Article

Impact of the COVID-19 Pandemic on Travel Behavior and Travel Mode Preferences: The Example of Bosnia and Herzegovina

Amra Čaušević *

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Impact of the COVID-19 Pandemic on Travel Behavior and Travel Mode Preferences: The Example of Bosnia and Herzegovina

Amra Čaušević[1]*

[1] University of Sarajevo, Faculty of Science, Department of Geography; amric.causevic@yahoo.com; amra.causevic@pmf.unsa.ba
* Correspondence: amric.causevic@yahoo.com; Tel.: +387-33-723709

Abstract: Building on the study by Abdullah et al. (2020), this study aims to analyze the perception of travel, especially in this context of the pandemic, when the measures are alleviated, as well as the citizens' intention and preferences for travel methods during the COVID-19 pandemic. The purpose of the study is to investigate the impact of the COVID-19 pandemic on travel behavior and travel mode preferences in the example of the residents of Bosnia and Herzegovina. Five research questions were defined. A quantitative research approach was applied in this study. The data was collected through a questionnaire (online survey) distributed to respondents via e-mail and the social network Facebook. The convenience sample included 265 respondents. Descriptive analysis, as well as quantitative comparative analysis, were carried out on the collected data. The results show that the COVID-19 pandemic has influenced a change in travel behavior. The primary purpose of travel before and during the COVID-19 pandemic was social activities. The most significant change in the primary purpose of travel before and during the COVID-19 pandemic is reflected in a decrease in social activities and an increase in recreational sports activities. In contrast, other activities remained proportionally the same before and during the COVID-19 pandemic. The average distance traveled for primary outdoor trips before the COVID-19 pandemic is greater than that for primary outdoor trips during the COVID-19 pandemic. This article allows for better organization and planning for the future in the event of another pandemic.

Keywords: COVID-19; tourist behavior; travel mode preferences; Bosnia and Herzegovina

1. Introduction

The Previous studies have pointed out that human mobility and interaction directly contribute to the spread of infectious diseases, especially during pandemics (Funk et al., 2010; Belik et al., 2011; Rizzo et al., 2014; Yan et al., 2018; Peixoto et al., 2020; Abdullah et al., 2020). Thus, travel is generally limited during a pandemic (Cooley et al., 2011; Peak et al., 2018). To control the spread of the virus, various controls and preventive measures have been recommended or imposed by the governments of different countries depending on socio-economic conditions, local governance, and cultural context. Such strategies included closing schools, remote or online classes, closing shops and restaurants, working from home, restrictions on public gatherings, social events, and meetings, locking down countries or cities, closing international borders and airports, imposing curfews, imposing social norms distancing, suspension of public transportation and taxi operations, as well as travel restrictions (Abdullah et al., 2020).

In the period before the pandemic, tourism represented the fastest-growing economic branch in the world. The world economy and the tourism sector face a series of restrictions and challenges in the general business environment due to the global health crisis. The COVID-19 pandemic has caused a global crisis, which has affected the economy and society, especially the service industry, which includes tourism. Declaring the outbreak of the COVID-19 pandemic at the beginning of 2020 left its mark on the economy of countries all over the world. The pandemic has slowed down the growth of world tourism. The COVID-19 pandemic at the beginning of 2020 shocked the global community and

surprised the scientific and professional public, but answers in tourism and related studies were found very quickly (Vojnović, 2021). Studies published early in the pandemic explained that working from home, reducing consumption, limiting community contacts, and limiting international travel were effective mitigation policies (Abdullah et al., 2020; Jones et al., 2021). However, these policies can affect not only people's travel behavior but also their health and well-being (De Vos, 2020).

Tourism is an activity that is sensitive to health and safety changes (Cavlek, 2002; Blake & Sinclair, 2003; Mao C.K. et al., 2010). The presence of risk affects travel plans and travel behavior (Cartwright, 2000). A fear has developed among tourists due to the long incubation period and the ease of disease transmission among people (Hong et al., 2020). Fear of contagion and perceived risk also significantly influence travel behavior, especially in transit, and the impact is different based on the infected area and people's demographic characteristics (Cahyanto et al., 2016; Kim et al., 2017). During the pandemic, people perceive a higher risk for all types of travel and avoid traveling to places where they perceive medium to high risk (Hotle et al., 2020). However, people have different travel needs during the pandemic, and such trips vary from daily grocery shopping trips to work travel. The characteristics of such trips can differ for different categories of employment. Also, different countries impose different levels of travel restrictions, and such policies can affect the general public's travel behavior. In addition, people's understanding, perception, and attitudes may also influence travel decisions and travel mode choices during a pandemic (Abdullah et al., 2020).

Understanding and predicting travel behavior is critical for transportation planning, decision-making, and policy-making during a pandemic based on people's travel needs. Because the COVID-19 pandemic is a global health crisis compared to previous pandemics, findings from previous research studies may not be directly applicable. Therefore, this study aims to investigate the effects of the COVID-19 pandemic on people's travel behavior. Characteristics of changes in travel behavior before and during COVID-19 and the factors influencing such changes are examined. This study focuses specifically on trips made out of necessity and people who feel compelled to make these trips for various reasons, hereafter referred to as primary travel. This research builds on the study "Exploring the impacts of COVID-19 on travel behavior and mode preferences," published at the beginning of the pandemic in 2020. This research was conducted when measures were being alleviated both in the world and in Bosnia and Herzegovina so that the data could be compared with that at the beginning of the pandemic. Data were collected through a questionnaire distributed via e-mail and the social network platform Facebook.

2. Literature Review

The tourism industry is evaluated in terms of its ability to attract tourists and as a platform for economic growth and sustainable development. The period since the beginning of the COVID-19 pandemic has affected all human activities, but none has been affected in the same way as tourism. Tourism is undoubtedly one of the sectors that have suffered the most dramatic impact, caused mainly by the lack of human mobility, albeit necessary for protection against COVID-19 (Cretu et al., 2021). The tourism context at the beginning of the pandemic was very delicate, but tourism has always shown remarkable adaptability and resilience in times of crisis. With alleviating measures in mid-2022, tourism began to recover very quickly, as demonstrated by previous studies that analyzed the impact of crises on tourism (Jones & Salathe, 2009; Leggat et al., 2010; Sharangpani et al., 2011; Fenichel et al., 2013; Cahyanto et al., 2016; Kim et al., 2017; Gössling et al., 2021).

The same tourist destination is perceived differently in conditions of an economic crisis (Sigala, 2020) or a health crisis (Mestanza-Ramón & Jiménez-Caballero, 2021), and it is an entirely different perception in the case of a terrorist crisis (Ali et al., 2018). Some studies examined travelers' risk perception during health crises (Pine & McKercher, 2004; Leggat et al., 2010; Cahyanto et al., 2016) (SARS, H1N1, Ebola) before this crisis. However, it is not yet known how COVID-19 (Schneider et al., 2021), a pandemic that defeats all previous tourism crises, influenced the perception of risk of travelers as well as the behavior of travelers during a certain period of time (Chua et al., 2020; Neuburger & Egger, 2021).

The emergence of the COVID-19 pandemic has affected tourists' perceptions of travel (Lopes et al., 2021) and will change the way people travel for another long period of time, especially in the intensity, pace, and spontaneity of travel (Neuburger & Egger, 2021). Previous studies have highlighted that travel behavior during a pandemic could be significantly different from normal everyday life. Many factors (demographic as well as attitudinal) can influence such changes in behavior and travel patterns (Abdullah et al., 2020).

During pandemics, different countries have adopted varying degrees of restrictions to prevent and control the spread of the virus. Such restrictions could greatly affect people's lifestyles, social interactions, and economic conditions. In particular, people's travel and outdoor activities can be significantly affected (de Haas et al., 2020; Mogaji, 2020). On the other hand, fear of infection and perceived risk can also influence travel behavior and the choice of travel mode. A review of previous studies showed that air travel could accelerate and amplify the spread of respiratory viruses, e.g., influenza, SARS, MERS, and coronavirus (Browne et al., 2016). Epstein et al. (2007) explained in their study that international travel restrictions alone could not control disease outbreaks but could delay the spread or flatten the curve. Kraemer et al. (2020) also indicated that travel restrictions are less effective when the epidemic is widespread. Additionally, mobility restrictions may not be effective when considering the overall size of the outbreak (Espinoza et al., 2020). Previous studies have shown that people tend to delay or cancel international travel or flights to avoid infection during a pandemic. Such self-protective behaviors depend mainly on demographic characteristics (mainly race and age) and perceived risk of infection (Sharangpani et al., 2011; Fenichel et al., 2013). Accordingly, several studies have reported that older travelers were willing to postpone their travel compared to younger travelers (18–35 years) during the H1N1 outbreak (Leggat et al., 2010; Sharangpani et al., 2011).

Research has also shown that people avoid domestic overland travel due to the perceived risk of contracting viruses. Jones and Salathe (2009), who conducted research at the beginning of the swine flu outbreak, concluded that older people are more associated with avoiding large gatherings and public transport. Goodwin et al. (2011) concluded that 22% of respondents, citizens of Portugal or England, intended to use public transportation less, and 20% planned to postpone or cancel flights. Cahyanto et al. (2016) conducted a study to analyze the factors influencing the avoidance of domestic travel by United States citizens due to confirmed cases of the Ebola virus. They concluded that perceived risk, vulnerability, subjective knowledge, and self-efficacy influence significant avoidance of domestic travel. Demographic characteristics, such as gender and age, also significantly impact travel avoidance.

Perceived risk is also a key consideration when choosing a tourist destination (Perpina et al., 2020). Therefore, the perception of risk and the feeling of safety during travel significantly influence the avoidance of destinations rather than the probability of traveling there (Sonmez & Graefe, 1998). Sadique et al. (2007) investigated SARS and influenza risk perception in Asian and European countries. The results showed that most respondents, as high as 75%, will avoid public transport. Kim et al. (2017) examined differences in travel behavior in a study in Seoul, South Korea, before and after the MERS outbreak. The findings of this study showed that travel behavior is significantly influenced by fear and that the frequency of travel was significantly reduced in Seoul in 2015 after the MERS outbreak. The results also show that the number of people over 65 years of age is a variable that significantly affects the reduction in travel frequency during MERS. In a survey conducted at the beginning of the COVID-19 pandemic in Hong Kong, 40% of respondents answered that they avoid public transportation (Kwok et al., 2020). Another study conducted in Budapest, Hungary, also found that the demand for public transportation decreased by about 80%, while the use of cars increased from 43% to 65% (Bucsky, 2020). Yıldırım et al. (2020) concluded in a study conducted in Turkey that one of the most accepted preventive behaviors during COVID-19 is avoiding public transport. In his study, De Vos (2020) concluded that because of COVID-19, people would reduce their travel and prefer to use a car rather than public transportation. Globally, a major drop in mobility has been observed due to the fear of COVID-19 and government orders to mitigate the spread. In cities that were hit hardest, mobility is reduced by up to 90% (Muhammad et al., 2020). In the US, population mobility was reduced by 7.87% due to official stay-at-home orders. An increase in the local infection

rate from 0% to 0.0003% reduced mobility by 2.31% (Abdullah et al., 2020). Research by Molloy et al. (2020) conducted in Switzerland showed that the number of trips per weekday and the average kilometers traveled decreased by about 60% during the second week of March 2020. This study further mentions that men continued to travel more compared to women.

Like any other pandemic, COVID-19 has caused significant changes in all countries, continents, regions, urban and rural communities, families, and individuals' thinking and lifestyle (Butu et al., 2020). All these previous studies emphasize that travel behavior during a pandemic may be significantly different compared to normal everyday life. Many demographic and attitudinal factors can influence such changes in behavior and travel patterns. Gathering insights from these studies, an online data collection questionnaire was designed and distributed to explore critical differences in travel before and during the COVID-19 pandemic. The study and the questionnaire are mostly based on and build on the research "Exploring the impacts of COVID-19 on travel behavior and mode preferences," published in 2020. The study examined the changes that have occurred in travel behavior due to the COVID-19 pandemic. Data were collected through an online questionnaire that included questions about the purpose of travel, choice of travel mode, distance traveled, and frequency of travel before and during COVID-19 (Abdullah et al., 2020). Building on the previous study, this study aims to analyze the perception of travel, especially in this context of the pandemic when the measures are relaxed, as well as citizens' intentions and preferences for travel methods during the COVID-19 pandemic.

3. Materials and Methods

A quantitative research approach was applied in this article. The data was collected through a questionnaire (online survey) distributed to respondents via e-mail and the social network Facebook. The questionnaire was taken from similar research, such as "Exploring the impacts of COVID-19 on travel behavior and mode preferences" by Abdullah, Dias, Muley & Shahin (2020), and adapted to this research. Data was collected through an online questionnaire that included questions about the purpose of travel, choice of travel mode, distance traveled, and frequency of travel before and during COVID-19. The questionnaire was created using Google Forms in the Bosnian language since the respondents are residents of Bosnia and Herzegovina. The research lasted a month and a half, during the period of alleviation of restrictions and measures adopted due to the COVID-19 pandemic in the world, but also in Bosnia and Herzegovina, from March 2nd to May 17th, 2022. The convenience sample included 265 respondents. Descriptive analysis, as well as quantitative comparative analysis, were carried out on the collected data. Nonparametric tests were mainly used in this study for inferential statistical analyses unless otherwise stated. Nonparametric tests can be used for ordinal and ranked data, require fewer assumptions, and are easier to understand and use (Abdullah, Dias, Muley & Shahin, 2020). Abdullah, Dias, Muley & Shahin (2020) suggested using a nonparametric test as an alternative to a parametric test whenever it is available unless there is experimental evidence of how the errors are distributed. This study looks at independent and paired observations of travel behavior before and during COVID-19. Therefore, adequate attention was paid when conducting statistical analyses.

The purpose of the article is to investigate the impact of the COVID-19 pandemic on travel behavior and travel mode preferences in the example of the residents of Bosnia and Herzegovina. The following research questions were defined:

-Has the COVID-19 pandemic influenced a change in behavior when traveling to work?

-What is the primary purpose of travel before and during the COVID-19 pandemic, and is there a change in the primary purpose of travel?

-What distance is traveled for primary outdoor trips before and during the COVID-19 pandemic? What is the number of primary outdoor weekly outdoor trips before and during the COVID-19 pandemic? What is the influence of socio-demographic factors on the distance traveled and the number of trips for the primary purpose before and during the COVID-19 pandemic? Is there a significant correlation between socio-demographic factors and the number of trips for the primary purpose before and during the COVID-19 pandemic?

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-What mode of transportation was used for primary outdoor trips before and during the COVID-19 pandemic, and is there a change in the mode?

-Has the mode of transportation changed for primary outdoor trips during the COVID-19 pandemic for people who own cars, and has the mode of transportation changed for primary outdoor trips during the COVID-19 pandemic for people who do not own a car?

4. Results

Table 1 shows changes in respondents' behavior when traveling to work due to COVID-19.

Table 1. Change in travel behavior due to COVID-19.

	Frequency	**Percent**
I never go to the office/college and work/study at home	7	2.6
I go to the office/college/workplace less often (less than 3 times a week)	53	20.0
Nothing has changed	136	51.3
I go to the office/college a few days a week, and the rest of the time, I work/study from home	60	22.6
I lost my job/I'm not studying anymore	4	1.5
I go to work by invitation only	5	1.9
Total	**265**	**100.0**

Source: Research results, 2022.

136 (51.3%) respondents state that nothing has changed, 60 (22.6%) state that they would go to the office/college several days a week and that the rest of the time, they work/study from home, 53 (20.0%) state that they go to the office/college/workplace less often, 7 (2.6%) state that they never go to the office/college and work/study at home, 5 (1.9%) state that they go to work by invitation, while 4 (1.5%) state that they are left unemployed or do not study anymore.

Table 2. Primary purposes of travel before and during the COVID-19 pandemic.

	BEFORE COVID-19		**DURING COVID-19**	
	Frequency	Percent	Frequency	Percent
Job	57	21.5	63	23.8
Studying	55	20.8	53	20.0
Shopping	10	3.8	11	4.2
Social activities	90	34.0	69	26.0
Recreational sports activities	14	5.3	26	9.8
Other	39	14.7	43	16.2
Total	**265**	**100.0**	**265**	**100.0**

Source: Research results, 2022.

Table 2 shows the primary purposes of travel before and during the COVID-19 pandemic, where it is evident that before the COVID-19 pandemic, the largest number of respondents, namely 90 (34.0%), stated social activities as the primary purpose of travel, 57 (21.5%) stated work, 55 (20.8%) studying, 39 (14.7%) other, 14 (5.3%) recreational sports activities, and 10 (3.8%) shopping. During the pandemic, it is evident that still, the largest number of respondents, namely 69 (26.0%), stated social activities as the primary purpose of travel, 63 (23.8%) stated work, 53 (20.0%) studying, 43 (16.2%) other, 26 (9.8%) recreational sports activities, and 11 (4.2%) shopping. The graph shows the results to see the changes before and during the pandemic more clearly.

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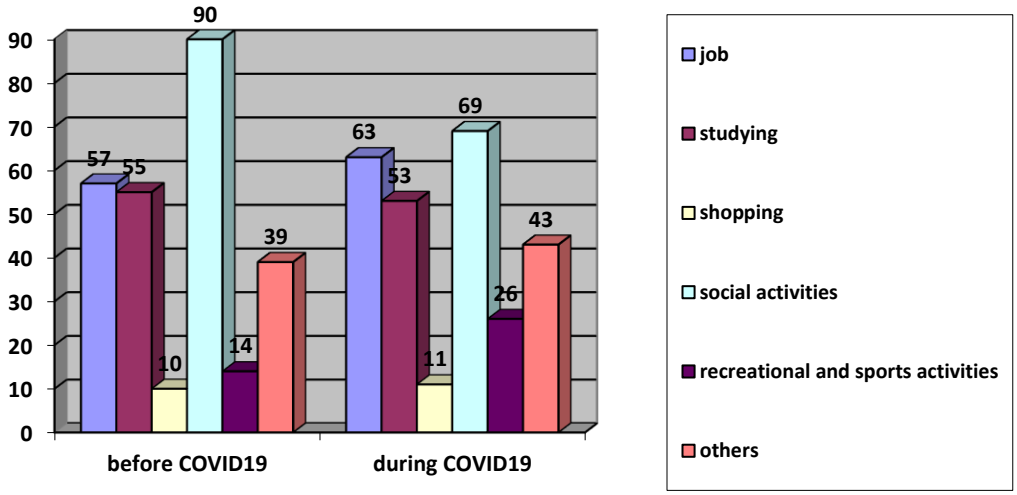

Figure 1. Primary purpose of travel before and during the COVID-19 pandemic.

The most significant change in the primary purpose of travel before and during the COVID-19 pandemic is reflected in a decrease in social activities (from 34.0% to 26.0%) and an increase in recreational sports activities (from 5.3% to 9.8%), while other activities remained proportionally the same before and during the COVID-19 pandemic.

Table 3. Primary purpose of travel before and during the COVID-19 pandemic, by gender Group statistics – Gender.

		Gender		Total
		male	female	
Primary purpose of travel before the COVID-19 pandemic	Job	30	27	57
	Studying	11	44	55
	Shopping	2	8	10
	Social activities	29	61	90
	Recreational sports activities	7	7	14
	Other	15	24	39
Total		**94**	**171**	**265**
Primary purpose of travel during the COVID-19 pandemic	Job	31	32	63
	Studying	6	47	53
	Shopping	2	9	11
	Social activities	27	42	69
	Recreational sports activities	11	15	26
	Other	17	26	43
Total		**94**	**171**	**265**

Source: Research results, 2022.

Table 3 shows that the primary purposes of travel before the COVID-19 pandemic for women were social activities and study, namely 61 (35.7%) and 44 (25.7%), respectively, while for men, these were work 30 (31.9%) and social activities 29 (30.9%). On the other hand, the primary purposes of travel during the COVID-19 pandemic for women were study 47 (27.5%) and social activities 42 (24.6%), and for men, these were work 31 (33.0%) and social activities 27 (28.7%). There was a noticeable decrease in the social activities of women before and during the COVID-19 pandemic (from 35.7% to 24.6%).

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Table 4. Primary purpose of travel before and during the COVID-19 pandemic by respondents' age.

		Group statistics - Age			Total
		18 - 30	**31 - 50**	**50 and older**	**Total**
Primary purpose of travel before the COVID-19 pandemic	Job	10	33	14	57
	Studying	55	0	0	55
	Shopping	3	3	4	10
	Social activities	54	26	10	90
	Recreational sports activities	6	6	2	14
	Other	17	16	6	39
Total		**145**	**84**	**36**	**265**
Primary purpose of travel during the COVID-19 pandemic	Job	12	39	12	63
	Studying	52	1	0	53
	Shopping	3	4	4	11
	Social activities	44	17	8	69
	Recreational sports activities	12	11	3	26
	Other	22	12	9	43
Total		**145**	**84**	**36**	**265**

Source: Research results, 2022.

Table 4 shows that the primary purposes of travel before the COVID-19 pandemic for respondents aged 18-30 were studying (37.9%) and social activities (37.2%); for respondents aged 31-50, these were work (39.3%) and social activities (30.9%), and for respondents, over the age of 50 these were work (38.9%) and social activities (27.8%). On the other hand, the primary purposes of travel during the COVID-19 pandemic for respondents aged 18-30 were study (35.9%) and social activities (30.3%); for respondents aged 31-50, it was work (46.4%), and for respondents aged over 50, these were work (33.3%), other (25.0%) and social activities (22.2%). There is a noticeable decrease in social activities among respondents aged 31-50 before and during the COVID-19 pandemic (from 30.9% to 20.2%).

Table 5. Primary purpose of travel before and during the COVID-19 pandemic by car ownership.

Group statistics – car ownership				
		Do you own a car?		**Total**
		YES	**NO**	
Primary purpose of travel before the COVID-19 pandemic	Job	51	6	57
	Studying	32	23	55
	Shopping	6	4	10
	Social activities	58	32	90
	Recreational sports activities	12	2	14
	Other	28	11	39
Total		**187**	**78**	**265**
	Job	55	8	63
	Studying	31	22	53

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Primary purpose of travel during the COVID-19 pandemic	Shopping	8	3	11
	Social activities	48	21	69
	Recreational sports activities	22	4	26
	Other	23	20	43
Total		**187**	**78**	**265**

Source: Research results, 2022.

Table 5 shows that the primary purposes of travel before the COVID-19 pandemic for respondents who have a car were social activities (31.0%) and work (27.3%), and for respondents who do not own a car, these were social activities (41.0%) and studying (29.5%). On the other hand, the primary purposes of travel during the COVID-19 pandemic for respondents who own a car were work (29.4%) and social activities (25.7%), and for respondents who do not own a car, these were study (28.2%), social activities (26.9%) and other (25.6%).

Table 6. Primary purpose of travel before and during the COVID-19 pandemic, by motorcycle ownership.

Group statistics – motorcycle ownership				
		Do you own a motorcycle?		
		YES	**NO**	**Total**
Primary purpose of travel before the COVID-19 pandemic	Job	5	52	57
	Studying	5	50	55
	Shopping	0	10	10
	Social activities	3	87	90
	Recreational sports activities	1	13	14
	Other	3	36	39
Total		**17**	**248**	**265**
Primary purpose of travel during the COVID-19 pandemic	Job	5	58	63
	Studying	4	49	53
	Shopping	0	11	11
	Social activities	4	65	69
	Recreational sports activities	1	25	26
	Other	3	40	43
Total		**17**	**248**	**265**

Source: Research results, 2022.

Table 6 shows that the primary purposes of travel before the COVID-19 pandemic for respondents who own a motorcycle were work (29.4%) and study (29.4%), and for respondents who do not own a motorcycle, it was primarily social activities (35.1%). On the other hand, the primary purposes of travel during the COVID-19 pandemic for respondents who own a motorcycle were work (29.4%), study (23.5%), and social activities (23.5%), and for respondents who do not own a motorcycle these were social activities (26.2%), work (23.4%) and studies (19.8%). A post hoc, McNemar test was applied to determine possible individual changes in the primary purpose of travel during the COVID-19 pandemic before and during COVID-19, which showed that comparing work and study, the primary purpose of travel did not statistically significantly ($p > 0.05$) change: out of 48 respondents who primarily went to work, only 1 (2.1%) started studying during COVID-19, while

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out of 42 respondents who primarily studied before COVID-19, only 1 (2.4%) started traveling primarily for work.

Table 7. Primary purpose of travel before and during the COVID-19 pandemic McNemar-test.

		Primary purpose of travel during the COVID-19 pandemic		Total	p
		Job	Studying		
Primary purpose of travel before the COVID-19 pandemic	Job	47	1	48	1.000
	Studying	1	41	42	
Total		**48**	**42**	**90**	

Source: Research results, 2022.

Also, when comparing work and social activities, the primary purpose of travel did not change statistically significantly ($p > 0.05$): out of 50 respondents who primarily went to work, only 3 (6.0%) during the COVID-19 period primarily started traveling for social activities, while out of 61 respondents who primarily traveled for social activities before COVID-19, 9 of them (14.7%) started primarily traveling for work.

Table 8. Primary purpose of travel before and during the COVID-19 pandemic McNemar-test.

		Primary purpose of travel during the COVID-19 pandemic		Total	p
		Job	Social activities		
Primary purpose of travel before the COVID-19 pandemic	Job	47	3	50	.146
	Social activities	9	52	61	
Total		**56**	**55**	**111**	

Source: Research results, 2022.

Comparing work and together shopping, recreation, sports, or other, the primary purpose of the trip did not change statistically significantly ($p > 0.05$): out of 53 respondents who primarily went to work, 6 of them (12.0%) started traveling primarily because of shopping, recreation, sports or other, while out of 53 respondents who before COVID-19 primarily traveled for shopping, recreation, sport or other, 5 of them (9.4%) started traveling primarily for work.

Table 9. Primary purpose of travel before and during the COVID-19 pandemic McNemar-test.

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		Primary purpose of travel during the COVID-19 pandemic		Total	p
		Job	Shopping, recreation, sports, other		
Primary purpose of travel before the COVID-19 pandemic	Job	47	6	53	1.000
	Shopping, recreation, sports, other	5	48	53	
Total		**52**	**54**	**106**	

Source: Research results, 2022.

Also, comparing studying and social activities, the primary purpose of the trip did not change statistically significantly ($p > 0.05$): out of 50 respondents who primarily traveled for study, 9 (18.0%) started traveling primarily for social activities during the COVID-19 period, while out of 57 respondents who primarily traveled for social activities before COVID-19, 7 of them (12.3%) started traveling primarily for studying.

Table 10. Primary purpose of travel before and during the COVID-19 pandemic McNemar-test.

		Primary purpose of travel during the COVID-19 pandemic		Total	p
		Studying	Social activities		
Primary purpose of travel before the COVID-19 pandemic	Studying	41	9	50	.804
	Social activities	7	48	57	
Total		**52**	**54**	**107**	

Source: Research results, 2022.

Comparing studying and shopping, recreation, sports, or other together, the primary purpose of travel did not change statistically significantly ($p > 0.05$): out of 45 respondents who primarily traveled for studying, 4 of them (8.9%) started traveling primarily because of shopping, recreation, sports or other, while out of 57 respondents who before COVID-19 primarily traveled for shopping, recreation, sports or other, 4 of them (7.7%) started traveling primarily for studying.

Table 11. Primary purpose of travel before and during the COVID-19 pandemic McNemar-test.

		Primary purpose of travel during the COVID-19 pandemic		Total	p
		Studying	Shopping, recreation, sports, other		
	Studying	41	4	45	1.000

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Primary purpose of travel before the COVID-19 pandemic	Shopping, recreation, sports, other	4	48	52	
Total		**45**	**52**	**97**	

Source: Research results, 2022.

On the other hand, comparing social activities and together shopping, recreation, sports, or other, there is a statistically significant change in the primary purpose of the travel ($p < 0.01$).

Table 12. Primary purpose of travel before and during the COVID-19 pandemic McNemar-test.

		Primary purpose of travel during the COVID-19 pandemic		**Total**	**p**
		Social activities	Shopping, recreation, sports, other		
Primary purpose of travel before the COVID-19 pandemic	Social activities	21	52	73	0.003
	Shopping, recreation, sports, other	47	5	52	
Total		**68**	**57**	**125**	

Source: Research results, 2022.

Of the 73 respondents who primarily traveled for social activities, as many as 52 (71.2%) primarily started traveling during COVID-19 for shopping, recreation, sports, or other reasons, while of the 52 respondents who primarily traveled before COVID-19 for shopping, recreation, sports or other 47 of them (90.3%) started traveling primarily for social activities.

Table 13. Testing for normality of distribution.

Tests of Normality						
	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
Distance traveled for primary outdoor trips before the COVID-19 pandemic	.160	265	.000	.879	265	.000
Distance traveled for primary outdoor trips during the COVID-19 pandemic	.161	265	.000	.901	265	.000

Source: Research results, 2022.

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Since the Kolmogorov-Smirnov test of normality of distribution for the variables Traveled distance for primary outdoor trips before and during the COVID-19 pandemic (at the significance level of 0.01) deviates from the normal distribution, the nonparametric Wilcoxon rank-test was used to test the difference of arithmetic means.

Table 14. Descriptive statistics and Wilcoxon signed-rank test.

	N	Mean	Std. Deviation
Distance traveled for primary outdoor trips before the COVID-19 pandemic	265	4.10	2.20
Distance traveled for primary outdoor trips during the COVID-19 pandemic	265	3.60	2.05
Total N	265		
Test Statistic	1457.000		
Standard Error	377.807		
Standardized Test Statistic	-5.912		
Asymptotic Sig.(2-sided test)	.000		

Source: Research results, 2022.

The average distance traveled for primary outdoor trips before the COVID-19 pandemic (M = 4.11, s = 2.20) is greater than that for primary outdoor trips during the COVID-19 pandemic (M = 3.61, s = 2.05). The Wilcoxon rank-test is 1457,000, showing that the obtained difference is statistically significant at the 0.01 level (z = -5.912, p < 0.01).

Table 15. Testing for normality of distribution.

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Number of primary outdoor trips per week before the COVID-19 pandemic	.369	265	.000	.739	265	.000
Number of primary outdoor trips per week during the COVID-19 pandemic	.303	265	.000	.845	265	.000

a. Lilliefors Significance Correction

Source: Research results, 2022.

Since the Kolmogorov-Smirnov distribution normality test for the variables which describe the number of primary outdoor trips per week before and during the COVID-19 pandemic (at the significance level of 0.01) deviate from the normal distribution, the nonparametric Wilcoxon rank-test was used to test the difference of arithmetic means.

Table 16. Descriptive statistics and Wilcoxon signed-rank test for the number of primary outdoor trips per week before and during COVID-19.

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	N	Mean	Std. Deviation
Number of primary outdoor trips per week before the COVID-19 pandemic	265	2.46	.896
Number of primary outdoor trips per week during the COVID-19 pandemic	265	2.23	.815
Total N	265		
Test Statistic	2016.500		
Standard Error	342.395		
Standardized Test Statistic	-4.191		
Asymptotic Sig.(2-sided test)	.000		

Source: Research results, 2022.

The average number of primary outdoor trips per week before the COVID-19 pandemic (M = 2.46, s = 0.896) is higher than the average number of primary outdoor trips per week during the COVID-19 pandemic (M = 2.23, s = 0.815). The Wilcoxon rank-test is 2016,500 and shows that the obtained difference is statistically significant at the 0.01 level (z = -4.191, p < 0.01).

Table 17. Descriptive statistics and the Mann-Whitney test: distance traveled, by gender.

Ranks				
	Gender	**N**	**Mean Rank**	**Sum of Ranks**
Distance traveled for primary outdoor trips before the COVID-19 pandemic	male	94	117.43	11038.50
	female	171	141.56	24206.50
	Total	265		
Distance traveled for primary outdoor trips during the COVID-19 pandemic	male	94	121.57	11428.00
	female	171	139.28	23817.00
	Total	265		

	Distance traveled for primary outdoor trips before the COVID-19 pandemic	Distance traveled for primary outdoor trips during the COVID-19 pandemic
Mann-Whitney U	6573.500	6963.000
Wilcoxon W	11038.500	11428.000
Z	-2.488	-1.821
Asymp. Sig. (2-tailed)	.013	.069
a. Grouping Variable: Gender		

Source: Research results, 2022.

The table shows descriptive statistics and the Mann-Whitney test for the variables related to the distance traveled for primary outdoor trips before and during the COVID-19 pandemic with respect to the sex of the respondents. Female respondents show a higher rank (M = 141.56) in the distance traveled for primary outdoor trips before the COVID-19 pandemic than male respondents (M = 117.43). The value of the Mann-Whitney test is 6573,500, which shows that the obtained difference is statistically significant at the 0.05 level (z = -2.488, p < 0.05). Although female respondents show a

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higher rank (M = 139.28) in the distance covered for primary outdoor trips during the COVID-19 pandemic compared to male respondents (M = 121.57), and the value of the Mann-Whitney test is 6963,000, the difference obtained is not statistically significant (z = -1.821, p > 0.05).

Table 18. Descriptive statistics and Mann-Whitney test: number of outdoor trips, by gender.

Ranks				
	Gender	**N**	**Mean Rank**	**Sum of Ranks**
Number of primary outdoor trips per week before the COVID-19 pandemic	male	94	138.73	13041.00
	female	171	129.85	22204.00
	Total	265		
Number of primary outdoor trips per week during the COVID-19 pandemic	male	94	135.62	12748.00
	female	171	131.56	22497.00
	Total	265		

	Number of primary outdoor trips per week before the COVID-19 pandemic	Number of primary outdoor trips per week during the COVID-19 pandemic
Mann-Whitney U	7498.000	7791.000
Wilcoxon W	22204.000	22497.000
Z	-1.049	-.453
Asymp. Sig. (2-tailed)	.294	.651
a. Grouping Variable: Gender		

Source: Research results, 2022.

The table shows descriptive statistics and the Mann-Whitney test for the variables "Number of primary outdoor trips per week before and during the COVID-19 pandemic" with regard to the sex of the respondents. Although male respondents show a higher rank (M = 138.73) in terms of the number of primary outdoor trips per week before the COVID-19 pandemic compared to female respondents (M = 129.85), and the value of the Mann-Whitney test is 7498.000, the obtained difference is not statistically significant (z = -1.049, p > 0.05). Also, male respondents show a higher rank (M = 135.62) in terms of the number of primary outdoor trips per week during the COVID-19 pandemic compared to female respondents (M = 131.56), and the value of the Mann-Whitney test is 7791.000, the obtained difference is not statistically significant (z = -0.453, p > 0.05).

Table 19. Primary purpose of travel before the COVID-19 pandemic, by level of education.

		Group statistics – Level of education						
		Primary school	High school	Some college or undergraduate	Graduate	Total	χ^2	p
Primary purpose of travel before	Job	0	21	21	15	57	56.219	.000
	Studying	0	11	41	3	55		
	Shopping	1	3	5	1	10		

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the COVID-19 pandemic	Social activities	0	37	43	10	90		
	Recreational sports activities	0	4	4	6	14		
	Other	0	14	18	7	39		
Total		1	90	132	42	265		

Source: Research results, 2022.

The primary purposes of travel before the COVID-19 pandemic for respondents with high school degrees, some university and undergraduate degrees were social activities, and for respondents with graduate education, it was work.

Table 20. Primary purpose of travel during the COVID-19 pandemic, by level of education.

		Group statistics – Level of education					χ^2	p
		Primary school	High school	Some college or undergraduate	Graduate	Total		
Primary purpose of travel during the COVID-19 pandemic	Job	0	22	26	15	63	54.142	.000
	Studying	0	9	41	3	53		
	Shopping	1	3	6	1	11		
	Social activities	0	29	31	9	69		
	Recreational sports activities	0	9	8	9	26		
	Other	0	18	20	5	43		
Total		1	90	132	42	265		

Source: Research results, 2022.

The primary purpose of travel during COVID-19 is the same as before COVID-19, i.e., for respondents with graduate education, it is work, and for respondents with high school degrees, some university and undergraduate degrees, it is social activities.

Table 21. Primary purpose of travel before the COVID-19 pandemic, by monthly household income (BAM).

		Group statistics – Monthly household income (BAM)					χ^2	p
		500 BAM and under	500 BAM – 1,500 BAM	1,500 BAM – 2,500 BAM	2,500 BAM and more	Total		
Primary purpose of travel before the COVID-19 pandemic	Job	1	15	17	24	57	41.991	.000
	Studying	10	22	17	6	55		
	Shopping	0	6	0	4	10		
	Social activities	2	29	37	22	90		
	Recreational sports activities	0	3	5	6	14		
	Other	3	16	11	9	39		
Total		16	91	87	71	265		

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Source: Research results, 2022.

The primary purpose of travel both before and during COVID-19 for respondents whose monthly income is less than 500 BAM is studying, while for respondents earning between 500 BAM and 2,500 BAM, it is work, study, and social activities equally.

Table 22. Primary purpose of travel during the COVID-19 pandemic, by monthly household income (BAM).

		Group statistics – Monthly household income (BAM)				Total	χ^2	p
		500 BAM and under	500 BAM – 1,500 BAM	1,500 BAM – 2,500 BAM	2,500 BAM and more			
Primary purpose of travel during the COVID-19 pandemic	Job	0	21	24	18	63	44.966	.000
	Studying	8	21	15	9	53		
	Shopping	0	7	0	4	11		
	Social activities	3	22	28	16	69		
	Recreational sports activities	0	3	7	16	26		
	Other	5	17	13	8	43		
Total		16	91	87	71	265		

Source: Research results, 2022.

Regarding primary purposes of travel both before and during COVID-19 for respondents with a monthly income of over 2,500 BAM, in addition to work and social activities, the importance of recreational activities increased during COVID-19 compared to the period before COVID-19 (from 8.5% to 22.5 %).

Table 23. Primary purpose of travel before the COVID-19 pandemic, by number of household members.

		Group statistics – Number of household members				χ^2	p
		1 - 2	3 - 4	5 and more	Total		
Primary purpose of travel before the COVID-19 pandemic	Job	17	38	2	57	41.118	.000
	Studying	4	38	13	55		
	Shopping	4	5	1	10		
	Social activities	38	48	4	90		
	Recreational sports activities	8	4	2	14		
	Other	13	25	1	39		
Total		84	158	23	265		

Source: Research results, 2022.

The primary purposes of travel before COVID-19 for respondents living in a household with 1-2 members are social activities, and during COVID-19, these are social activities, work, and other. The primary purposes of travel both before and during COVID-19 for respondents living in a household with 3-4 members are social activities, work, and study.

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Table 24. Primary purpose of travel during the COVID-19 pandemic, by number of household members.

		Group statistics – Number of household members				χ^2	p
		1 - 2	3 - 4	5 and more	Total		
Primary purpose of travel during the COVID-19 pandemic	Job	22	38	3	63	34.720	.000
	Studying	5	36	12	53		
	Shopping	3	8	0	11		
	Social activities	23	45	1	69		
	Recreational sports activities	11	12	3	26		
	Other	20	19	4	43		
Total		84	158	23	265		

Source: Research results, 2022.

The primary purpose of travel both before and during COVID-19 for respondents living in a household with 5 or more members is to study.

Table 25. Mode of transportation for primary outdoor trips before the COVID-19 pandemic, by car ownership.

		Group statistics – car ownership				
		YES	NO	Total	χ^2	p
Mode of transportation for primary outdoor trips before the COVID-19 pandemic	Nothing/I didn't travel	4	1	5	81.356	.000
	Public transportation	30	26	56		
	Private car	142	18	160		
	Company car	2	4	6		
	Taxi	1	2	3		
	Motorcycle	0	3	3		
	Bike	0	7	7		
	Walking	8	17	25		
Total		187	78	265		

Source: Research results, 2022.

The tables show that the largest percentage (77.0%) of respondents who own a car also use it as a means of transportation, with the fact that there is no difference in the use of a car in the period before and during COVID-19, while only 25.6% of respondents who do not own a car use it as a means of transportation, with the fact that there is no difference in the use of cars between the period before and during COVID-19. The χ^2-test shows a statistically significant difference in the mode of transportation for primary outdoor travel with regard to owning or not owning a car ($p < 0.01$), but there is no significant impact of COVID-19.

Table 26. Mode of transportation for primary outdoor trips during the COVID-19 pandemic, by car ownership.

	Group statistics – car ownership				
	DA	NE	Total	χ^2	p

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N Mode of transportation for primary outdoor trips during the COVID-19 pandemic	Nothing/I didn't travel	6	7	13	68.827	.000
	Public transportation	15	22	37		
	Private car	144	20	164		
	Company car	5	3	8		
	Taxi	2	1	3		
	Motorcycle	1	0	1		
	Bike	2	9	11		
	Walking	12	16	28		
Total		187	78	265		

Source: Research results, 2022.

On the other hand, it is noticeable that the use of public transportation by respondents who own a car dropped during COVID-19, from 16.0% to 8.0%, while no change was recorded among respondents who do not own a car in the mode of transportation for primary outdoor travel.

Table 27. Descriptive statistics and the Kruskal-Wallis test: distance traveled, by employment.

Ranks			
	Employment	N	Mean Rank
Distance traveled for primary outdoor trips before the COVID-19 pandemic	Student	102	141.98
	Employed	129	135.68
	Pensioner	17	74.35
	Other	17	117.44
	Total	265	
Distance traveled for primary outdoor trips during the COVID-19 pandemic	Student	102	138.65
	Employed	129	138.34
	Pensioner	17	73.38
	Other	17	118.18
	Total	265	

	Distance traveled for primary outdoor trips before the COVID-19 pandemic	Distance traveled for primary outdoor trips during the COVID-19 pandemic
Kruskal-Wallis H	12.576	12.396
df	3	3
Asymp. Sig.	.006	.006
a. Kruskal Wallis Test		
b. Grouping Variable: Employment		

Source: Research results, 2022.

The table shows descriptive statistics and the Kruskal-Wallis test for the variables "Distance traveled for primary outdoor trips before and during the COVID-19 pandemic" with respect to employment. The highest rank (M = 141.98) of distance traveled for primary outdoor trips before the COVID-19 pandemic is shown among students, while the lowest rank is among pensioners (M =

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74.35). The Kruskal-Wallis test value is 12.576, and the obtained difference is statistically significant ($p < 0.01$). Also, students (M = 138.65) and employees (M = 138.34) show the highest ranks of distance traveled for primary outdoor trips during the COVID-19 pandemic, while pensioners (M = 73.38) show the lowest ranks. The Kruskal-Wallis test value is 12.396, and the obtained difference is statistically significant ($p < 0.01$).

Table 28. Descriptive statistics and the Kruskal-Wallis test: distance traveled, by employment.

Ranks			
	Employment	N	Mean Rank
Number of primary outdoor trips per week before the COVID-19 pandemic	Student	102	133.25
	Employed	129	132.41
	Pensioner	17	128.76
	Other	17	140.24
	Total	265	
Number of primary outdoor trips per week during the COVID-19 pandemic	Student	102	127.56
	Employed	129	137.12
	Pensioner	17	120.47
	Other	17	146.85
	Total	265	

	Number of primary outdoor trips per week before the COVID-19 pandemic	Number of primary outdoor trips per week during the COVID-19 pandemic
Kruskal-Wallis H	.286	2.288
df	3	3
Asymp. Sig.	.963	.515
a. Kruskal Wallis Test		
b. Grouping Variable: Employment		

Source: Research results, 2022.

The table shows descriptive statistics and the Kruskal-Wallis test for the variable "Number of primary outdoor trips per week before and during the COVID-19 pandemic "with respect to employment. The highest rank (M = 140.24) in terms of the number of primary outdoor trips per week before the COVID-19 pandemic is shown by respondents in the occupation category "Other," while the lowest rank is shown by pensioners (M = 128.76). The Kruskal-Wallis test value is 0.286, and this difference is not statistically significant ($p > 0.05$). Also, the highest rank (M = 146.85) in terms of the number of primary outdoor trips per week during the COVID-19 pandemic is shown by respondents in the occupation category "Other," while the lowest rank is shown by pensioners (M = 120.47). The Kruskal-Wallis test value is 2.288, and this difference is not statistically significant ($p > 0.05$).

Table 29. Descriptive statistics and the Kruskal-Wallis test: distance traveled, by car ownership.

Ranks				
	Do you own a car?	N	Mean Rank	Sum of Ranks
Distance traveled for primary outdoor trips before the COVID-19 pandemic	YES	187	140.57	26286.50
	NO	78	114.85	8958.50
	Total	265		

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Distance traveled for primary outdoor trips during the COVID-19 pandemic	YES	187	141.84	26523.50
	NO	78	111.81	8721.50
	Total	265		

	Distance traveled for primary outdoor trips before the COVID-19 pandemic	Distance traveled for primary outdoor trips during the COVID-19 pandemic
Mann-Whitney U	5877.500	5640.500
Wilcoxon W	8958.500	8721.500
Z	-2.526	-2.941
Asymp. Sig. (2-tailed)	.012	.003
a. Grouping Variable: Do you own a car?		

Source: Research results, 2022.

Table 29 shows the descriptive statistics and Mann-Whitney test for the variables "Distance traveled for primary outdoor trips before and during the COVID-19 pandemic" with respect to car ownership. Respondents who own a car show a higher rank (M=140.57) in the distance traveled for primary outdoor trips before the COVID-19 pandemic compared to respondents who do not have a car (M=114.85). The value of the Mann-Whitney test is 5877,500, which shows that the obtained difference is statistically significant at the 0.05 level ($z = -2.526$, $p < 0.05$). Also, respondents who own a car show a higher rank (M = 141.84) in the distance traveled for primary outdoor trips during the COVID-19 pandemic than respondents who do not have a car (M = 111.81). The value of the Mann-Whitney test is 5640,500, which shows that the obtained difference is statistically significant at the 0.01 level ($z = -2.941$, $p < 0.01$).

Table 30. Descriptive statistics and Mann-Whitney test: number of outdoor trips, by car ownership.

Ranks				
	Do you own a car?	N	Mean Rank	Sum of Ranks
Number of primary outdoor trips per week before the COVID-19 pandemic	YES	187	132.32	24744.00
	NO	78	134.63	10501.00
	Total	265		
Number of primary outdoor trips per week during the COVID-19 pandemic	YES	187	138.14	25833.00
	NO	78	120.67	9412.00
	Total	265		

	Number of primary outdoor trips per week before the COVID-19 pandemic	Number of primary outdoor trips per week during the COVID-19 pandemic COVID-19
Mann-Whitney U	7166.000	6331.000
Wilcoxon W	24744.000	9412.000
Z	-.260	-1.858
Asymp. Sig. (2-tailed)	.795	.063
a. Grouping Variable: Do you own a car?		

Source: Research results, 2022.

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Table 30 shows the descriptive statistics and Mann-Whitney test for the variable "Number of primary outdoor trips per week before and during the COVID-19 pandemic" with respect to car ownership. Respondents who do not have a car show a higher rank (M = 134.63) regarding the number of primary outdoor trips before the COVID-19 pandemic than those who have a car (M = 132.32). The value of the Mann-Whitney test is 7166,000, which shows that the obtained difference is not statistically significant (z = -0.260, p > 0.05). On the other hand, respondents who own a car show a higher rank (M = 138.14) for the number of primary outdoor trips during the COVID-19 pandemic compared to respondents who do not have a car (M = 120.67). The value of the Mann-Whitney test is 6331,000, which shows that the obtained difference is not statistically significant (z = -1.858, p > 0.05).

Table 31. Descriptive statistics and Mann-Whitney test: distance traveled, by motorcycle ownership.

Ranks				
	Do you own a motorcycle?	N	Mean Rank	Sum of Ranks
Distance traveled for primary outdoor trips before the COVID-19 pandemic	YES	17	127.94	2175.00
	NO	248	133.35	33070.00
	Total	265		
Distance traveled for primary outdoor trips during the COVID-19 pandemic	YES	17	129.32	2198.50
	NO	248	133.25	33046.50
	Total	265		

	Distance traveled for primary outdoor trips before the COVID-19 pandemic	Distance traveled for primary outdoor trips during the COVID-19 pandemic
Mann-Whitney U	2022.000	2045.500
Wilcoxon W	2175.000	2198.500
Z	-.285	-.207
Asymp. Sig. (2-tailed)	.775	.836
a. Grouping Variable: Do you own a motorcycle?		

Source: Research results, 2022.

Table 31 shows the descriptive statistics and Mann-Whitney test for the variable "Distance traveled for primary outdoor trips before and during the COVID-19 pandemic" with respect to motorcycle ownership. Respondents who do not own a motorcycle show a higher rank (M = 133.35) in the distance traveled for primary outdoor trips before the COVID-19 pandemic than respondents who own a motorcycle (M = 127.94). The value of the Mann-Whitney test is 2022,000, which shows that the obtained difference is not statistically significant (z = -0.285, p > 0.05). Also, respondents who do not own a motorcycle show a higher rank (M = 133.25) in the distance traveled for primary outdoor trips during the COVID-19 pandemic compared to respondents who own a motorcycle (M = 129.32). The value of the Mann-Whitney test is 2045,500, which shows that the obtained difference is not statistically significant (z = -0.207, p > 0.05).

Table 32. Descriptive statistics and Mann-Whitney test: number of outdoor trips, by motorcycle ownership.

Ranks

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	Do you own a motorcycle?	N	Mean Rank	Sum of Ranks
Number of primary outdoor trips per week before the COVID-19 pandemic	YES	17	138.47	2354.00
	NO	248	132.63	32891.00
	Total	265		
Number of primary outdoor trips per week during the COVID-19 pandemic	YES	17	140.26	2384.50
	NO	248	132.50	32860.50
	Total	265		

	Number of primary outdoor trips per week before the COVID-19 pandemic	Number of primary outdoor trips per week during the COVID-19 pandemic
Mann-Whitney U	2015.000	1984.500
Wilcoxon W	32891.000	32860.500
Z	-.353	-.444
Asymp. Sig. (2-tailed)	.724	.657
a. Grouping Variable: Do you own a motorcycle?		

Source: Research results, 2022.

Table 32 shows the descriptive statistics and Mann-Whitney test for the variable "Number of primary outdoor trips per week before and during the COVID-19 pandemic" with respect to motorcycle ownership. Respondents who own a motorcycle show a higher rank (M = 138.47) regarding the number of primary outdoor trips before the COVID-19 pandemic than respondents who do not own a motorcycle (M = 132.63). The value of the Mann-Whitney test is 2015,000, which shows that the obtained difference is not statistically significant (z = -0.353, p > 0.05). Also, respondents who own a motorcycle show a higher rank (M = 140.26) regarding the number of primary outdoor trips during the COVID-19 pandemic than respondents who do not own a motorcycle (M = 132.50). The value of the Mann-Whitney test is 1984.500, which shows that the obtained difference is not statistically significant (z = -0.444, p > 0.05).

Table 33. Group statistics of the influence of socio-demographic factors on the distance traveled per week before and during the COVID-19 pandemic.

Group statistics					
Distance traveled per week before the COVID-19 pandemic Group		Mean Rank	Man-Whitney[a] Wilcoxon-rank [b]	z	p
Gender	male	117.43	6573.500 [a]	-2.488	.013
	female	141.56			
Employment	Student	141.98	12.576 [b]		.006
	Employed	135.68			
	Pensioner	74.35			
	Other	117.44			
Car ownership	YES	140.57	5877.500 [a]	-2.526	.012

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	NO	114.85			
Motorcycle ownership	YES	127.94	2022.000 [a]	-.285	.775
	NO	133.35			
Group statistics					
Distance traveled per week during the COVID-19 pandemic Group		Mean Rank	Man-Whitney[a] Wilcoxon-rank [b]	z	p
Gender	male	121.57	6963.000 [a]	-1.821	.069
	female	139.28			
Employment	Student	138.65	12.396 [b]		.006
	Employed	138.34			
	Pensioner	73.38			
	Other	118.18			
Car ownership	YES	141.84	5640.500 [a]	-2.941	.003
	NO	111.81			
Motorcycle ownership	YES	129.32	2045.500 [a]	-.207	.836
	NO	133.25			

Source: Research results, 2022.

Table 33 shows the statistical significance of the influence of socio-demographic factors (gender, employment, and car ownership) on the distance traveled per week before the COVID-19 pandemic, while during the COVID-19 pandemic, it shows statistical significance for the following socio-demographic factors: employment and car ownership. In the case of age and owning a motorcycle, no statistical significance of the influence on the weekly distance traveled was established.

Table 34. Group statistics of the influence of socio-demographic factors on the number of primary outdoor trips per week before and during the COVID-19 pandemic.

Group statistics					
Number of primary outdoor trips per week before the COVID-19 pandemic Group		Mean Rank	Man-Whitney[a] Wilcoxon-rank [b]	z	p
Gender	male	138.73	7498.000 [a]	-1.049	.294
	female	129.85			
Employment	Student	133.25	.286 [b]		.963
	Employed	132.41			
	Pensioner	128.76			
	Other	140.24			
Car ownership	YES	132.32	7166.000 [a]	-.260	.795
	NO	134.63			
Motorcycle ownership	YES	138.47	2015.000 [a]	-.353	.724
	NO	132.63			
Group statistics					

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Number of primary outdoor trips per week during the COVID-19 pandemic COVID-19 Group		Mean Rank	Man-Whitney[a] Wilcoxon-rank [b]	z	p
Gender	male	135.62	7791.000[a]	-.453	.651
	female	131.56			
Employment	Student	127.56	2.288 [b]		.515
	Employed	137.12			
	Pensioner	120.47			
	Other	146.85			
Car ownership	YES	141.84	6331.000 [a]	-1.858	.063
	NO	111.81			
Motorcycle ownership	YES	140.26	1984.500 [a]	-.444	.657
	NO	132.50			

Source: Research results, 2022.

Table 34 confirms that the group statistics of the influence of socio-demographic factors on the number of primary outdoor trips per week before and during the COVID-19 pandemic did not show statistical significance.

Table 35. Correlation analysis before COVID-19.

Spearman's Correlations – BEFORE COVID-19						
Age			**Monthly household income (BAM)**	**Number of household members**	**Distance traveled for primary outdoor trips before the COVID-19 pandemic**	**Number of primary outdoor trips per week before COVID-19**
Age	Correlation Coefficient	1.000	.173**	-.284**	-.062	-.011
	Sig. (2-tailed)	.	.005	.000	.311	.859
	N	265	265	265	265	265
Monthly household income (BAM)	Correlation Coefficient		1.000	.004	.091	.127*
	Sig. (2-tailed)		.	.949	.138	.039
	N		265	265	265	265
Number of household members	Correlation Coefficient			1.000	.016	.048
	Sig. (2-tailed)			.	.798	.432
	N			265	265	265
Distance traveled for primary outdoor	Correlation Coefficient				1.000	.110
	Sig. (2-tailed)				.	.073

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trips before the COVID-19 pandemic	N				265	265
Number of primary outdoor trips per week before the COVID-19 pandemic	Correlation Coefficient					1.000
	Sig. (2-tailed)					.
	N					265
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Source: Research results, 2022.

From Table 35, it can be concluded that before COVID-19, there was only a statistically significant relationship between age and monthly household income, as well as age and the number of people in the household.

Table 36. Correlation analysis during COVID-19.

Spearman's Correlations – DURING COVID-19						
Age			**Monthly household income (BAM)**	**Number of household members**	**Distance traveled for primary outdoor trips during the COVID-19 pandemic**	**Number of primary outdoor trips per week during COVID-19**
Age	Correlation Coefficient	1.000	.173**	-.284**	-.080	.022
	Sig. (2-tailed)	.	.005	.000	.194	.725
	N	265	265	265	265	265
Monthly household income (BAM)	Correlation Coefficient		1.000	.004	.188**	.185**
	Sig. (2-tailed)		.	.949	.002	.002
	N		265	265	265	265
Number of household members	Correlation Coefficient			1.000	-.015	.040
	Sig. (2-tailed)			.	.812	.518
	N			265	265	265
Distance traveled for primary outdoor trips during the COVID-19 pandemic	Correlation Coefficient				1.000	.182**
	Sig. (2-tailed)				.	.003
	N				265	265

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Number of primary outdoor trips per week during the pandemic COVID-19	Correlation Coefficient					1.000
	Sig. (2-tailed)					.
	N					265
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

Source: Research results, 2022.

Table 36 shows that during COVID-19, there is a statistically significant relationship between age and monthly household income, age, and the number of people in the household. Then, a statistically significant relationship was established between monthly household income (BAM) and distance traveled for primary outdoor trips during COVID-19, as well as the number of primary outdoor trips per week during COVID-19. A statistically significant association was also found between the distance traveled for primary outdoor trips during COVID-19 and the number of primary outdoor trips per week during COVID-19.

Table 37. Correlation of distance traveled and number of primary outdoor trips before and during the COVID-19 pandemic.

Spearman's Correlation Coefficient				
	BEFORE COVID-19			
	Distance traveled		Number of primary trips	
	r	p	r	p
Age	-.062	.311	-.011	.859
Monthly household income (BAM)	.091	.138	.127*	.039
Number of household members	.016	.798	.048	.432
	DURING COVID-19			
	Distance traveled		Number of primary trips	
	r	p	r	p
Age	-.080	.194	.022	.725
Monthly household income (BAM)	.188**	.002	.185**	.002
Number of household members	-.015	.812	.040	.518

Source: Research results, 2022.

From the correlation table, it can be seen that before COVID-19, only the relationship between monthly household income and the number of primary outdoor trips ($r = 0.127$, $p < 0.05$) is statistically significant, while during COVID-19, there is a statistically significant relationship between monthly household income and distance traveled ($r = 0.188$, $p < 0.01$), as well as the number of primary outdoor trips ($r = 0.185$, $p < 0.01$).

Table 38. Mode of transportation for primary outdoor trip before and during COVID-19.

	BEFORE COVID-19		**DURING COVID-19**	
	Observed N	Percent	Observed N	Percent
Nothing/I didn't travel	5	1.8	13	4.9
Public transportation	56	21.1	37	13.9

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Private car	160	60.4	164	61.9
Company car	6	2.3	8	3.0
Taxi	3	1.1	3	1.1
Motorcycle	3	1.1	1	0.4
Bike	7	2.6	11	4.2
Walking	25	9.4	28	10.6
Total	265	100.0	265	100.0

Source: Research results, 2022.

There were no significant changes in the mode of transportation before and during COVID-19. The largest number of respondents used a private car as a means of transportation; before COVID-19, 160 (60.4%), and during COVID-19, 164 (61.9%).

Table 39. Mode of transportation for primary outdoor trips before and during the COVID-19 pandemic.

McNemar-test					
		Mode of transportation for primary outdoor trips during the COVID-19 pandemic		Total	p
		Public transportation	Private car		
Mode of transportation for primary outdoor trips before the COVID-19 pandemic	Public transportation	35	15	50	0.001
	Private car	1	146	147	
Total		36	161	197	

Source: Research results, 2022.

A post hoc, McNemar test was applied to determine possible individual changes in the mode of transportation for primary outdoor trips before and during COVID-19, which showed that the primary mode of transportation changed statistically significantly ($p < 0.001$) from using public transportation to using private car: out of 50 respondents who used public transportation before COVID-19, 15 (30%) started using a private car during COVID-19, while out of 147 respondents who used a private car before COVID-19, only 1 (0.7 %) started using public transportation during COVID-19.

Table 40. Mode of transportation for primary outdoor trips before and during the COVID-19 pandemic.

McNemar-test				
	Mode of transportation for primary outdoor trips during the COVID-19 pandemic		Total	p
	Private car	Walking		

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Mode of transportation for primary outdoor trips before the COVID-19 pandemic	Private car	145	5	150	0.219
	Walking	1	21	22	
Total		36	146	26	172

Source: Research results, 2022.

On the other hand, the primary mode of transportation did not change statistically significantly ($p > 0.05$) from using a private car to walking: out of 150 respondents who used a private car before COVID-19, 5 (3.0%) started using one during COVID-19 walking, while out of 22 respondents who used to walk before COVID-19, only 1 (4.5%) started using a private car during COVID-19.

Table 41. Mode of transportation for primary outdoor trips before and during the COVID-19 pandemic.

McNemar-test					
		Mode of transportation for primary outdoor trips during the COVID-19 pandemic		Total	p
		Public transportation	Walking		
Mode of transportation for primary outdoor trips before the COVID-19 pandemic	Public transportation	35	1	36	1.000
	Walking	0	21	21	
Total		35	22	57	

Source: Research results, 2022.

Also, the primary mode of transportation did not change statistically significantly ($p > 0.05$) from using public transportation to walking: out of 36 respondents who used public transportation before COVID-19, only 1 (2.8%) started using it during COVID-19 walking, while of the 21 respondents who used walking before COVID-19, none started using public transportation during COVID-19.

5. Discussion

Authors The results provided answers to the research questions:

-Has the COVID-19 pandemic affected the change in behavior related to traveling to work?

Most respondents (51.3%) state that nothing has changed, while the rest (48.7%) state that the COVID-19 pandemic has influenced a change in behavior when traveling to work. Given that it is slightly less than 50% of the respondents, it can be concluded that the pandemic influenced behavior changes, which agrees with the study by Abdullah et al. (2020).

-What is the primary purpose of travel before and during the COVID-19 pandemic, and is there a change in the primary purpose of travel?

The primary purpose of travel before and during the COVID-19 pandemic is social activities. The most significant change in the primary purpose of travel before and during the COVID-19 pandemic is reflected in a decrease in social activities (from 34.0% to 26.0%) and an increase in recreational sports activities (from 5.3% to 9.8%), while other activities remained proportionally the same before and during the COVID-19 pandemic. There is also a noticeable decrease in the social activities of women before and during the COVID-19 pandemic (from 35.7% to 24.6%), as well as a decrease in the social activities of respondents aged 31-50 before and during the COVID-19 pandemic

(from 30.9% to 20.2 %). Comparing social activities with shopping, recreation, sports, or other shows a statistically significant change in the primary purpose of the travel ($p < 0.01$). Of the 73 respondents who primarily traveled for social activities, as many as 52 (71.2%) of them primarily started traveling during COVID-19 for shopping, recreation, sports, or other reasons, while of the 52 respondents who before COVID-19 primarily traveled for shopping, recreation, sports or other, 47 (90.3%) started traveling primarily for social activities. It can be concluded that there are changes in the purpose of travel before and during the COVID-19 pandemic. Abdullah et al. (2020) explained in their study that the purpose of travel, the mode of transportation, the distance traveled, and the frequency of travel for primary purpose differed significantly before and during the pandemic. Furthermore, the majority of shopping trips were made during the pandemic, which is in agreement with this research, given the fact that the results of this study showed that a number of respondents who primarily traveled for shopping, recreation, sports, or other before COVID-19, as many as 90.3% started traveling primarily for social activities.

-What distance is traveled for primary outdoor trips before and during the COVID-19 pandemic? What is the number of primary weekly outdoor trips before and during the COVID-19 pandemic? What is the influence of socio-demographic factors on the distance traveled and the number of trips for the primary purpose before and during the COVID-19 pandemic? Is there a significant correlation between socio-demographic factors and the number of trips for the primary purpose before and during the COVID-19 pandemic?

The average distance traveled for primary outdoor trips before the COVID-19 pandemic is greater than that for primary outdoor trips during the COVID-19 pandemic, and the resulting difference is statistically significant. The results are in agreement with previous studies that showed that subjects significantly reduced their traveled distance during COVID-19 (Abdullah et al., 2020; Molloy et al., 2020). In a study conducted in Switzerland, Molloy et al. (2020) reported that the mean daily travel distance varied between 0 km and 10 km while travel bans were in force, i.e., between March 15th and April 30th, 2020. In this study, the average number of primary outdoor trips per week before the COVID-19 pandemic is higher than the average number of primary outdoor trips per week during the COVID-19 pandemic, and the obtained difference is statistically significant at the 0.01 level ($z = -4.191$, $p < 0.01$).

As for the influence of socio-demographic factors on the distance traveled, the research results show that female respondents show a higher rank ($M = 141.56$) in the distance traveled for primary outdoor trips before the COVID-19 pandemic compared to male respondents ($M = 117.43$). The value of the Mann-Whitney test shows that the obtained difference is statistically significant. Also, the χ^2-test indicates a statistically significant difference in the mode of transportation for primary outdoor trips with regard to owning or not owning a car ($p < 0.01$), but there is no significant impact of COVID-19. This finding is consistent with the study by Abdullah et al. (2020), who concluded that people who owned cars traveled significantly longer distances for the primary purpose of travel before COVID-19 than those who did not own a car. However, car ownership did not significantly impact the distance traveled for the primary purpose of driving during COVID-19. The distance traveled for primary outdoor trips before and during the COVID-19 pandemic with regard to employment shows that the highest rank ($M = 141.98$) of the distance traveled for primary outdoor trips before the COVID-19 pandemic is demonstrated by students, while the lowest rank is shown by pensioners ($M = 74.35$) and the obtained difference is statistically significant. Also, students ($M = 138.65$) and employed persons ($M = 138.34$) show the highest ranks in the distance traveled for primary outdoor trips during the COVID-19 pandemic, while the lowest ranks are shown by pensioners ($M = 73.38$) and the difference obtained is statistically significant. The results related to the number of primary outdoor trips per week before and during the COVID-19 pandemic with regard to employment show that the highest rank ($M = 140.24$) in terms of the number of primary outdoor trips per week before the COVID-19 pandemic is shown by respondents in the occupation category "Other," while the lowest rank is shown by pensioners ($M = 128.76$). Also, the highest rank ($M = 146.85$) in terms of the number of primary outdoor trips per week during the COVID-19 pandemic is shown by respondents in the occupation category "Other," while the lowest rank is shown by pensioners ($M = 120.47$).

However, the mentioned differences are not statistically significant. These findings are consistent with the results of several previous studies that mentioned that older travelers (in this case, pensioners) travel less compared to younger ones (students, employed persons, etc.) (Leggat et al., 2010; Sharangpani et al., 201). Respondents who own a car show a higher rank (M = 140.57) in the distance traveled for primary outdoor trips before the COVID-19 pandemic than respondents who do not own a car (M = 114.85). Also, respondents who own a car show a higher rank (M = 141.84) in the distance traveled for primary outdoor trips during the COVID-19 pandemic than respondents who do not own a car (M = 111.81). The obtained differences are statistically significant. Respondents who do not own a car show a higher rank (M = 134.63) regarding the number of primary outdoor trips before the COVID-19 pandemic than respondents who own a car (M = 132.32). On the other hand, respondents who own a car show a higher rank (M = 138.14) for the number of primary outdoor trips during the COVID-19 pandemic compared to respondents who do not own a car (M = 120.67). The obtained differences are not statistically significant. Respondents who do not own a motorcycle show a higher rank (M = 133.35) in the distance traveled for primary outdoor trips before the COVID-19 pandemic than respondents who own a motorcycle (M = 127.94). The situation is the same during the COVID-19 pandemic; however, the obtained differences are not statistically significant. Respondents who own a motorcycle show a higher rank (M = 138.47) regarding the number of primary outdoor trips before the COVID-19 pandemic than respondents who do not own a motorcycle (M = 132.63). Also, respondents who own a motorcycle show a higher rank (M = 140.26) regarding the number of primary outdoor trips during the COVID-19 pandemic than respondents who do not own a motorcycle (M = 132.50). The obtained differences are not statistically significant.

The results show the statistical significance of the influence of socio-demographic factors (gender, employment, and car ownership) on the distance traveled per week before the COVID-19 pandemic, while during the COVID-19 pandemic, they show statistical significance for the following socio-demographic factors: employment and car ownership, while in the case of age and owning a motorcycle, no statistical significance of the influence on the weekly distance traveled was established. Previous studies have found that male respondents traveled significantly longer distances for primary travel purposes during COVID-19 (Abdullah et al., 2020; Molloy et al., 2020), which is inconsistent with this research. The study results show that the group statistics of the influence of socio-demographic factors on the number of primary outdoor trips per week before and during the COVID-19 pandemic did not show statistical significance.

From the obtained results, it can be concluded that there was only a statistically significant relationship between age and monthly household income, as well as age and the number of people in the household before COVID-19. The results show a statistically significant relationship between age and monthly household income, age, and the number of people in the household during COVID-19. A statistically significant association was also found between monthly household income (BAM), the distance traveled for primary outdoor trips during COVID-19, and the number of primary outdoor trips per week during COVID-19. A statistically significant association was also found between the distance traveled for primary outdoor trips during COVID-19 and the number of primary outdoor trips per week during COVID-19. The correlation table shows that before COVID-19, the only statistically significant relationship exists between monthly household income and the number of primary outdoor trips ($r = 0.127$, $p < 0.05$), while during COVID-19, there is a statistically significant relationship between monthly household income and distance traveled ($r = 0.188$, $p < 0.01$), as well as the number of primary trips outdoors ($r = 0.185$, $p < 0.01$). Abdullah et al. (2020) state that the correlation between the number of people in the household and trips made for the primary purpose during COVID-19 was not significant. Furthermore, weak correlations were observed between age, education, and the number of trips for the primary purpose before COVID-19. However, they were not significant during COVID-19. All other correlations in the study were very weak. The results of the study are not in agreement with this research. Gender, car ownership, work status, travel distance, and the primary purpose of travel have been shown to be significant predictors of choice of mode of transportation during the COVID-19 pandemic (Abdullah et al., 2020), which is in agreement with this research.

-What mode of transportation was used for primary outdoor trips before and during the COVID-19 pandemic, and is there a change in the mode?

There were no significant changes in the mode of transportation before and during COVID-19. The largest number of respondents used a private car as a means of transportation, namely, 160 (60.4%) before COVID-19 and 164 (61.9%) during COVID-19.

-Has the mode of transportation changed for primary outdoor trips during the COVID-19 pandemic for people who own a car, and has the mode of transportation changed for primary outdoor trips during the COVID-19 pandemic for people who do not own a car?

The results showed that the primary mode of transportation changed statistically significantly ($p < 0.001$) from the use of public transportation to the use of a private car: of the 50 respondents who used public transportation before COVID-19, 15 (30%) started using a private car during COVID-19, while out of 147 respondents who used a private car before COVID-19, only 1 (0.7%) started using public transportation during COVID-19. These results agree with previous studies showing that people avoid public transportation during a pandemic (Sadique et al., 2007; Goodwin et al., 2011; Kim et al., 2017, Kwok et al., 2020). On the other hand, the primary mode of transportation did not change statistically significantly ($p > 0.05$) from using a private car to walking: out of 150 respondents who used a private car before COVID-19, 5 (3.0%) started walking during COVID-19, while out of 22 respondents who used to walk before COVID-19, only 1 (4.5%) started using a private car during COVID-19. Also, the primary mode of transportation did not change statistically significantly ($p > 0.05$) from using public transportation to walking: out of 36 respondents who used public transportation before COVID-19, only 1 (2.8%) started walking COVID-19, while of the 21 respondents who walked before COVID-19, none started using public transportation during COVID-19. These results are inconsistent with a study that showed that walking (as a primary mode of transportation) increased by 7% during COVID-19 compared to pre-COVID periods (Abdullah et al., 2020).

Blendon et al. (2008) reported the results of a national survey conducted in the USA to investigate public opinion on community mitigation measures for pandemic influenza. In the study, 89% of survey participants would limit the use of public transportation (trains and buses). Also, 85% of them stated that they would not allow their children to use public transportation and perform activities outside the home, such as social gatherings and public events while schools are closed. Ives et al. (2009) conducted a qualitative study using interviews and focus groups aimed at health personnel. Several survey participants indicated they used public transportation less, and more people were willing to travel to work by private car. Abdullah et al. (2020) state in the study that there has been a significant shift from public transportation to private transportation and non-motorized modes of operation. The mentioned researches are in agreement with this research because the study showed that the primary mode of transportation changed statistically significantly from the use of public transportation to the use of a private car.

6. Conclusions

This The results show that the COVID-19 pandemic has influenced a change in behavior when traveling to work. The primary purpose of travel before and during the COVID-19 pandemic is social activities. The most significant change in the primary purpose of travel before and during the COVID-19 pandemic is reflected in a decrease in social activities and an increase in recreational sports activities, while other activities remained proportionally the same before and during the COVID-19 pandemic. The average distance traveled for primary outdoor trips before the COVID-19 pandemic is greater than that for primary outdoor trips during the COVID-19 pandemic. The distance traveled for primary outdoor trips before and during the COVID-19 pandemic with regard to employment as a socio-demographic factor shows that the highest rank ($M = 141.98$) of the distance traveled for primary outdoor trips before the COVID-19 pandemic is demonstrated by students, while pensioners show the lowest rank. Also, the highest ranks of distance covered for primary outdoor trips during the COVID-19 pandemic are demonstrated by students and employees, while pensioners show the lowest rank. Respondents who own a car show a higher rank ($M = 140.57$) in the distance traveled for

primary outdoor trips before the COVID-19 pandemic compared to respondents who do not have a car. Also, respondents who own a car show a higher rank of distance traveled for primary outdoor trips during the COVID-19 pandemic compared to respondents who do not have a car.

The results show the statistical significance of the influence of socio-demographic factors (gender, employment, and car ownership) on the distance traveled per week before the COVID-19 pandemic, while during the COVID-19 pandemic, it shows statistical significance for the following socio-demographic factors: employment and car ownership, while in the case of age and owning a motorcycle, no statistical significance of the influence on the weekly distance traveled was established. The largest number of respondents used a private car as a means of transportation. The results showed that the primary mode of transportation changed statistically significantly from the use of public transportation to the use of a private car.

It should be noted that there are some limitations associated with this study. First, this study is based on data collected in Bosnia and Herzegovina, and at the time of the survey, it had certain levels of restrictions and percentages of the infected population. These percentages do not have to match the percentages in other countries at the time. Second, people who had access to the Internet, that is, e-mail or the social network Facebook answered this questionnaire. Thus, generalizing the results for the average population in Bosnia and Herzegovina may not be practical. Furthermore, economic, social, and health inequalities also play a vital role, and reactions and behaviors depend on such factors. In addition, the reported behavior likely may not truly represent their actual travel behavior, especially before the pandemic (Abdullah et al., 2020). An increase in sample size and diversity is recommended for future studies addressing this issue. Also, it is recommended that this and similar research be conducted in several countries so that the results can be compared and findings can be generalized. The findings of this study could have implications for traffic planning during post-COVID, but also, especially during possible future pandemic situations.

The results of this study could be useful in traffic planning and making various policies during various pandemics based on people's travel needs. In particular, government bodies could use such knowledge to plan partial and smarter lockdowns. Tourism and transport companies could use this information to better plan their services and operations.

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