HAS OUR LONG-TERM TRIP-MAKING BEHAVIOR CHANGED DUE TO COVID-19?

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Abstract:

This study investigates the impact of the COVID-19 pandemic on travel risk perceptions and shopping habits among individuals in the United Arab Emirates (UAE). The study's primary objectives are to analyze changes in travel risk perceptions and to examine shifts in travel behaviors and shopping patterns during and after the pandemic. A comprehensive survey was conducted, gathering data on socioeconomic demographics, travel risk perceptions, and shopping habits across three periods: pre-pandemic, during, and post-pandemic. The survey included a diverse and representative sample of UAE residents, covering various demographic factors such as gender, age, residency status, and emirate of residence. Data cleaning and pre-processing were employed to ensure the accuracy and reliability of the results. Descriptive analysis and statistical tests such as the Wilcoxon signed-rank test and One-way Analysis of Variance (ANOVA) revealed significant changes in perceptions and behaviors across the three periods. The findings indicate a notable decrease in travel risk perceptions post-pandemic, particularly concerning personal modes of transportation, including private vehicles, walking, and cycling, which were perceived as safer due to their ability to limit exposure. However, public transportation continued to evoke discomfort, reflecting ongoing concerns about virus transmission in crowded environments. The study also highlights changes in shopping behaviors, with a decline in in-person food and grocery shopping during the pandemic, as many individuals shifted towards online grocery delivery services for safety and convenience. Similarly, there was a reduction in in-person shopping for non-food items, accompanied by a significant increase in online shopping, indicating a broader shift towards e-commerce. Overall, these findings provide valuable insights for policymakers, businesses, and researchers, offering a deeper understanding of the lasting impacts of the pandemic on consumer behavior. The study underscores the need for strategies that address individuals' evolving needs and concerns in the post-pandemic era, promoting resilience and adaptability in both the travel and retail sectors.

Keywords: travel risk perceptions, trip-making behavior, shopping & food ordering habits, covid-19, pandemic

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1. Introduction

The outbreak of the coronavirus disease (COVID-19) in Wuhan City, China, in December 2019 significantly disrupted global health systems, economies, and societal structures. Designated a global pandemic by the World Health Organization (WHO) on March 11, 2020, COVID-19 exhibited high transmissibility and severe health consequences (Y. Chen et al., 2020; Jebril, 2020). Authorities worldwide adopted diverse strategies to mitigate the virus's spread, including mobility restrictions, non-pharmaceutical interventions, and, later, the deployment of vaccines (Amanna & Slifka, 2020). These vaccines proved instrumental in reducing infection rates and mitigating symptom severity (Karaivanov et al., 2022). However, the emergence of viral variants has posed ongoing challenges, requiring adaptive public health responses and raising concerns about the long-term efficacy of these interventions (Duong, 2021). In response to viral variants, governments reintroduced safety measures and encouraged individuals to vaccinate. Proof of vaccination has become essential for unrestricted access to public events, educational institutions, workplaces, and other locations. Concurrently, the perceived risk of COVID-19 transmission has prompted individuals to reduce their travel by public and shared transport modes and shift towards active and private options (Budd & Ison, 2020; De Vos, 2020; Shakibaei et al., 2021; Tirachini & Cats, 2020; Zafri et al., 2021; N. Zhang et al., 2021).

Panic buying, driven by concerns among vulnerable individuals, has been examined through big data analytics, analyzing consumer reactions and sentiments to government measures (Clemens et al., 2020; Duncan, 2020; Prentice et al., 2020). Understanding these dynamics is essential for predicting mode choice behavior and informing decision-making processes during the pandemic and future crises (Hamad & Obaid, 2022). The pandemic caused significant disruptions in consumer behavior, leading to a surge in e-commerce and online shopping. With physical mobility restricted, individuals turned to online platforms for goods and services, accelerating the digital transformation in trade (Akhtar et al., 2020, 2024). The rapid development of online shopping has introduced new challenges for logistics providers, requiring them to adapt their systems to handle increased demand and ensure secure delivery mechanisms. Addressing these challenges is vital to sustaining the new trends initiated during the pandemic, particularly as e-commerce shapes consumer behavior post-COVID-19.

The remainder of this paper is organized as follows: Section 2 presents a review of the relevant literature, focusing on the impacts of COVID-19 on travel behavior and shopping patterns. Section 3 defines this study's research gap, objectives, and goals. Section 4 details the methodology, including data collection, pre-processing, and analysis techniques. Section 5 discusses the findings and their implications, while Section 6 concludes the paper by summarizing key insights and proposing directions for future research

2. Literature review
2.1. Travel Risk Perception

The COVID-19 pandemic has significantly altered various aspects of daily life, including how individuals perceive risk and make decisions related to travel and shopping. A growing body of research has emerged, examining these changes across different regions and contexts. This literature review forms key findings from studies investigating the pandemic's impact on travel behavior, risk perception, and shopping habits, providing a comprehensive understanding of the shifts that have occurred during and after the pandemic.

Travel risk perception has become an increasingly studied domain, especially in light of the COVID-19 pandemic. This global health crisis has brought heightened awareness of risks associated with various modes of transportation, particularly public transit and logistics services. Key factors influencing travel risk perception include health concerns, such as pathogen transmission, and psychological factors, such as perceived safety and comfort.

Several studies have explored the changes in travel risk perceptions and behaviors during the pandemic. Neuburger and Egger (2021) conducted a case study in the DACH region to examine travelers' behavior and risk perception during the COVID-19 pandemic. The study employed a comprehensive travel survey to investigate the perceptions and behaviors of individuals. The study's findings demonstrated a substantial increase in the perceived risk associated with COVID-19 and notable changes in travel risk perception and behavior observed within a relatively brief timeframe.

Nazneen et al. (2020) examined travel risk perceptions in China and revealed that the COVID-19

pandemic influenced individuals' travel attitudes. Additionally, it demonstrated that travelers' risk perceptions significantly negatively impacted their travel decisions. Similarly, a study by da Silva Lopes et al. (2021) conducted in Porto Metropolitan Area, Portugal, found that the pandemic has substantially affected public space utilization. Furthermore, tourists exhibited shorter visits than in pre-pandemic times and limited their spatial exploration. Additionally, Perić et al. (2021) assessed the impact of the pandemic on Serbian tourists and found comparable results, indicating that the risk perception of those individuals also negatively affected their travel decisions, including their choice of travel destinations abroad.

While risk perception focuses on safety and health, passenger comfort also plays a pivotal role in shaping travel decisions. Recent studies, such as Wawryszczuk et al. (2023), highlighted technical methods for evaluating passenger comfort in rail transport. These methods assess vibrational comfort, thermal comfort, and visual comfort. Such evaluations provide valuable insights into improving passenger experiences in typical and crisis conditions. The involvement of these technical assessments complements subjective comfort perceptions, such as emotional safety, seating ergonomics, and noise levels, offering a holistic approach to understanding passenger needs.

Moreover, Ismail (2024) examined the influence of several factors, including the destination COVID status, healthcare services, digital distribution channels, and hygiene and safety measures on tourists' perceived travel risk, travel attitudes, and future travel intentions during the endemic stage of COVID-19. Study findings indicated that the factors studied significantly affect tourists' perceived travel risk, attitudes, and future intentions. Additionally, individual differences play a moderating role in these relationships. The study suggests practical strategies to promote safe and responsible travel by considering these differences. Similarly, another study by Zhang et al. (2023) examined how COVID-19 and related risk perceptions affect tourism recovery, mainly through the lens of tourists' attitudes toward tourism policies. The findings highlighted that the pandemic continues to generate tourist insecurity, negatively impacting tourism recovery. The study identified that risk perceptions significantly

influenced transportation choices and the avoidance of overcrowded places, hindering tourism recovery. Another study by Jęczmyk et al. (2023) focused on Poland and explored how the COVID-19 pandemic influenced Poles' perceptions of travel risk and subsequent travel behaviors. The study found that safety concerns and global travel restrictions led to significant changes in travel behavior. Specifically, many respondents chose to forego international travel in favor of domestic destinations they perceived as safer, highlighting a preference for security during the pandemic. This shift underscores the broader trend of increased risk aversion among travelers globally during this period.

In addition, research conducted in the Silesian Voivodeship in Poland provides valuable insights into travel risk perceptions during the COVID-19 pandemic. Burdzik et al. (2023) examined the impact of passenger flow at bus stops on the potential spread of COVID-19. Their study utilized advanced simulation tools such as PTV Vissim and FlexSim to model scenarios and assess how factors like social distancing measures, passenger exchange durations, and stop designs influence the risk of viral transmission. The findings underscored the importance of strategic bus stop planning to mitigate health risks in public transport systems.

Furthermore, Burdzik (2023) introduced the Deep Hazard Identification (DHI) methodology to evaluate epidemic hazards associated with customer delivery services in urban areas adopting smart city concepts. This approach analyzed risks in delivery operations, including air circulation, surface contact, and exposure duration, to provide a comprehensive framework for minimizing infection risks. The study's results are particularly relevant for understanding how logistics and transport services can adapt to future public health crises.

2.2. Shopping Behaviors and Attitudes

Considering the wide range of travel risk perception research, it is also essential to explore how people's shopping behaviors and attitudes have been affected during the pandemic. In a study by Hartono et al. (2021) conducted in Indonesia, the shopping patterns of individuals during the pandemic were examined. The results revealed that younger generations readily adjust attitudes and behaviors, while older individuals prioritize logic, health, and support for the affected. Conducted in Slovakia, a distinct study

aimed to analyze the impact of the pandemic on individuals' shopping habits. The study revealed significant changes in consumer shopping preferences due to the pandemic (Valaskova et al., 2021). A study found that most individuals (76%) have increased their online shopping activities, and an overwhelming majority (96%) of consumers who altered their purchasing behavior expressed intentions to persist with e-commerce platforms (Hopkins & Potcovaru, 2021). Alhaimer (2022) conducted a study in Kuwait to examine the impact of the pandemic on online shopping behavior and identified that the increased risk of COVID-19 infection influenced a shift toward online shopping. Gumasing et al. (2024) found that the most important factors affecting online shopping were perceived benefits, perceived vulnerability, behavioral intention, and performance expectancy.

Throughout the COVID-19 pandemic, there has been a significant transformation in both online and in-store shopping behaviors. A study by Diaz-Gutierrez et al. (2023) focused on the Puget Sound region in Washington, U.S., revealed that perceived health risks and pre-pandemic habits drove changes in shopping frequencies. Interestingly, while online shopping increased substantially, it did not completely substitute in-store shopping; rather, it often complemented it, especially for groceries. The study also indicated that many consumers who adopted online shopping during the pandemic plan to continue this behavior post-pandemic. In Vietnam, Dang et al. (2023) explored the factors influencing online purchasing decisions after the pandemic, highlighting that customer trust, website quality, and satisfaction are crucial in shaping these decisions. The study underscores the importance of enhancing these factors for e-commerce businesses to sustain the growth of online shopping in the post-pandemic era. In the context of grocery shopping, Titiloye et al. (2024) analyzed consumer preferences during the pandemic and found that while certain demographics preferred in-store shopping, others, particularly females and younger individuals, leaned towards home delivery and curbside pickup. This shift emphasizes the need for retailers to adapt to the changing demands by offering diverse shopping options.

The pandemic also influenced online shopping behaviors in China, as demonstrated in a study by Wei et al. (2024) in Guangzhou. The research found that the COVID-19 pandemic and technological advancements helped reduce the gap in online shopping between urban and suburban areas. However, individuals with higher incomes and education were more inclined to shop online. This highlights the persistence of the "smart divide," emphasizing the need for policies to ensure equitable access to online shopping. The growth of social commerce in the post-pandemic era is noteworthy. Elshaer et al. (2024) found that consumer attitudes and trust are pivotal in shaping buying intentions on social commerce platforms. The study suggests that businesses need to build trust and positive consumer attitudes to thrive in the evolving landscape of online shopping.

In Beijing, China, a study by Chen et al. (2023) analyzed how household food shopping behaviors changed during the COVID-19 lockdown period. The research, which involved face-to-face surveys with 900 residents, found that the lockdown significantly accelerated the preference for fresh food e-commerce, with a 48% increase in usage rates. Conversely, wet markets experienced a severe decline, with a 75% reduction in usage during the lockdown, and struggled to recover post-lockdown. The study identified community context and perceived COVID-19 risk as significant factors influencing shopping behaviors, with direct impacts on supermarket and convenience store shopping and indirect effects on e-commerce and wet market usage. These findings provide valuable insights into future emergency responses and the long-term planning of food supply facilities.

Focusing specifically on the UAE, Shanableh et al. (2022) conducted a study to examine the immediate impact of the lockdown on mobility and air quality in the UAE. The authors investigated mobility trends and correlated them with government-imposed safety measures to confirm the impact of the lockdown. Their findings demonstrated significant reductions in mobility across various categories of places during the lockdown period. Another relevant study by Hamad et al. (2024) examined the pandemic effects on travel patterns in the UAE. The study covered travel modes, frequency, duration, and distance, unveiling a pandemic-driven shift towards increased personal vehicle usage due to public transportation concerns. In contrast to previous studies in the UAE, our research focuses on uncovering the long-term effects of the pandemic on individuals'

risk perceptions, shopping habits, and attitudes, going beyond the immediate impact.

To complement this discussion, integrating modern technological applications such as Virtual Reality (VR) for safety improvements in logistics systems can offer transformative potential. Lewczuk and Żuchowicz (2024) presented an innovative VR framework to enhance safety in intralogistics systems, such as warehouses and distribution centers. Their study highlights how VR technology, supported by simulation environments, can effectively analyze and mitigate occupational hazards, offering practical benefits for logistics operations. Moreover, VR training modules can significantly improve the skills and awareness of employees, thereby reducing risks associated with intralogistics and increasing operational efficiency. Such advancements underline the vital role of emerging technologies in addressing the evolving challenges of e-commerce and logistics, particularly in the context of pandemic-driven changes.

2.3. Gap, Goal, and Specific Objectives

Despite the extensive body of research addressing the immediate impacts of COVID-19 on travel behavior and consumer shopping habits, there is a noticeable gap in understanding the long- term effects of the pandemic on individuals' travel risk perceptions and shopping behaviors, particularly in the context of the UAE. Previous studies have predominantly focused on short-term changes and specific aspects of behavior, often overlooking the sustained transformations in daily life brought about by the pandemic. This study seeks to fill this gap by providing a comprehensive analysis of how the pandemic has reshaped travel and shopping behaviors over an extended period, offering valuable insights beyond the crisis's immediate aftermath.

The primary goal of this study is to provide significant insights into individuals' mode choice perceptions and consumer behavior during and post-pandemic periods. While previous research has predominantly focused on travel risk perception from a tourist's perspective, this study takes a comprehensive approach by examining individuals' risk perceptions associated with six different modes of travel during and after the pandemic. Additionally, this study examines risk perceptions related to seven distinct travel activities during and after the pandemic while specifically focusing on their

comfort levels with various activities after the pandemic. Furthermore, the study explores participants' food ordering habits and preferences for online and in-store shopping for groceries and non-food items across three different periods. By integrating these two vital aspects, namely travel risk perceptions and shopping habits and attitudes, within a single study, a holistic understanding of individuals' behavior is achieved. The insights gained from this research are invaluable for policymakers in formulating effective strategies to mitigate risks, enhance public safety, and establish sustainable travel and consumption patterns. Consequently, the findings hold significant implications for informing policy interventions and improving crisis management practices, particularly in response to future public health challenges and emergencies similar to the COVID-19 pandemic.

To achieve this goal, the study is guided by the following specific objectives:

1. Analyze and examine how risk perceptions associated with different modes of travel (e.g., public transport, private vehicles, walking) have evolved during and after the pandemic.
2. Investigate comfort levels related to various travel-related activities, such as commuting, domestic travel, and international travel, during and after the pandemic.
3. Explore the changes in shopping preferences and habits, focusing on online versus in-store shopping for groceries and non-food items across the pre-pandemic, during-pandemic, and post-pandemic periods.
4. Determine how different socioeconomic factors (e.g., age, income, education) have influenced the observed changes in travel risk perceptions and shopping behaviors.

Assess the long-term implications of the pandemic on mobility choices and consumer preferences, with a focus on understanding the persistence of these changes. This study makes a significant contribution to the existing literature by offering a full understanding of the long-term effects of the COVID-19 pandemic on travel risk perceptions and shopping behaviors in the UAE. By integrating two critical aspects of daily life - travel and shopping - into a single research framework, this study provides a clear perspective on how the pandemic has reshaped individual behaviors. The findings are expected to inform policymakers and business leaders

in developing strategies that address individuals' evolving needs, promote resilience in the face of future public health challenges, and enhance crisis management practices.

2.4. Methods

Figure 1 illustrates the methodological framework applied in this study to examine the enduring effects of COVID-19 on travel risk perceptions and the shopping habits and attitudes of individuals in the UAE. The research encompasses four distinct phases: data collection, data pre- processing, data analysis, and presentation of results.

The survey employed in this study was designed to comprehensively capture participants' demographic characteristics, travel risk perceptions, and shopping habits across three distinct periods: pre-pandemic, during the pandemic, and post-pandemic. The survey questions were divided into three main groups:

Group   A: Demographics This section gathered information on participants' socioeconomic and demographic profiles, including:

– **Gender**: Options included male, female, and prefer not to say.
– **Age Group**: Participants were categorized into six age ranges (18–24, 25–34, 35– 44, 45– 54, 55–64, and 65+ years).
– **Residency Status**: Options included Emirati, Arab resident, non-Arab resident, and visitor.
– **Emirate of Residence**: Respondents identified their place of residence within the UAE's seven emirates (e.g., Abu Dhabi, Dubai, Sharjah, etc.).
– **Education Level**: Ranging from elementary school to doctorate.
– **Marital Status**: Categories included single, married (with or without children), divorced, widowed, and prefer not to say.
– **Monthly Income Range**: Income brackets included less than 5,000 AED, 5,000– 15,000 AED, 15,000–30,000 AED, and higher, as well as "not applicable/prefer not to say.
– **Employment Status and Sector**: Participants indicated whether they were employed full-time or part-time, retired, a student, or unemployed. Those employed specified their job sector (e.g., government, healthcare, education, or others).

– **COVID-19 Experience**: Respondents noted whether they had tested positive for COVID-19, their vaccination status, or if they were unvaccinated.

Group B: Travel Risk Perceptions This section explored participants' perceptions of travel-related risks during and after the pandemic:

– **Travel Modes:** Participants assessed the perceived COVID-19 risk of using various transportation modes, including personal vehicles, carpooling/shared cars, ride- hailing services, public transportation (bus/metro), and non-motorized modes (cycling and walking). Risk perceptions were categorized as high, medium, or low risk.
– **Travel-Related Activities:** Respondents evaluated the perceived COVID-19 risk of activities such as going to hospitals, shopping in-store, dining at restaurants, visiting family and friends, going to parks, attending cinemas, and gym/fitness center visits.
– **Post-Pandemic** Comfort Levels: Participants were asked how comfortable they felt performing activities like traveling by air, using ride-hailing services, staying at hotels, attending events, and dining in restaurants.

Group C: Shopping Habits and Attitudes This section captured participants' behaviors and preferences regarding shopping and food ordering during the three analysis periods:

– **Food Ordering:** Frequency of ordering food each week (e.g., 0, 1–2, 3–5, or 5+ times).
– **Grocery** Shopping: Frequency of in-store and online grocery shopping each week.
– **Non-Food Shopping**: Frequency of in-store and online shopping for non-food items each month.

The survey questions were distributed online and through in-person interviews to ensure a representative sample of the UAE population. This design enabled a detailed analysis of the long- term impacts of the COVID-19 pandemic on individuals' travel behaviors and shopping habits, segmented by key demographic factors. Quantitative analysis of the survey data was carried out using statistical methods to uncover significant patterns and trends.
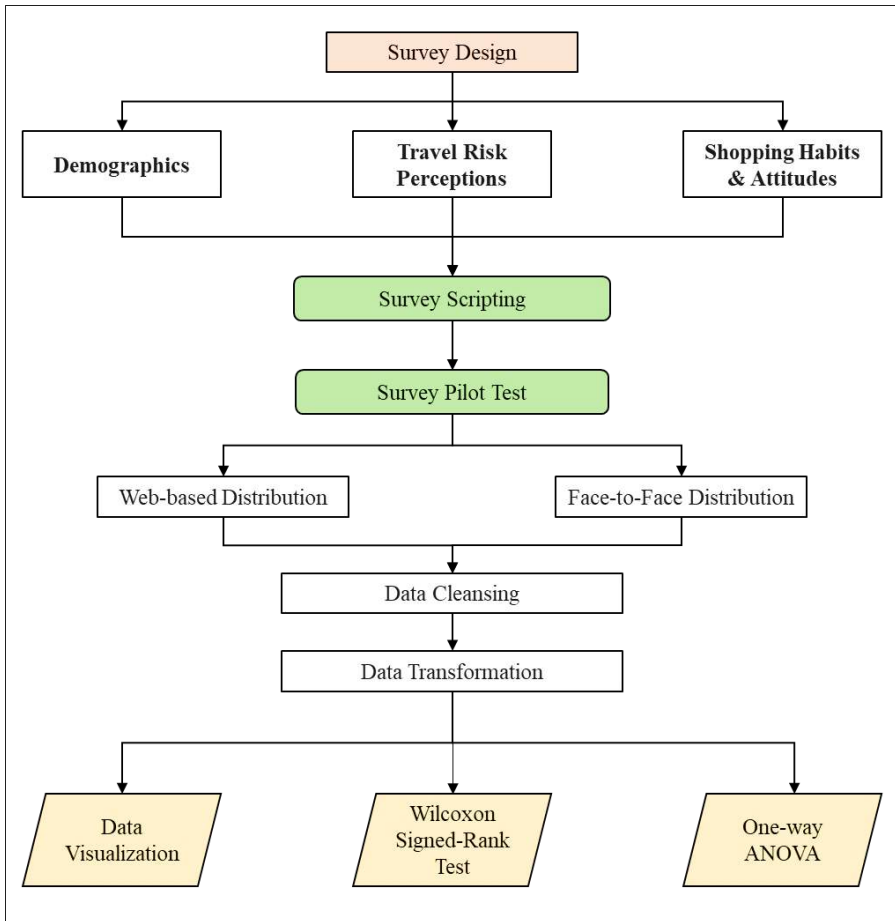
Fig. 1. Methodology Framework

The following equation was employed to calculate the required sample size, considering the UAE population of approximately 10.2 million (Taherdoost, 2017):

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)} \tag{1}$$

Where n' is the required sample size, N is the total population size (10.2 million in this study), Z is the Z-score corresponding to the desired confidence level (1.96 for 95% confidence level), P is the estimated proportion of the population exhibiting the attribute of interest (50%, or 0.5, used as a conservative estimate for maximum variability), d is the Precision (margin of error) desired in the estimate (5%, or 0.05 in this study). Using these values, the calculated sample size was 385, ensuring the reliability of our survey results.

The survey was conducted to gather information on participants' socioeconomic demographics, travel risk perceptions during the COVID-19 pandemic (spring 2020 and summer 2021) and after the pandemic (post-summer 2021), and their shopping habits and attitudes during these periods. The primary objective was to examine the dynamic shifts in participants' attitudes and perceptions over time. A meticulous pilot test was conducted using Google Forms to ensure a representative sample, enabling

valuable feedback for refining the survey instrument. Subsequently, the survey utilized a dual sampling approach. The initial method involved expanding the sample size through the "Snowball" technique via the web-based survey. However, biases concerning participants' emirate of residence and age groups became apparent. To address these issues, a professional market research firm was recruited to conduct face-to-face interviews with participants in public settings. The "maximum variation" method was applied for this sampling stage, deliberately selecting participants with specific demographics to ensure a diverse and representative sample. The next critical phase entails data pre-processing, a crucial step in preparing the collected survey data for analysis. In this phase, removing illogical and straight-line responses ensured data integrity, while applying translation and dummy coding methods facilitates standardized analysis.

In the data analysis phase, our findings are presented through various visualization techniques, including pie charts, stacked column charts, and alluvial plots. These visualizations effectively show the survey data clearly and meaningfully, unveiling insights that may not be readily apparent. Alluvial plots are graphical representations commonly utilized in data visualization to illustrate the movement and flow of data points among different categories or groups. Additionally, our findings are substantiated through statistical analyses, mainly using the Wilcoxon signed-rank test and one-way Analysis of Variance (ANOVA). These statistical methods enable the examination of significant disparities in participants' perceptions, habits, and attitudes before, during, and after the pandemic. The Wilcoxon signed-rank test, a nonparametric statistical tool, is deployed to analyze matched-pair data. Its fundamental purpose is to assess the concordance between the probability distributions of two correlated datasets. This test proves especially advantageous when handling ordinal data or data that significantly deviates from the assumptions of a normal distribution (MacFarland et al., 2016). It is employed to determine whether significant variations exist across two distinct periods within the dataset. Furthermore, the Analysis of Variance (ANOVA) stands out as it compares the means of a dependent variable across two or more groups (Ross et al., 2017). Its primary application involves evaluating whether participants' demographic

characteristics influence their responses within the survey context.

This study employs a comprehensive methodological approach to gain a detailed understanding of the data collected. It aims to provide valuable insights into the effects of COVID-19 on travel risk perceptions and shopping habits in the UAE, contributing to a better understanding of the lasting impacts of the pandemic.

3. Results And Discussion
3.1. Sample Descriptive Statistics

The survey received significant responses, with 1,805 participants representing diverse demographics in the UAE, surpassing the minimum required sample size. However, following rigorous data cleansing, approximately 100 responses were excluded. The online survey achieved a commendable response rate of 92.7%, surpassing the average response rates typically reported in scholarly work involving in-person and online survey methodologies (Nayak & Narayan, 2019). However, the precise response rate remains unattainable for face-to-face interviews conducted by the market research firm.

Regarding gender distribution, Figure 2(a) illustrates that approximately 56% of respondents were male, 42% were female, and 1% chose not to disclose their gender. These findings align with the reported male-to-female ratio in the UAE, which can be attributed to the unique demographic composition of the country, primarily influenced by a dominant presence of young male expatriates (GMI, 2023; Hamad, 2016). Moreover, Figure 2(b) displays the distribution of participants across various age groups. Notably, 64% of respondents were found in the 18-24 and 25-34 age brackets, indicating a significant proportion of younger individuals. The remaining participants were distributed among different age groups, with 22% falling in the 35-44 age range, 9% in the 45-54 age range, 5% in the 55-64 age range, and 1% aged 65 and above. This distribution aligns with the overall age structure of the UAE population, where a substantial portion lies within the 15-64 age range (Statista, 2023). Furthermore, Figure 2(c) and Figure 2(d) provide insights into the survey participants' residency status and emirate of residence, respectively. Most participants were classified as non-Arab residents (51%), with Arab residents comprising 25% of the sample. Emiratis represented 21% of the

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respondents, while visitors accounted for 2%. Geographically, the highest proportion of participants resided in Dubai (32%), followed by Sharjah (21%), Abu Dhabi (25%), Ajman (12%), Ras Al Khaimah, and Umm Al Quwain (4% each), and Fujairah (3%). These findings align with the population distribution observed in the respective cities within the UAE (GMI, 2023). The demographics section of this study provides valuable insights into the surveyed population's age, gender, and residency and highlights the representation of the sample within the country's population distribution.

3.2. Travel Risk Perceptions

In this section, individuals' risk perceptions are investigated during and after the peak of the COVID-19 pandemic. Specifically, the perceptions of the risks associated with various travel modes and activities are examined. Furthermore, their post-pandemic comfort levels are assessed by inquiring about their comfort level with different activities once the pandemic has subsided. This will provide a comprehensive understanding of the shifts in risk tolerance and post-pandemic behavior expectations.

3.2.1. Mode of Travel During the Peak of the Pandemic

The risk perceptions of individuals towards a series of modes of transportation during the pandemic's peak are shown in Figure 3.
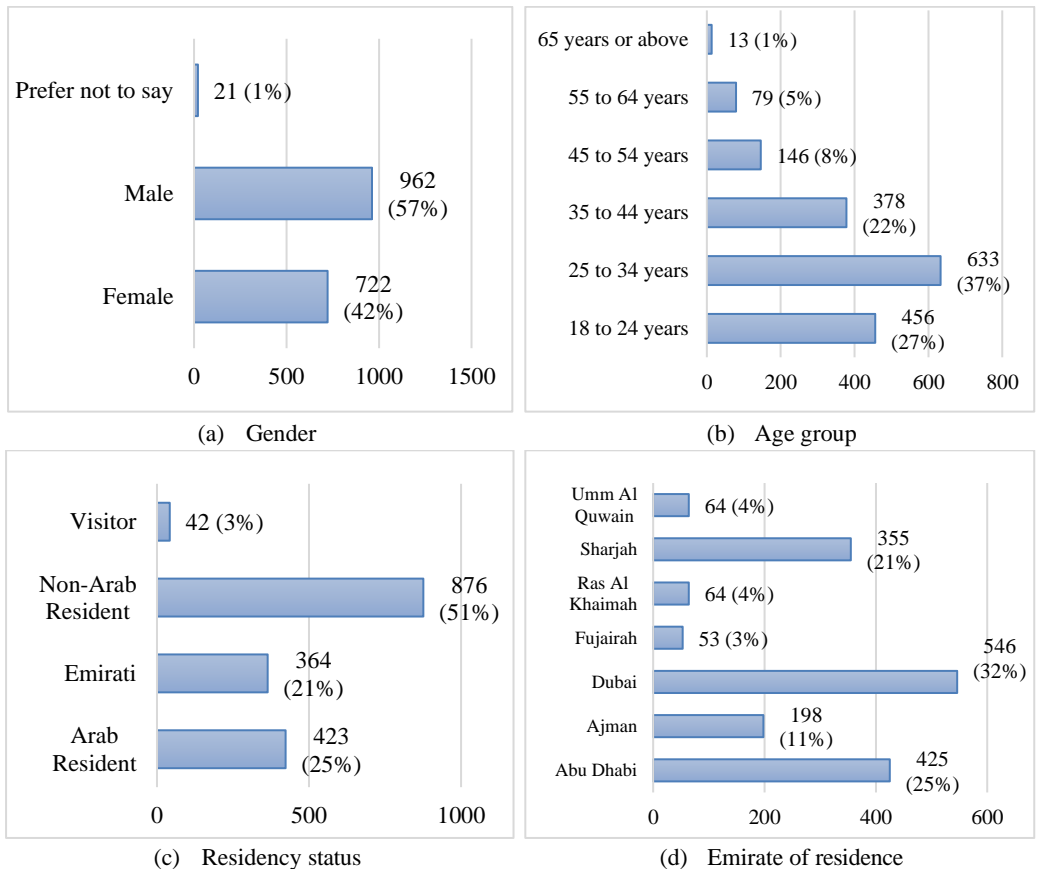

Fig. 2. Demographic and Socioeconomic Characteristics: (a) Gender, (b) Age Group, (c) Residency Status, and (d) Emirate of Residence
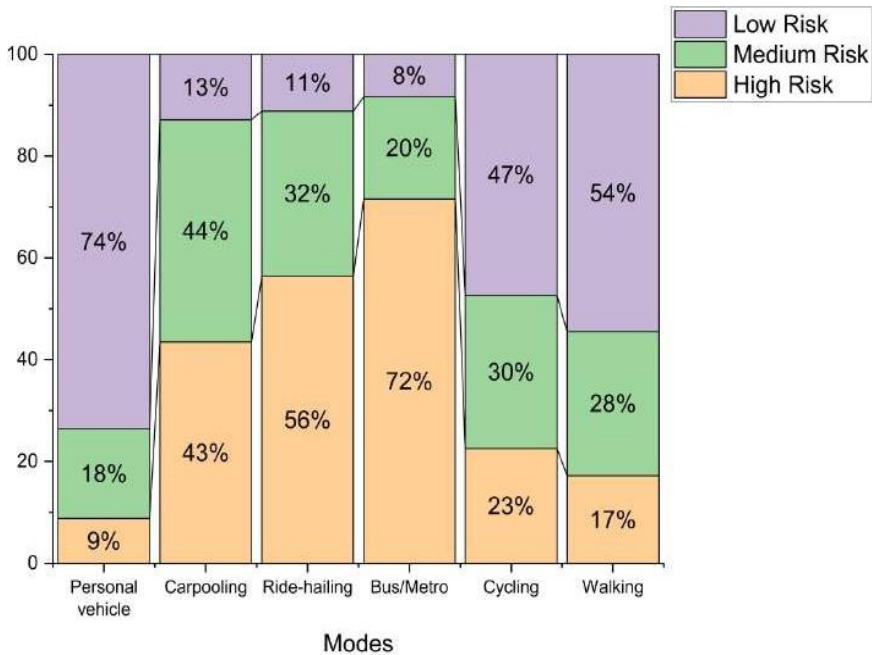
Fig. 3. The Riskiness of Modes of Travel During the Peak of the Pandemic

Figure 3 depicts the risk perception of various modes of transportation during the peak of the COVID-19 pandemic. The results show that only 9% of individuals perceived their personal vehicle as high-risk transportation. This indicates that the majority of individuals felt relatively safe traveling in their personal vehicles. On the other hand, 72% of individuals perceived public transport like buses and metro as high-risk during the pandemic, the highest among all modes of transportation. This may be due to the potentially increased exposure to the virus when traveling in crowded public transport. These findings are consistent with the research conducted by Dingil & Esztergár-Kiss (2021), who noted a substantial avoidance of buses during the pandemic, with 62% expressing hesitancy, while only 3% raised similar concerns about cars.

Interestingly, 43% of individuals perceived carpooling or shared cars as high risk during the pandemic, while only 13% considered it low risk. This could be due to the uncertainty of who the other travelers would be and whether they would take adequate precautions against the virus. The same trend was observed for ride-hailing services, with 56%

perceiving them as high-risk and 11% perceiving them as low-risk.

Cycling and walking were considered low-risk modes of transportation by 47% and 54% of individuals, respectively. This could be due to the absence of a confined space and the ability to maintain social distancing while cycling or walking. A moderate risk perception was observed for both modes of transportation, with 30% and 28%, respectively.

Generally, the results suggest that individuals considered personal vehicles and non-motorized modes of transportation relatively safer than public transport and ride-hailing services during the pandemic. These findings may have implications for transportation planners and policymakers considering the safety concerns of individuals while planning transportation systems post- pandemic.

3.2.2. Mode of Travel After the Pandemic

The risk perceptions of individuals towards various modes of transportation after the pandemic are depicted in Figure 4. The results indicate a decrease in the percentage of individuals who perceive the modes of transportation as high risk. Personal vehicles are perceived as low risk by most individuals

(81%), followed by cycling (64%) and walking (72%). On the other hand, bus/metro and ride-hailing services continue to be viewed as high-risk by the majority of individuals, with 36% and 26% expressing this perception, respectively. This aligns with the findings of Cho & Park (2021), indicating an amplified concern regarding infectious diseases in public transportation following the COVID-19 pandemic, thus explaining its sustained perception as high-risk. Carpooling/shared cars are perceived as a medium risk by the largest share of individuals (47%).

After examining both Figure 3 and Figure 4, the trend suggests a shift in individuals' risk perception toward modes of transportation after the pandemic. Personal vehicles, cycling, and walking modes have the least risk perception in both figures, with a higher percentage of individuals perceiving them as low risk after the pandemic. On the other hand, the bus/metro mode has the highest risk perception in both figures, consistent with findings from Bari et al. (2021), who examined educational travel behavior during the pandemic's onset and noted parental reluctance to use public transport for their children's commute. Nonetheless, there has been a noticeable decline in the perceived risk of utilizing public transportation compared to the pandemic's peak. The carpooling/shared car and ride-hailing modes have seen an increase in the percentage of individuals perceiving them as low risk and a decrease in the rate of perceiving them as high risk after the pandemic.

Overall, the trend suggests a shift towards a lower risk perception of individuals towards personal modes of transportation after the pandemic, especially towards private vehicles and cycling modes. This could be due to the increased emphasis on personal hygiene and the desire for more control over one's environment during the pandemic. Meanwhile, the perception of bus/metro and ride-hailing as high risk indicates a continued wariness of shared modes of transportation, even after the pandemic subsides. The perception of carpooling/shared cars as medium risk suggests a cautious approach towards shared modes of transportation, balancing convenience and cost savings with the potential risks involved.
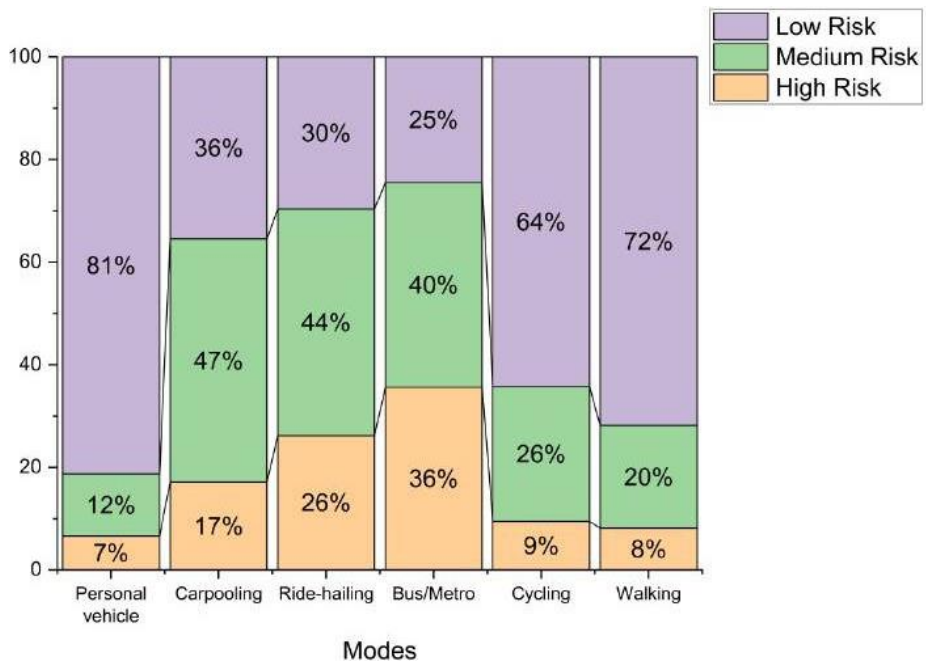

Fig. 4. The Riskiness of Modes of Travel After the Pandemic

3.2.3. Travel Activities During the Peak of the Pandemic

Figure 5 shows individuals' risk perception towards performing various activities during the pandemic. Most participants perceive going to hospitals as high risk (73%). This may be due to concerns about being exposed to the virus because many infected people usually go to the hospital for a checkup. Similarly, 52% to 55% of participants perceive going out for in-store shopping, dining at restaurants, and visiting cinemas as high risk. The trend in these activities suggests that people are cautious about social gatherings and exposure to public spaces during the pandemic. On the other hand, visiting family and friends and going to parks have lower perceived risks, with 38% and 35%, respectively. This may indicate that individuals feel more comfortable with close personal contacts and outdoor activities than public gatherings. Lastly, 61% of participants see going to the gym or fitness center as high risk, while only 10% see it as low risk. This highlights the perceived risk of indoor activities and exposure to large crowds.

3.2.4. Travel Activities After the Pandemic

Figure 6 displays individuals' risk perception toward performing different activities after the pandemic's peak. The percentage of individuals who view going to hospitals as high risk has decreased from 73% to 25%. Similarly, the rate of individuals who view in-store shopping, dining at restaurants, and visiting family and friends as high-risk has also decreased. The percentage of individuals who view gym/fitness centers and parks as high risk has reduced from 61% and 35% to 19% and 11%, respectively. The percentage of individuals who view cinemas as high-risk has decreased from 53% to 17%.

The changes in risk perceptions towards performing certain activities after the pandemic's peak indicate a shift in the general public's confidence and comfort level toward returning to more normal activities. The decrease in high-risk perceptions towards activities such as visiting hospitals, shopping in-store, dining at restaurants, visiting family and friends, and going to the gym/fitness centers suggests that people are feeling more confident in taking these actions as the pandemic situation improves. Moreover, there has been an increase in low-risk perceptions towards going to cinemas and parks.
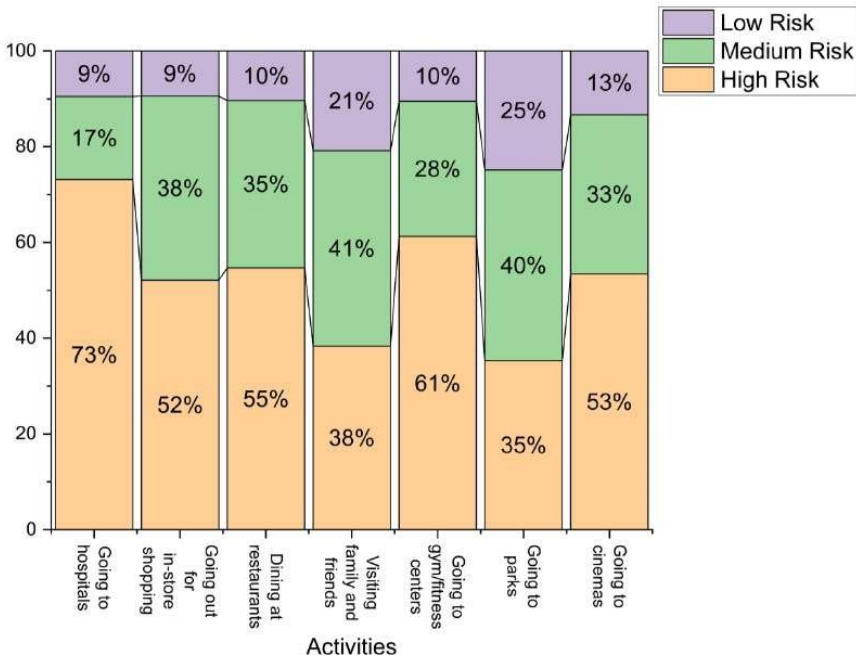

Fig. 5. Riskiness of Travel Activities During the Peak of the Pandemic

Hamad, K. et al.
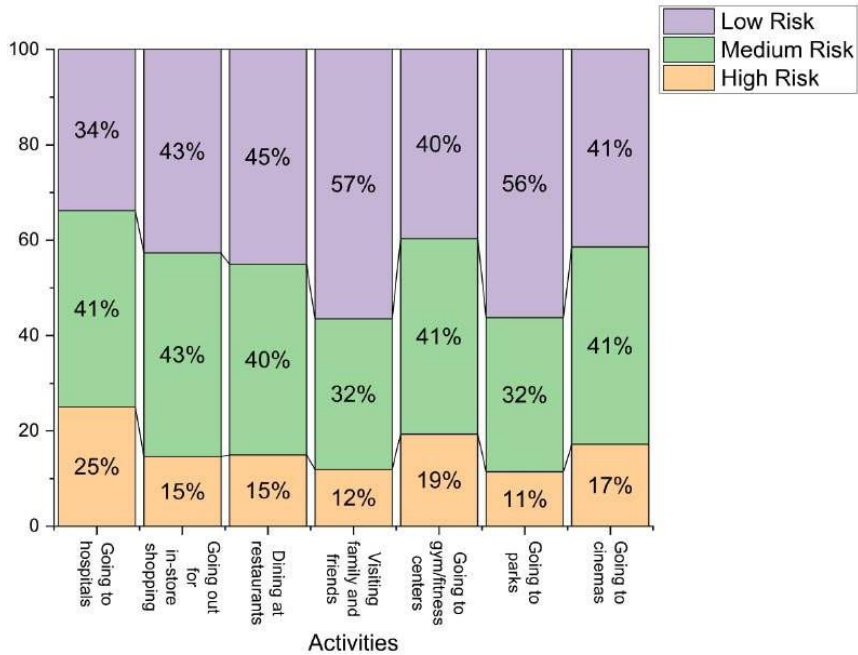Archives of Transport, 73(1), 7-34, 2025

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Fig. 6. The Riskiness of Travel Activities After the Pandemic

Various elements, such as government regulations, vaccine access, and personal views on the pandemic, can impact risk perception shifts. The results imply that as conditions improve, individuals regain the confidence to engage in more everyday activities while maintaining caution in certain circumstances.

3.2.5. Post-Pandemic Activity Comfort Levels

Figure 7 indicates that individuals are more comfortable resuming certain activities after the pandemic. Participants were questioned explicitly about their comfort levels regarding engagement in these activities once the pandemic subsided, with no comparisons between different periods since the focus was solely on their comfort post-pandemic. Out of all the activities listed, traveling by air and dining at a restaurant seems to be the most appealing to individuals, with 61% of people expressing that they would feel comfortable doing so. On the other hand, activities such as attending concerts/sporting events and using public transportation seem to be the least appealing, with only 44% and 34% of individuals feeling comfortable, respectively.

However, the trend shows that many individuals remain neutral about most activities, indicating a cautious approach toward resuming everyday life. The data highlights that while comfort levels have increased, a significant portion of people still remain uncertain about fully embracing activities they used to enjoy pre-pandemic. The trend suggests that people are more comfortable with activities that are perceived to be lower risk and more personal in nature, such as dining and hotel stays. In comparison, activities with higher perceived risk, such as public transportation or attending events, have lower comfort levels. The data implies that people are gradually becoming more comfortable performing activities as the pandemic improves but still have reservations about activities involving large gatherings or close contact with others.

3.2.6. Wilcoxon signed-rank test of Risk Perceptions

The findings of the Wilcoxon signed-rank test are displayed in Table 1, offering a valuable and illuminating understanding of the shift in risk perception between two pivotal periods - the peak of the

pandemic and after the pandemic. The table summarizes whether the alteration in risk perception is statistically significant and highlights the impact of the pandemic on people's attitudes toward risks associated with various activities and modes of travel. A noticeable trend is a remarkable and statistically significant transformation in the risk perceptions for each mode, indicating that individuals have altered their views on the riskiness of these modes since the pandemic. This suggests a higher level of comfort and ease with these modes compared to their perceptions during the pandemic.
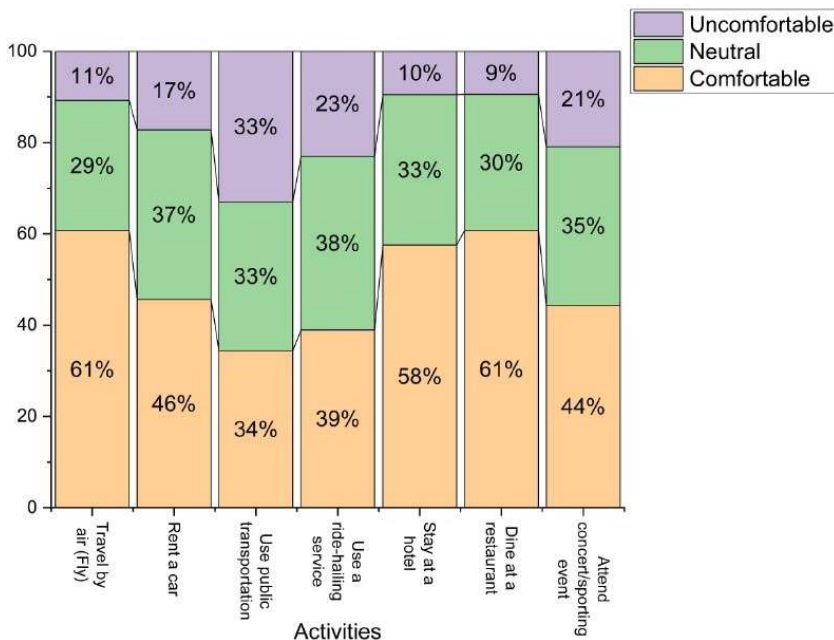
Fig. 7. Post-Pandemic Activity Comfort Levels

Table 1. Wilcoxon Signed-Rank Test for Riskiness of Different Modes and Travel Activities

Mode of Travel		
Variable	**Periods**	**Sig. (2-tailed)**
Personal vehicle	During – After	0.000**
Shared car	During – After	0.000**
Ride-hailing	During – After	0.000**
Bus/Metro	During – After	0.000**
Cycling	During – After	0.000**
Walking	During – After	0.000**
Different Travel Activities		
Variable	Periods	Sig. (2-tailed)
Going to hospitals	During – After	0.000**
Shopping in-stores	During – After	0.000**
Dining at restaurants	During – After	0.000**
Visiting family	During – After	0.000**
Going to the gym	During – After	0.000**
Going to parks	During – After	0.000**
Going to cinemas	During – After	0.000**

**Significant at the .01 level

Moreover, the shift in individuals' risk perceptions regarding various travel activities is presented. Notably, a statistically significant change in risk perception is evident for all travel activities, implying a shift in individuals' perception of risk associated with these activities. The results suggest that individuals feel more confident about participating in these activities post- pandemic than during the pandemic.

3.3. Shopping and Food Ordering Habits and Attitudes

In the previous section, the study focused on individuals' risk perceptions during and after the COVID-19 pandemic. Specifically, we focused on investigating the participants' perceptions of the risks linked with various modes of travel and travel activities. Furthermore, the section evaluated participants' comfort level with engaging in specific activities after the pandemic subsided. In this section, the participants' shopping and food ordering habits and attitudes across three time periods, before, during, and after the COVID-19 pandemic, were comprehensively evaluated. The data collected in this section sheds light on the significant changes in individuals' shopping and food ordering behaviors and attitudes due to the COVID-19 pandemic.

By comparing their practices across three different periods, it was observed that the pandemic profoundly impacted people's daily routines and decision-making.

3.3.1. Ordering Food

Figure 8 displays a comprehensive alluvial plot showcasing the frequency of food ordering among individuals and how it changed during and after the pandemic. The data reveals a significant shift in behavior, with a staggering 32% of individuals who previously ordered food 1-2 times a week ceasing their orders entirely during the pandemic. Additionally, a considerable 25% of individuals who used to order food 3-5 times a week before the pandemic also discontinued their orders during this time. Moreover, a noteworthy 13% of individuals who ordered food five or more times a week before the pandemic also ceased their orders.
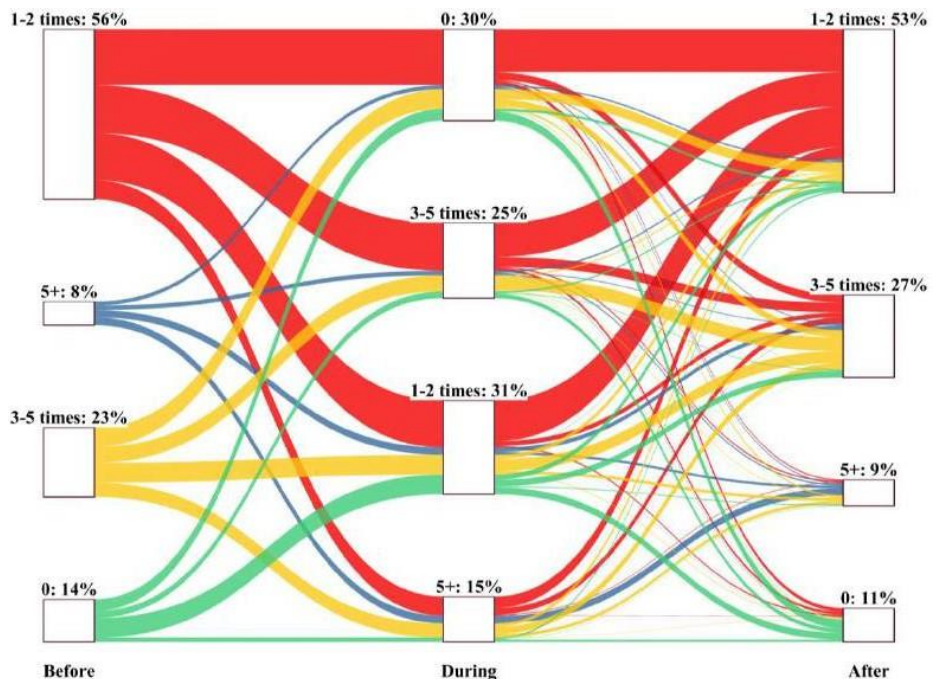

Fig. 8. Alluvial Plot of the Food Ordering Habits

On the other hand, the data also highlights some positive changes, with an impressive 27% of individuals who previously ordered food 1-2 times a week increasing their orders to 3-5 times a week during the pandemic. Furthermore, 11% of individuals who previously ordered 1-2 times a week increased their orders to 5 or more times a week. The ordering food trend indicates that the post-pandemic percentages are returning to pre-pandemic levels.

3.3.2. In-Store Grocery Shopping

The changes in individuals' frequency of in-person grocery shopping over three periods are presented in Figure 9. Significantly, a notable percentage of individuals (58%) who previously engaged in grocery shopping 4-7 times weekly before the pandemic substantially reduced their frequency to 1-3 times weekly during the pandemic. Likewise, approximately half (47%) of those who formerly shopped for groceries seven or more times weekly also decreased their frequency to 1 to 3 times weekly amid the pandemic. Furthermore, a substantial portion of

individuals (32%) who previously shopped for groceries 1-3 times weekly discontinued this practice during the pandemic. These findings resonate with the study conducted by Zannat et al., which observed a higher frequency of shopping trips per week in Bangladesh before the pandemic (Zannat et al., 2021).

Contrarily, a considerable number of individuals (42%) who did not shop in person for groceries before the pandemic began to do so at a frequency of 1-3 times per week during the pandemic. This observation is consistent with the findings of Habib et al., where approximately 30% of the respondents reported an increase in their food, beverage, and grocery-related trips during the pandemic (Habib et al., 2021). Interestingly, some individuals (13%) who previously shopped for groceries 1-3 times per week even increased their shopping frequency during the pandemic. Finally, after the pandemic, individuals' in-person grocery shopping habits seemed to revert to their pre-pandemic frequencies.
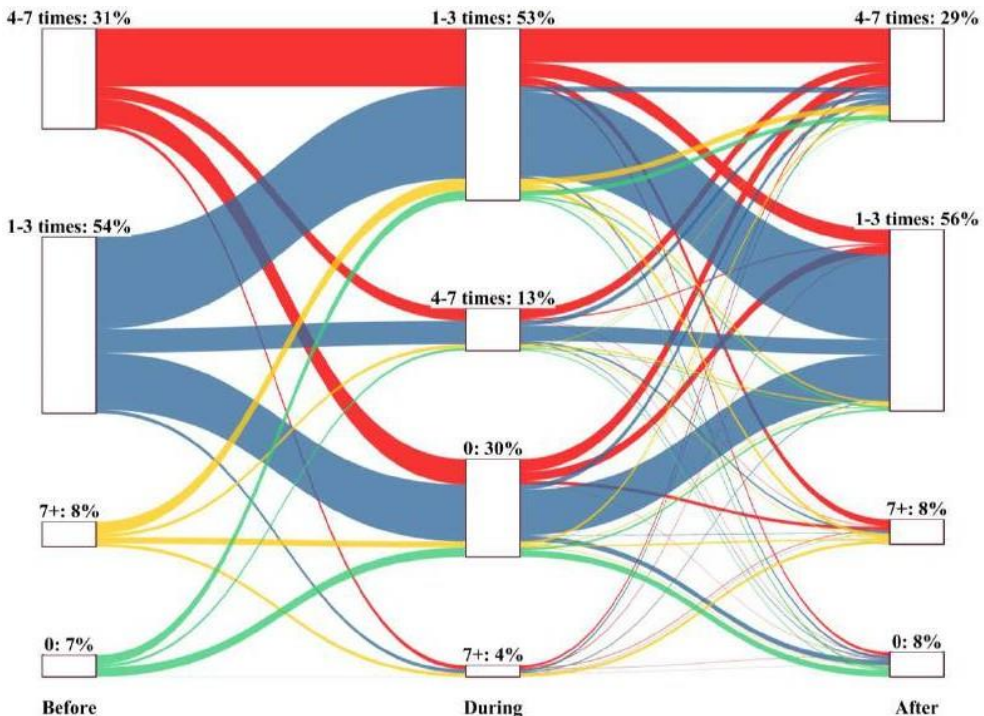

Fig. 9. Alluvial Plot of the In-Store Grocery Shopping Habits

3.3.3. Online Grocery Shopping

Figure 10 shows the alluvial plot of online grocery shopping habits among individuals over three periods. A noticeable shift can be observed as 43% of those who did not previously order groceries online began to do so 1-3 times per week during the pandemic. Additionally, 19% of individuals who never ordered groceries online before the pandemic started doing so 4-7 times per week during the pandemic, and an impressive 4% even started ordering groceries seven or more times per week. Moreover, 35% of those who previously ordered groceries online 1-3 times per week increased their frequency to 4-7 times per week during the pandemic. Conversely, it was observed that 38% of individuals who previously ordered groceries online 4-7 times per week decreased their frequency to 1-3 times per week during the pandemic, and 12% of individuals who previously ordered 1-3 times per week stopped ordering groceries online altogether during the pandemic. This might be attributed to individuals' fears of contracting the virus from delivery parties, as they are exposed to many customers and could be carriers of the virus.

In summary, both in-store and online shopping frequency underwent changes during the pandemic, but the trends were different. The frequency of in-store shopping 4-7 times and seven or more times per week decreased during the pandemic, while the frequency of online shopping 4- 7 times and seven or more times per week increased. After the pandemic, the frequencies of both in-store and online shopping went back to similar levels as before the pandemic

3.3.4. In-Store Shopping for Non-Food Items

Figure 11 shows the alluvial plot highlighting the variation in shopping behavior for in-person non-food purchases across three periods. It is evident that during the pandemic, a considerable 42% of individuals who previously shopped for non-food items ceased to do so. Additionally, those who shopped 4-7 times and seven or more times per month before the pandemic saw a decrease in their shopping frequency, with 27% and 19%, respectively, halting their purchases altogether.
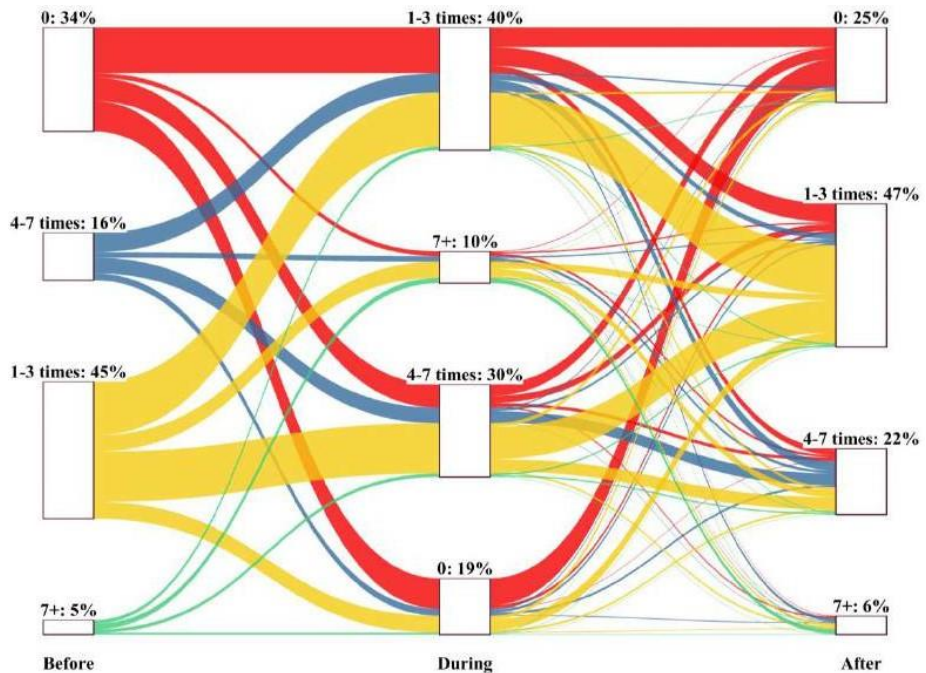

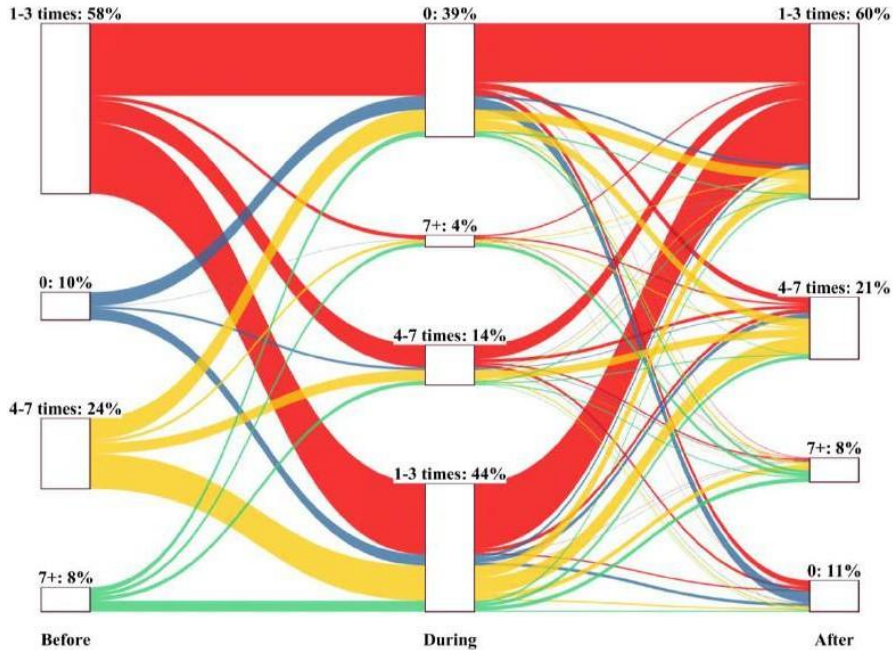Fig. 10. Alluvial Plot of the Online Grocery Shopping Habits

Fig. 11. Alluvial Plot of the In-Store Shopping for Non-Food Items Habits

Meanwhile, most of those who shopped 4-7 times per month before the pandemic reduced their visits to 1-3 times, and a substantial 40% of those who shopped seven or more times similarly lowered their shopping frequency. This shift in behavior can be attributed to the perceived non-essential nature of non-food items, which led individuals to prioritize their health and safety over non-critical purchases. However, a notable 13% of individuals who previously shopped 1-3 times per month increased their visits to 4-7 times during the pandemic.

3.3.5. Online Shopping for Non-Food Items
The alluvial plot in Figure 12 highlights the fluctuation of online shopping habits for non-food items among individuals. During the pandemic, 28% of individuals escalated their ordering frequency from 1-3 times per month to a frequent 4-7 times per month. Additionally, a substantial 9% even increased their orders to 7 or more times per month. Furthermore, a remarkable 38% of individuals who had not previously ordered non-food items adopted the behavior and started ordering 1-3 times per month. An additional 19% even started ordering 4-7 times per

month. Conversely, 19% of individuals who previously ordered non-food items 1-3 times per month completely ceased the behavior during the pandemic.

In comparing the changes between the trends of in-store shopping and online shopping for non-food items, it can be observed that there was a shift from in-person shopping to online shopping during the pandemic. Individuals increased their online shopping behavior for non-food items during the pandemic due to various factors, including health and safety concerns, convenience, and limited in-store availability. The COVID-19 pandemic led to widespread store closures and restrictions, making it difficult and risky for people to shop in person. Shopping online allowed individuals to purchase non-food items while avoiding potential exposure to the virus. Additionally, online shopping offers the convenience of browsing and purchasing items from the comfort of one's own home, which has become increasingly appealing as people spend more time at home due to lockdowns and other restrictions. As a result, many individuals shifted from in-store shopping to online shopping, increasing the percentage

of individuals who ordered non-food items online during the pandemic. However, the in-store and online shopping trend after the pandemic has returned to pre-pandemic levels.

3.3.6. Wilcoxon signed-rank test of Shopping and Food Ordering Habits

The Wilcoxon signed-rank test results are presented in Table 2, offering an insightful understanding of the changes in shopping and food ordering habits across the three periods, namely, before, during, and after the pandemic. One can see that for Question 1,

"How often do you order food per week?" the period "Before – During" was not statistically significant ($p = .973$), which implies that the food ordering habits of individuals changed during the pandemic. Still, it is likely due to chance or random differences.

The results for the remaining questions indicate a statistically significant change in individuals' shopping and food ordering habits during the pandemic and post-pandemic, with a p- value less than 0.05 in all comparison periods. This supports the hypothesis that the pandemic has had a lasting impact on these habits.
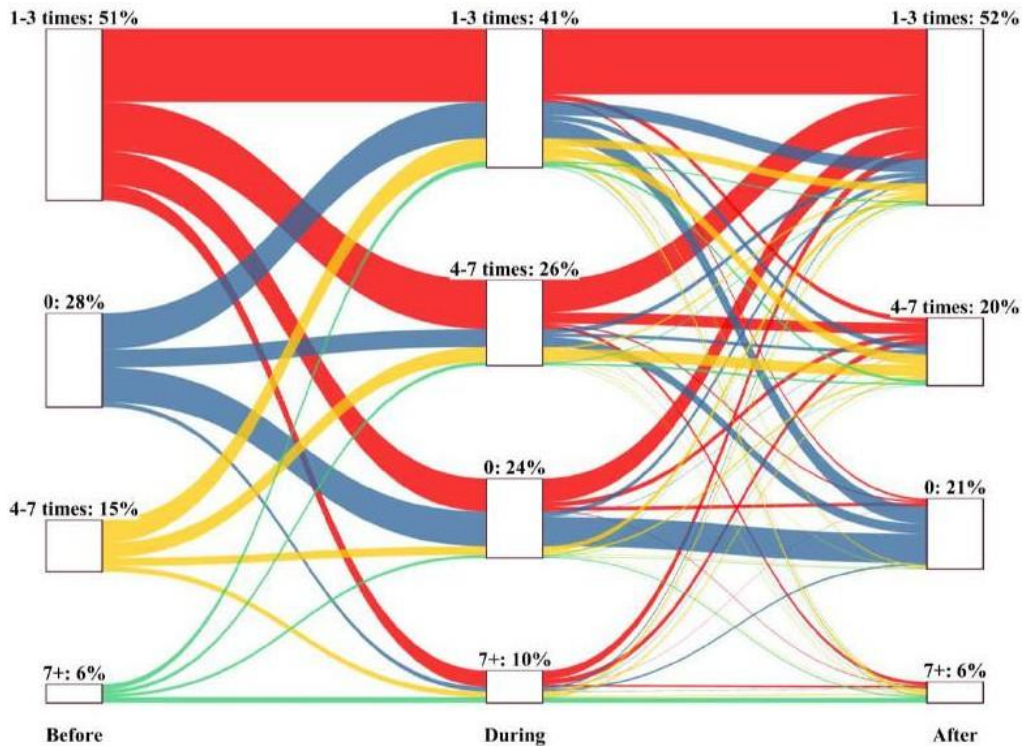
Fig. 12. Alluvial Plot of the Online Shopping for Non-Food Items Habits

3.3.7. One-Way Analysis of Variance

In the analysis of survey data, the demographic factors were examined in questions related to travel risk perceptions (starting with "B") and shopping habits and attitudes (starting with "C"). A one-way ANOVA was employed to assess the influence of these demographic variables, and the results are

summarized in Table 3, covering questions from B1-1 to C5-3. This analysis illuminates the significant demographic factors affecting the survey questions. The findings contribute to understanding how demographics shape perceptions and attitudes in the context of travel risk and shopping behaviors.

Table 2. Results of Wilcoxon Signed-Rank Test for Shopping and Food Ordering Habits

Question	Periods	Sig. (2-tailed)
1. Ordering food in a week	Before – During	0.973
	Before – After	0.000**
	During – After	0.004**
2. Grocery shopping in a week	Before – During	0.000**
	Before – After	0.043*
	During – After	0.000**
3. Ordering groceries in a week	Before – During	0.000**
	Before – After	0.000**
	During – After	0.000**
4. Non-food items shopping in a month	Before – During	0.000**
	Before – After	0.038*
	During – After	0.000**
5. Ordering non-food items in a month	Before – During	0.000**
	Before – After	0.000**
	During – After	0.000**

*Significant at the .05 level
**Significant at the .01 level

The ANOVA analysis revealed statistically significant impacts of demographic variables ($p < .05$) on several questions. Table4 provides a comprehensive overview of these influential demographic factors.

The influence of respondents' COVID-19 experiences is notably prominent, significantly affecting 14 questions. Among these, six questions relate to travel risk perceptions, and eight pertain to shopping habits and attitudes. This underscores the pandemic's enduring influence on both sections. One possible reason for this observation could be the different ways in which individuals have interacted with the virus. Given their prior immunity, those who were vaccinated and previously infected might feel more confident about travel and shopping. In contrast, those who are unvaccinated and infected may exercise caution, as they have experienced the virus's impact. These diverse experiences with COVID-19 could account for the variation in perceptions and behaviors, illustrating the complexity of the ongoing pandemic's influence on travel and shopping attitudes.

Furthermore, it was found that factors such as education level, marital status, employment status, and job sector exerted a considerable influence, impacting 12 to 13 questions each. This highlights the profound role that one's educational background, marital status, and occupation play in shaping their views and behaviors. These factors have a far-reaching impact on respondents' responses to the survey questions, illustrating the importance of considering these variables in various contexts.

Conversely, factors such as residency status and emirate of residence had a relatively lower impact, affecting 7 to 10 questions. While they are certainly relevant, their influence appears to be more limited than other demographic factors. Moreover, gender and monthly income had fewer impacts, influencing seven questions each. This suggests that while these factors contribute to differences in perceptions and attitudes, their influence is less pronounced than other demographic determinants.

These major findings provide a robust understanding of how key demographic factors shape questions in both travel risk perception and shopping habits and attitudes sections. These insights can be attributed to the enduring impact of COVID-19, generational differences, educational attainment, and marital dynamics, all of which play pivotal roles in shaping perspectives and behaviors. These findings are invaluable for policymakers and marketers looking to develop strategies that resonate with diverse demographic groups and for further research initiatives to understand the evolving landscape of travel and shopping behaviors

Table 3. Results of One-way ANOVA

Question		Gender	Age group	Residency status	Emirate of residence	Education	Marital status	Monthly income	Employment stat.	Job Sector	COV-19 Exp.
	B1-1	0.002**	-	-	-	0.160	-	0.005**	-	-	-
	B1-2	0.146	-	-	0.000**	-	-	-	-	-	0.356
	B1-3	0.518	0.184	-	-	0.472	-	0.000**	-	-	0.217
	B1-4	0.160	0.147	-	-	0.137	0.000**	-	0.011*	-	0.000**
	B1-5	0.000**	-	-	-	-	-	-	-	-	-
	B1-6	0.006**	-	-	-	0.169	-	-	-	-	-
	B2-1	0.292	0.144	-	-	-	-	-	-	-	-
	B2-2	0.060	0.038*	0.878	-	0.423	-	0.924	-	-	0.281
	B2-3	0.060	0.105	-	-	0.128	0.341	0.209	0.108	0.000**	0.075
	B2-4	-	0.086	-	-	0.032*	-	-	-	-	0.447
	B2-5	-	0.01*	0.000**	-	0.032*	-	0.162	-	-	-
	B2-6	-	0.312	0.110	-	0.237	-	-	-	-	-
	B3-1	-	-	-	-	-	-	-	-	-	-
	B3-2	0.069	0.007**	0.029*	-	0.001**	0.000**	0.054	0.000**	-	-
	B3-3	0.431	0.070	0.044*	0.000**	0.264	-	0.454	0.000**	-	0.000**
	B3-4	0.363	-	-	-	0.000**	-	0.006**	-	-	-
	B3-5	0.690	0.161	0.538	-	-	0.004**	-	-	-	0.000**
	B3-6	0.586	0.000**	0.000**	-	0.023*	0.004**	0.000**	0.000**	-	0.000**
Travel Risk Perceptions	B3-7	0.494	0.021*	0.365	0.000**	0.120	0.235	0.050*	0.000**	0.004**	0.078
	B4-1	0.000**	0.534	-	-	0.001**	-	0.200	0.113	0.000**	-
	B4-2	0.036*	0.175	0.247	-	0.141	0.001**	0.275	0.004**	-	0.424
	B4-3	0.002**	0.771	0.353	-	0.399	0.000**	0.731	0.509	-	0.153
	B4-4	-	0.325	-	-	-	-	0.398	0.02*	-	-
	B4-5	0.521	0.139	0.669	0.018*	0.002**	0.207	0.01*	0.281	-	0.207
	B4-6	0.268	0.324	0.300	-	-	-	0.449	-	0.144	0.049*
	B4-7	0.747	0.612	0.608	-	0.022*	0.000**	0.678	-	-	0.015*
	B5-1	0.184	0.521	-	-	-	0.136	0.781	0.586	-	0.710
	B5-2	0.901	0.310	0.04*	-	-	0.424	-	-	-	-
	B5-3	0.534	-	-	-	0.215	0.977	-	0.695	0.699	0.051
	B5-4	0.819	0.302	-	-	0.162	0.920	-	-	-	-
	B5-5	0.058	0.434	-	-	0.119	0.004**	0.931	0.038*	-	0.590
	B5-6	0.788	-	0.275	-	0.299	0.423	0.714	-	-	0.053
	B5-7	0.151	0.914	0.019*	-	0.235	-	-	-	0.014*	0.800
	D1-1	-	0.000**	-	0.000**	-	0.009**	-	0.000**	0.000**	-
	D1-2	-	-	-	0.000**	-	-	-	-	0.000**	-
	D1-3	-	0.892	0.293	-	-	-	0.581	0.479	0.000**	0.048*
	D2-1	-	-	-	0.000**	-	-	0.000**	-	0.000**	-
	D2-2	0.200	-	-	0.000**	0.396	-	-	-	0.000**	0.038*
Shopping Habits and Attitudes	D2-3	-	-	-	0.000**	0.018*	-	-	-	-	-
	D3-1	0.004**	0.007**	0.055	0.000**	-	-	-	-	-	0.001**
	D3-2	0.145	0.000**	-	-	0.000**	0.000**	-	0.000**	-	-
	D3-3	0.255	0.461	0.079	-	0.109	0.902	0.638	0.088	-	0.000**
	D4-1	0.163	-	-	-	0.002**	-	-	-	-	0.014*
	D4-2	0.059	-	0.000**	-	0.015*	0.014*	0.209	-	0.000**	0.007**
	D4-3	0.068	-	-	-	0.329	0.237	0.000**	-	-	0.245
	D5-1	0.634	0.182	0.776	-	-	-	-	0.002**	0.000**	0.000**
	D5-2	0.092	-	0.000**	-	0.005**	0.074	-	0.000**	0.000**	-
	D5-3	0.125	0.291	0.471	-	0.065	0.933	0.055	0.072	-	0.000**

Table 4. Significant Demographic Factors Influencing Survey Responses Across Questions

Demographic Factor	Affected Survey Questions
Gender	B1-1, B1-5, B1-6, B4-1, B4-2, B4-3
	C3-1
Age Group	B2-2, B2-5, B3-2, B3-6, B3-7
	C1-1, C3-1, C3-2
Residency Status	B2-5, B3-2, B3-6, B5-2, B5-7
	C4-2, C5-2
Emirate of Residence	B1-2, B3-3, B3-7, B3-5
	C1-1, C1-2, C2-1, C2-2, C2-3, C3-1
Level of Education	B2-4, B2-5, B3-2, B3-4, B3-6, B4-1, B4-5, B4-7
	C2-3, C3-2, C4-1, C4-2, C5-2
Marital Status	B1-4, B3-2, B3-5, B3-6, B4-2, B4-3, B4-7, B5-5
	C1-1, C3-2, C4-2
Monthly Income	B1-1, B1-3, B3-4, B3-6, B3-7, B4-5
	C2-1, C4-3
Employment Status	B1-4, B3-2, B3-3, B3-6, B3-7, B4-2, B4-4, B5-5
	C1-1, C3-2, C5-1, C5-2
Job Sector	B2-3, B3-7, B4-1, B5-7
	C1-1, C1-2, C1-3, C2-1, C2-2, C4-2, C5-1, C5-2
COVID-19 Experience	B1-4, B3-3, B3-5, B3-6, B4-6, B4-7
	C1-3, C2-2, C3-1, C3-3, C4-1, C4-2, C5-1, C5-3

4. Conclusions

The comprehensive analysis of survey responses provided valuable insights into the representative nature of the sample, encompassing various demographic dimensions such as gender, age, residency status, and emirate of residence. The findings revealed a noteworthy shift in participants' travel risk perceptions, indicating a decreased sense of risk post-pandemic. Notably, this shift is most pronounced in the context of personal modes of transportation, including personal vehicles, walking, and cycling, as these modes inherently minimize potential exposure. Furthermore, the study shed light on an interesting trend related to comfort levels in different activities. Participants displayed higher comfort levels with lower-risk activities such as dining out and hotel stays, reflecting a growing confidence in these areas. However, a distinct discomfort was observed concerning the use of public transportation. This discomfort suggests lingering concerns about potential virus transmission in crowded settings.

The analysis further shed light on changes in shopping behaviors during the pandemic. It was observed that in-person food and grocery ordering experienced a decline, possibly due to safety concerns and the adoption of alternative options. Conversely, online grocery shopping increased as individuals sought convenience and minimized their exposure to crowded places. Similarly, there was a noticeable decrease in in-person shopping for non-food items, likely influenced by restrictions and a shift towards online platforms for purchasing various goods. The increase in online shopping for non-food items reflects a broader shift towards e-commerce platforms as individuals embraced the convenience and safety of virtual shopping experiences.

The analysis, employing the Wilcoxon signed-rank test, emphasized the statistical significance of observed differences across the three periods, affirming substantial response shifts before, during, and after the pandemic. Furthermore, the one-way ANOVA indicated that nearly all demographic factors significantly influenced individuals' responses within this survey. Notably, the experiences of individuals with COVID-19 had a pronounced impact. Conversely, participants' gender appeared to be less prominent in shaping their responses. These findings offer valuable insights for policymakers, businesses, and researchers aiming to grasp the changing dynamics of consumer behavior in the aftermath of a global crisis.

In the future, research can expand beyond the single-country context to investigate the impacts of COVID-19 on travel risk perceptions and shopping habits on a regional, continental, or global scale, offering a more comprehensive insight into individual responses. Additionally, other statistical analyses,

such as regression analysis, can be employed to explore further the underlying relationships and patterns influencing individuals' reactions.

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Appendix 1. Different Group Questions and Response Options

Group	Questions	Variables/ Analysis Period	Response Options
	A1. What is your gender?	-	Male Female Prefer not to say
	A2. What is your age group?	-	18 to 24 years 25 to 34 years 35 to 44 years 45 to 54 years 55 to 64 years 65 years or above
	A3. What is your residency Status?	-	Emirati Arab Resident Non-Arab Resident Visitor
	A4. What is your emirate of residence?	-	Abu Dhabi Ajman Dubai Fujairah Ras Al Khaimah Sharjah Umm Al Quwain
	A5. What is the highest degree or level of education you have completed?	-	Bachelor's Degree Diploma Doctorate Degree Elementary School High School Master's Degree
Group A: Demographics	A6. What is your current marital status?	-	Divorced Married with Children Married without Children Prefer not to say Single - never married Widowed
	A7. What is your monthly income range?	-	15,000 - 30,000 AED 30,000 - 60,000 AED 5,000 - 15,000 AED Above 60,000 AED Less than 5,000 AED Not applicable/Prefer not to say
	A8. What is your current employment status?	-	Employed Full-Time Employed Part-Time Retired Student Unemployed
	A9. In which sector do you currently work?	-	Banking/Finance Business, consultancy, or management Charity and voluntary work Chemicals/Pharmaceuticals Computing or I.T. Construction sector Creative arts or design Education and research Energy and utilities Engineering or manufacturing

Group	Questions	Variables/ Analysis Period	Response Options
			Environment or agriculture Government/Public services Healthcare Hotel, leisure, sport, or tourism Law and judiciary Law enforcement and security Marketing, advertising, or public relations Media Others Real estate agent/developer Recruitment/Human resources Retail/Sales Social care Transport or logistics Unemployed
	A10. Please state your COVID-19 experience	-	I have not been tested positive for a COVID-19 infection previously, and I am unvaccinated. I have not been tested positive for a COVID-19 infection previously, and I am vaccinated. I have tested positive for a COVID-19 infection previously, and I am unvaccinated. I have tested positive for a COVID-19 infection previously, and I am vaccinated.
Group B: Travel Risk Perceptions	B1. During the pandemic's peak, how did you feel when traveling using these modes (in terms of COVID-19 infection risk)?	Personal Vehicle Carpooling/Shared Car Ride-hailing Bus/Metro Cycling Walking	High risk Low risk Medium risk Not applicable
	B2. How do you currently feel when traveling using these modes (in terms of COVID-19 infection risk)?	Personal Vehicle Carpooling/Shared Car Ride-hailing Bus/Metro Cycling Walking	High risk Low risk Medium risk Not applicable
	B3. During the peak of the pandemic, how did you feel when performing these activities (in terms of COVID-19 infection risk)?	Going to hospitals Going out for in-store shopping Dining at restaurants Visiting family and friends Going to gym/fitness centers Going to parks Going to cinemas	High risk Low risk Medium risk Not applicable
	B4. How do you currently feel when performing these activities (in terms of COVID-19 infection risk)?	Going to hospitals Going out for in-store shopping Dining at restaurants Visiting family and friends Going to gym/fitness centers Going to parks Going to cinemas	High risk Low risk Medium risk Not applicable
	B5. Once the pandemic has subsided, how comfortable will you feel doing each of these activities (in terms of COVID-19 infection risk)?	Travel by air (Fly) Rent a car Use public transportation Use a ride-hailing service Stay at a hotel Dine at a restaurant Attend concerts/sporting events	Comfortable Neutral Uncomfortable
Group C: Shopping Habits and Attitudes	C1. How often do you order food in a week?	Before COVID-19 During COVID-19 After COVID-19	0 1-2 times 3-5 times 5+

Group	Questions	Variables/ Analysis Period	Response Options
	C2. How often do you shop for groceries in a week? (in-store)	Before COVID-19 During COVID-19 After COVID-19	0 1-3 times 4-7 times 7+
	C3. How often do you order groceries in a week? (online shopping)	Before COVID-19 During COVID-19 After COVID-19	0 1-3 times 4-7 times 7+
	C4. How often do you shop for non-food items in a month? (in-store)	Before COVID-19 During COVID-19 After COVID-19	0 1-3 times 4-7 times 7+
	C5. How often do you order non-food items in a month? (online shopping)	Before COVID-19 During COVID-19 After COVID-19	0 1-3 times 4-7 times 7+