where 1 corresponds to the best possible score and 5 to the worst, how do you evaluate your city's level of walking infrastructure?	1 2 3 4 5
Walking	If the walking infrastructure level increases in your city, do you consider walking for a short distance more during and after pandemics?	1: Totally disagree 2: Disagree 3: Neutral 4: Agree 5: Totally agree
Remote working	Do you think that remote working/studying should remain after the pandemic?	1: Totally disagree 2: Disagree 3: Neutral 4: Agree 5: Totally agree

3 Results

In this research, a sample of 510 participants was recruited from the residents of Amman-Jordan during the first pandemic phase. The sample consisted of 348 (68.2%) males and 162 (31.8%) females. Data were collected using a survey circulated through Google forms and anonymous voluntary participation. The participants' age ranges from 18 t0 70, with noticeable participation from the age groups between 18–25 and 26–40, reaching up to 64% and 27%, respectively (Table 4). Furthermore, the high participation of the age group between 18–25 could be due to the age structure of Jordanian society, where 53% is under the age of 24 years [49]. Furthermore, 82% of the participants had a higher secondary certificate, and 81% worked remotely during the first wave of the COVID-19 outbreak. Additionally, 36% of the participants reported that they traveled more than 10 km/ day, while 24% traveled up to 2km/day. The results have indicated a noticeable reduction in public transportation usage during the COVID-19 pandemic. Table 5 indicates that users' preferences have changed during the first wave, where only 11% preferred public transportation for traveling mode during the pandemic compared to 20% before the pandemic. In contrast, a slight increase between 2% and 3% was noticed in relation to the usage of other modes of transportation such as cars, taxis, as well as walking.

The frequency of using public transportation declined noticeably; only 4% of the study participants used public transportation on a daily basis (7 days/week) compared to 16% before the pandemic. However, an increase from 60% to 78% in public transportation usage occurred for users who travel less than 5 days/ week.

Table 4. Frequency and percentage (%) of socio-demographic variables

Variable	Frequency (%)	Variable	Frequency (%)
Age (year)		Work conditions	
18–25, n (%)	324 (63.5%)	Virtual, *n* (%)	412 (80.8%)
26–40, *n* (%)	137(26.9%)	office, *n* (%)	98 (19.2%)
41–55, n (%)	42 (8.2%)	Education level	
56–70, n (%)	6 (1.4%)	Primary School	24 (4.7%)
Gender		Higher secondary	422 (82.7%)
Male, *n* (%)	348 (68.2%)	Bachelor	38 (7.5%)
Female, *n* (%)	162 (31.8%)	Master	9 (1.8%)
Employment status		Doctorate	14 (2.7%)
Freelance, *n* (%)	48 (9.4%)	Other	3 (0.6)
Student, *n* (%)	241 (47.3%)	Moving around	
Unemployed, *n* (%)	67 (13.1%)	<2 km, *n* (%)	123 (24.1%)
Fulltime work, *n* (%)	127 (24.9%)	2–5 km, *n* (%)	90 (17.6%)
Part time work, *n* (%)	27 (5.3%)	6–10 km, *n* (%)	115 (22.5%)
		>10 km, *n* (%)	182 (35.7%)

Similarly, for pre and post-pandemic travel behavior, the results shown in Table 5 were obtained.

Table 5. Frequency and percentage (%) of pre/post-pandemic travel behavior variables.

The means of transportation	Pre	Post
A cab, n (%)	53 (10.4%)	61(12.0%)
Private vehicle, n (%)	326 (63.9%)	345 (67.6%)
By foot, n (%)	26 (5.1%)	39 (7.6%)
Public transportation, n (%)	102 (20.0%)	56 (11.0%)
Others, n (%)	3 (0.6%)	9 (1.8%)
Number of walking days (before the pandemic)		
<5 day, n (%)	223 (43.7%)	308 (60.4%)
5 days, n (%)	99 (19.4%)	86 (16.9%)
6 days, n (%)	69 (13.5%)	65 (12.7%)
7 days, n (%)	119 (23.3%)	51 (10.0%)
Number of days using the private car (before the pandemic)		
<5 day, n (%)	164 (32.2%)	262 (51.4%)
5 days, n (%)	83 (16.3%)	84 (16.5%)
6 days, n (%)	64 (12.5%)	65 (12.7%)
7 days, n (%)	199 (39.0%)	99 (19.4%)
Number of days using public transportation (before the pandemic)		
<5 day, n (%)	306 (60.0%)	395 (77.5%)
5 days, n (%)	82 (16.1%)	49(9.6%)
6 days, n (%)	44 (8.6%)	46 (9.0%)
7 days, n (%)	78 (15.3%)	20 (3.9%)
Reasons for choosing the means of traveling (before the pandemic)		
Duration of traveling, n (%)	218 (42.7%)	115 (22.5%)
Social distancing, n (%)	59 (11.6%)	247 (48.4%)
Financial issues, n (%)	192 (37.6%)	112 (22.0%)
Environmental factors, n (%)	41 (8.0%)	36 (7.1%)

On the other hand, the results indicated that social distancing was the most important criterion to choose traveling mode during the pandemic, where almost 50% chose their travel mode based on social distancing adherence issues. However, in terms of trip duration as well as trip cost, 22% considered each criterion before traveling. Furthermore,

before the pandemic, trip duration and trip cost were the most important criteria to select the traveling mode, where 43% and 37% of the participants considered these criteria respectively, while only 11% considered social distancing before choosing travel means. A potential explanation for that is the serious consequences of COVID-19 on health. In addition, participants using their cars less than 5 days/week increased from 32% to 52% after the pandemic, with a slight increase in other categories (5 days/week and 6 days/week). However, the percentage of participants using cars every day (7days/ week) reduced from 39% to 19%. This could be related to the governmental restriction on traveling during the weekends. On the other hand, a noticeable increase in participants walking habits to and from their work/ shopping locations for less than 5 days/ week, reaching up to 61% after the pandemic, compared to 43% before the pandemic. A possible explanation could be related to the restrictions that were put on transportations modes. Furthermore, the results in Table 6 indicate that 60% of users agree and totally agree that they felt anxious during their trips in public transportation. However, 60% and 80% of participants reported that they would agree and totally agree to use public transportation and walking as a travel mode if the infrastructure was improved, respectively.

This could be related to the nature of the spread of the COVID-19 virus. Keep in mind that 50% and 40% of the participants agreed (i.e., the selected value of 5), using a Likert scale from 1 to 5, that neither public transportation nor walking infrastructure statuses are appropriate, respectively. However, approximately 60% of the participants reported that public transportation lacked health conditions and selected 4 and 5 on a Likert scale (Table 7).

Table 6. Frequency and percentage (%) of public transportation user's perception during the COVID-19 pandemic.

	Totally disagree	Disagree	Neutral	Agree	Totally agree
Feeling anxious	37 (7.3%)	23 (4.5%)	136 (26.7%)	146 (28.6%)	168 (32.9%)
Using Public transportation (if infrastructure is improved)	38 (7.5%)	28 (5.5%)	129 (25.3%)	205 (40.2%)	110 (21.6%)
Walking (if infrastructure is improved)	22 (4.3%)	10 (2%)	78 (15.3%)	224 (43.9%)	176 (34.5%)

Finally, the correlation matrix (Table 8) indicated a significant relationship between PT using during the pandemic and anxiety, which agrees with the results of similar studies [50]. Moreover, the results indicated that the frequency of using PT or walking is significantly correlated to education levels only before the pandemic. These results might be attributed to the implementation of lockdown measures such as shifting the academic sector to online education. In addition, the results did not show any significant role for gender in determining the frequency of using travel mode neither before nor after the pandemic.

Table 7. Frequency and percentage (%) of public transportation user's perception during COVID-19 pandemic on Likert scale 1 to 5, where 1 corresponds to the best possible score and 5 to the worst.

	1	2	3	4	5
Public transportation Infrastructure level (Status) of appropriateness	22 (4.3%)	35 (6.9%)	88 (17.3%)	113 (22.2%)	252 (49.4%)
Walking Infrastructure level (Status) of appropriateness	29 (5.7%)	63 (12.4%)	99 (19.4%)	117 (22.9%)	202 (39.6%)
Health-related safety perception on using public transport during COVID-19 pandemic?	29 (5.7%)	46 (9%)	121 (23.7%)	116 (22.7%)	198 (38.8%)

Table 8. Correlation matrix between study-related variables

	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	-0.074	1									
3	**-.123****	**.177****	1								
4	**.097***	0.041	**.866****	1							
5	0.009	**-.091***	-0.045	-0.011	1						
6	-0.003	0.051	-0.085	**-.094***	0.014	1					
7	0.074	0.017	-0.047	-0.02	**.362****	**.768****	1				
8	-0.027	-0.067	0.013	-0.01	**.088***	**-.160****	0.026	1			
9	-0.059	**-.089***	0.021	0.02	-0.045	**-.145****	**-.123****	**.334****	1		
10	-0.042	-0.07	-0.02	-0.014	0.008	-0.001	-0.006	**.243****	**.110***	1	
11	0.044	-0.065	0.039	0.035	-0.064	-0.073	-0.073	-0.036	-0.019	**-.144****	1

1- Gender
2- Education Level
3- Age group
4- Employment status
5- Frequency of walking per week before COVID-19 spread? (work/leisure)
6- Frequency of walking per week during COVID-19 spread? (work/leisure)
7- Frequency of using private car per week before COVID-19 spread? (work/leisure)
8- Frequency of using private car per week duringCOVID-19 spread? (work/leisure)
9- Frequency using public transport per week before COVID-19 spread? (work/leisure)
10- Frequency using public transport per week during COVID-19 spread? (work/leisure)
11- Anxiety

4 Conclusion

During the COVID-19 pandemic, the transportation sector was affected dramatically, while people's mobility was reduced and challenged by the various implemented regulations. It is evident that people's use of public transport mode (i.e., busses) was reduced after the pandemic, while other traveling methods such as using private cars, taxis, or on foot have increased. Shared public transportation was the only travel mode which has a reduction of 50% in usage, while the usage of all other transportation modes was increased during the pandemic. This agrees with the user's main criterion for choosing traveling mode, which showed that considering social distancing increased from 11% before the pandemic to 50% after the pandemic.

Moreover, the results indicated a significant correlation between using PT and anxiety during the pandemic, which is mainly related to the increased risk of being infected in PT due to limited space. Furthermore, private cars are the most preferred method to travel in Amman, mostly due to the lack of proper walking and public transportation infrastructure, according to participants' perceptions. However, the percentage of travelers who travel to and from work/shopping centers on foot less than 5 days/week increased during the pandemic. This indicates the importance of improving the walking infrastructure, which would reduce the disease spread, and reduce the need to implement social distancing measures in public transportation.

Finally, people in Jordan were not sure that public transportation was safe; hence, actions are needed to regain people's confidence in public transportation safety. Current health and social distancing measures are not enough. The increasing importance of social distancing, health, and safety concerns in public transportation confirms the need for new designs and plans to reconstruct the transportation sector. Furthermore, this research uses a cross-sectional design, which precludes the cause and effect relationship. Hence, the generalizability of the results should be taken with caution. Although we believe our study yielded very important empirical data that can be used to implement future PT plans in Amman. The present work lays the foundations for further research steps: in particular, it will be possible to analyze the correlation between the parameters acquired by means of a bivariate assessment, and a second investigation step will cover the current period and provide a comparison of the data from the beginning to the end of the pandemic period.

Conflicts of Interest:. The authors declare no conflict of interest.

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