COVID-19 vaccine confidence and tourism at the early stage of a voluntary mass vaccination campaign: A PMT segmentation analysis

ABSTRACT

Restarting the mass tourism industry relies on the success of the COVID-19 vaccination campaign which requires individuals' voluntary participation to reduce health risks to hosts and visitors. This study identifies segments of Italian residents based on vaccine confidence at the early stage of a voluntary mass vaccination program.   Using a survey held with 3,893 Italian residents, two COVID-19 vaccine confidence clusters were identified. These clusters were compared and revealed significant differences in response and self-efficacy, vaccine adoption, travel behaviour and involvement in the tourism industry. Keywords: COVID-19 vaccine; vaccine confidence; Travel Intention; Protection Motivation Theory; vaccine hesitancy; Italy;

1. Introduction

Vaccination is the administration of agent-specific, but safe, antigenic components that in inoculated individuals can induce protective immunity against the corresponding infectious agent (WHO 2021). Vaccine confidence is defined as trust in the safety and efficacy of a vaccine (Larson, Schulz, Tucker & Smith 2015). Low confidence can lead to vaccine hesitancy, which has been defined as the delaying or refusing of available vaccines by individuals (e.g. MacDonal 2015), which is a threat to the success of the COVID-19 vaccination campaign (Harrison &Wu 2020; Nguyen *et al.* 2021).

Recent research has examined the potential for using Protection Motivation Theory (PMT) to explore the willingness to obtain COVID-19 vaccination (Kowalski and Black, 2021). PMT seeks to examine how individuals may adopt or reject protective measures against potential

threats as an outcome of two underlying cognitive processes (Floyd, Prentice-Dunn & Rogers, 2000). The first is the threat appraisal process which individuals use to evaluate the magnitude and the impact of potential risks. The second is the coping-appraisal process in which individuals select responses to perceived risk. This process can include an examination of perceived response efficacy (the effectiveness of the response) as well as self-efficacy or the ability to perform the required behaviour.

In situations of high uncertainty, such as the present COVID-19 pandemic, individuals may not feel knowledgeable to make a given decision (Siegrist & Cvetkovich 2000). In these scenarios, individuals cannot easily perform a rational assessment of risk and benefits (Quinn, Kumar, Freimuth, Kidwell, & Musa 2009). Differing perspectives on the same issue as well as misinformation can influence the threat and coping appraisal processes (van der Weerd, Timmermans, Beaujean, Oudhoff & van Steenbergen, 2011). For the threat approval process, research has identified that exposure to misinformation may reduce compliance with COVID-19 protection measures by encouraging individuals to downplay the potential for infection as well as the impact (Lee, Kang, Wang, Zhao, Wong, O'Connor, Yang, & Shin, 2020). Further, misinformation has also been associated with doubts of the efficacy of COVID-19 vaccines, suggesting that it may influence the coping approval process.

COVID-19 vaccination is one of the key factors that can help to restart travel and revive domestic and international tourism (Moreno-González, León & Fernández-Hernández, 2020), along with other biosecurity behavior such as handwashing and wearing masks (Kim, Bonn, & Hall, 2021). However, there is still a lack of empirical studies devoted to analyzing COVID-19 vaccine confidence and tourism. Using theoretical constructs derived from PMT, vaccine

confidence and social media usage, this paper seeks to explore the interaction between perceptions of voluntary health behaviors and interest in tourism activities in residents of a given country setting. It intends to make an academic contribution by identifying characteristics of the more and less vaccine confident groups and their travel intentions at the early stage of a mass vaccination program, which can inform the design of subsequent work at the intersection of health and tourism.

2. Literature Review

2.1. Vaccine Confidence and Vaccine adoption

Individuals and groups can display a range of behaviours as a result of vaccine confidence, from vaccine promotion to refusal (Dubé, Laberge, Guay, Bramadat Roy & Bettinger, 2013). Individuals may also have a relatively high general vaccine confidence while rejecting a specific vaccine such as the COVID-19 vaccine (Little, Goodridge, Lewis, Lingard, Din, Tidley, Roberts Williams & Hayes, 2015) due to the novelty, composition (chemicals formulation) or the process of delivery (Cafiero, Guille-Escuret & Ward, 2021). Additional complexity is the evidence of low-confident, or often called hesitant compliers (Enkel, Attwell, Snelling, and Christian 2018). These individuals may have low confidence but will become vaccinated either for professional (work-related) or personal reasons.

2.2. Protection Motivation Theory and COVID-19 Vaccination

The adoption and rejection of protective health behaviors have been examined using conceptual frameworks such as the Theory of Planned Behavior and the health behavior model (Gerend & Shepherd, 2012). These approaches assume that there is an assessment of the health threat and

the required action is conducted before the behaviour is adopted. PMT, unlike other approaches, examines perceptions of response efficacy as part of the appraisal process. PMT also enables the contextualization of construct measures since perceptions of responses can be influenced by the infrastructure and media environment of a given country context.

Recent work using PMT have contextualized vaccination response costs using the vaccination concern concept (Wang, Kunasekaran & Rasoolimanesh, 2021), the subdimensions of which were identified by Adongo *et al.* (2021). Efficacy concerns refer to the doubt that vaccines do not or will not perform as expected, while vaccine safety concern is a perception that vaccinations could result in harmful outcomes (Yaqub *et al.*, 2014). This concept is directly captured in PMT, for example, Bish, Yardley, Nicoll, and Michie (2011) show in the context of Hajj Pilgrimage that doubts about the efficacy of the influenza vaccine has led to low uptake. Cost and time are two factors related to affordability in income and time scarcity terms (Thomson, Robinsion & Vallée-Tourangeau 2016). At the time of writing, COVID-19 vaccines are offered free of cost by countries worldwide, including Italy and are not considered as a likely concern for this study. Time concerns are particularly important when multiple doses of a vaccine need to be administered (Steffen and Connor 2005), such as is the case with most current COVID-19 vaccines. Usually, this aspect includes the availability of health services, entry into the health care system, and their potential use (Dassah *et al.* 2018).

Autonomy concerns refer to the perceptions of the institutions involved in the vaccination process, mostly referring to doctors, governments, and pharmaceutical companies (Yaqub *et al.,* 2014). Negative autonomy perceptions over political control may have been increased due to lockdown measures (Woelfert & Kunst 2020). Hence, this factor is included in the study.

Social media usage and misinformation may influence perceptions of the vaccine and hence concerns. While social media has been extensively researched in the tourism and travel literature (e.g. Xiang and Gretzel 2010; Milano, Baggio, and Piattelli 2011), issues related to misinformation appear relatively limited in the current pandemic context (Rather, 2021). Williams *et al.* (2020) hypothesize that with the release of the COVID-19 vaccines, attitudes towards the vaccine take-up could have significant impacts on travel intentions. Accordingly, tourists may gravitate towards destinations that adopted a certain type of vaccine, certain types of rules and restrictions, and countries that are more or less vaccine-hesitant in their policies (p. 2). It can thus be assumed that COVID-19 vaccine confidence can be related to future travel intentions (Read 2021).

3. Methodology

3.1. Survey instrument

The survey instrument consists of four sections. The first three sections collected the information regarding COVID-19 vaccine confidence, including response efficacy via COVID-19 vaccine concern, social media usage, and misinformation perception, as well as vaccine history. The scale for COVID-19 vaccine confidence was used to identify the overall trust in the vaccine (Larson, Clarke, Jarrett, Eckersberger, Levine, Schulz & Paterson, 2018). The instrument proposed by Shapiro *et al.*'s (2018) was adapted to measure the COVID-19 vaccine confidence, comprising of 8 measurement items. The scale for COVID-19 vaccination response costs was adapted from Adongo, Amenumey, Kumi-Kyereme, and Dub'e (2021) which has 6 dimensions: efficacy, safety, cost, time, access and autonomy (Adongo *et al.* 2021). As the COVID-19 vaccine is offered to all Italian citizens without a fee, cost and access were not considered. It was also not clear at the stage of the study design which type of vaccine would be offered, so

respondents were not asked to identify the type of vaccine that would be preferred. Travel information, including past trips and future travel intention, were also collected. The final section collected the sociodemographic characteristics such as age, gender, education, income, and region of the residents. For this study, a translation back approach was adopted. The original English survey was translated by bilingual speakers for each language, followed by a translation back to the original language by other bilingual speakers. This was done to check for linguistic and functional aspects and to gain equivalence. The instrument was reviewed and ethical approval granted by University of Sassari. The questionnaire was pre-tested on 25 Italian respondents to assure the comprehensibility of the questions. No concerns were reported, and the final survey was considered as definitive.

3.2. Data collection

The survey was administered online through a snowball sampling technique, used when subjects are difficult to locate, approach, and access (Auerbach & Silverstein 2003) and provides an ever-expanding set of potential respondents in a relatively inexpensive and efficient way (Goldenberg *et al.,* 2009). This approach allowed the research team to collect data from a large sample of individuals across different regions in Italy (including those from remote areas) meanwhile, also enabling us to cope with the financial constraints of this project (Wrenn, Stevens & Loudon 2007) and the social distancing rules and travel restrictions, especially across regions, imposed by the Italian government. Specifically, respondents were recruited through the database of a large Italian association located in the centre of Italy that agreed to send out the email invitation to their newsletter subscribers guaranteeing national coverage and other several tourism businesses (accommodation and tour operators, travel agencies, airports, etc.) who promoted the survey on their social media profiles. The email invitation included the link to the online survey

and was also encouraging all the recipients to forward the survey to their friends and acquaintances. The data collection was carried out in the time span of January 25 - 15st, February 2021. At the end of the data collection period, a total of 4,020 surveys were obtained. Given that 157 surveys were eliminated due to the presence of partial entries in the data, a convenience sample of 3,893 complete questionnaires was obtained and used for this study.

3.3. Data analysis

The data set was analyzed using SPSS 26.0. The analysis techniques such as descriptive analysis, cluster analysis, t-tests, and Chi-square tests were performed to identify and profile the clusters. A two-stage clustering process was used, where hierarchical and non-hierarchical procedures were performed in each stage, as recommended by Hair, Black, Babin & Anderson (2010). Firstly, the hierarchical technique was performed, with the consideration of the stopping rule of Hair *et al.* (2010), to establish an appropriate number of clusters. This number of clusters was then used in a non-hierarchical analysis, i.e. K-mean cluster, to identify cluster membership. The raw data of the Vaccine Confidence construct, which consisted of 8 items, was used as cluster variables to achieve a more accurate heterogeneity of the data (Dolnicar & Grun 2008). This choice of using raw data rather than factor score was also because the execution of factor analysis before the cluster analysis could result in a loss of information which potentially influences the findings (Fredline & Faulkner 2000).

The profile of each cluster was then produced and compared using cross-tabulations and t-tests. The demographic variables, consisting of age, gender, education, income, household type, and residency, were included. To further differentiate the clusters, COVID-19 vaccine concerns, vaccine history, social media usage, and misinformation perception, as well as pre-and post-COVID travel information, were also compared across factors using Chi-square tests and t-tests.

With latent variables, the item-based approach (as opposed to using factor analysis and factor scores) was applied. Similar to the above approach of cluster analysis, this study aims to obtain the true heterogeneity of the data (Dolnicar & Grun 2008), meaning the accurate and detailed differences among clusters were identified. Considering the exploratory nature of this study, i.e. this is among the first studies to examine COVID-19 vaccine confidence using PMT, the use of raw data hoped to generate detailed and extensive findings.

4. Results and Discussion

4.1. Profile of the clusters

As indicated earlier, the raw data of Vaccine confidence, which is comprised of 8 items, were used for clustering. From the hierarchical clustering process, a two-cluster solution was chosen as this stage yielded the greatest percentage change in heterogeneity. The 3,893 cases were then included in a non-hierarchical clustering method, i.e. K-mean cluster. The results indicated a "High Confidence" group (N=3,306) (henceforth HCG) and a "Low Confidence" group (N=587) (henceforth LCG). As shown in Table 1 below, HCG includes those who expressed a positive perception towards the Vaccine Confidence scale, with cluster centres ranged from 3.59 to 4.92, out of a 5-point Likert scale. LCG is comprised of those who indicated a rather negative perception towards the Vaccine Confidence scale, with most of the cluster centres were below 3.

Table 1. Results of cluster analysis

| | Final Cluster Centers | | ANOVA | |
	1 – Low Confidence (N=587)	2 – High Confidence (N=3306)	F	Sig.
(1) The COVID-19-vaccine is important for my health	2.87	4.83	5037.774	0.000
(2) Having the COVID-19-vaccine is important for the health of others in my community	3.29	4.92	4665.523	0.000

(3) The COVID-19-vaccine offered by the government program in my community is beneficial	2.36	3.80	1026.576	0.000
(4) The COVID-19-vaccine carries more risks than older vaccines (reversed)	2.87	4.18	761.290	0.000
(5) The information I receive about the COVID-19-vaccine from the vaccine program is reliable and trustworthy	2.10	3.59	1049.214	0.000
(6) Getting the COVID-19-vaccine is a good way to protect myself from disease	2.71	4.73	5223.669	0.000
(7) Generally I do what my doctor or health care provider recommends about the COVID-19-vaccine	2.74	3.78	285.681	0.000
(8) I am concerned about the serious adverse effects of the COVID-19-vaccine (reversed)	2.14	4.00	1439.583	0.000

The distinction between the two clusters was also established using Chi-square tests (Table 2) which indicated significant differences in most demographic characteristics, except for education, in contrast to past studies have shown that education levels are often associated with higher vaccine confidence (Tian *et al.,* 2019).

There were more male members in the HCG, with 58.8% male in the HCG and 49.6 in the LCG (χ^2=0.000). The HCG also tended to be older, with the highest proportion (46.9%) above 55, with higher income, 35.9% claimed an annual income of more than 50000 EUR in compared to 22% of the LCG (χ^2=0.000). More HCG members were in the North-West (38.7%), whilst more LCG members were in the South (30.7%) (χ^2=0.005). The Northwest of Italy and the highly urbanized Lombardy region were the hardest hit by the first wave, with the most deaths and highest infection rates (Landi 2021). The LCG tends to be more dependent on tourism; 13.1% of LCG were extremely dependent on tourism, compared to 8.5% of HCG. This suggests that there might be a lower level of vaccine confidence among workers employed in Italy's tourism sector.

Table 2. Cluster profile

	Total (3893)	Low Confidence (N=587)	High Confidence (N=3306)	P value (of Chi-

	N	*(% or SD)*	N	*(% or SD)*	N	*(% or SD)*	Square or t tests)
DEMOGRAPHICS							
Gender							**0.000**
Male	2236	*(57.4)*	291	*(49.6)*	1945	*(58.8)*	
Female	1627	*(41.8)*	295	*(50.3)*	1332	*(40.3)*	
Missing	*30*	*(0.8)*	*1*	*(0.2)*	*29*	*(0.9)*	
Age							**0.000**
18 - 24	119	*(3.1)*	11	*(1.9)*	108	*(3.3)*	
25 - 34	490	*(12.6)*	84	*(14.3)*	406	*(12.3)*	
35 - 44	644	*(16.5)*	147	*(25)*	497	*(15)*	
45 - 54	899	*(23.1)*	164	*(27.9)*	735	*(22.2)*	
55 - 64	910	*(23.4)*	128	*(21.8)*	782	*(23.7)*	
Above 65	821	*(21.1)*	53	*(9)*	768	*(23.2)*	
Missing	*10*	*(0.3)*			*10*	*(0.3)*	
Education							**0.323**
Primary school	2	*(0.1)*	1	*(0.2)*	1	*(0)*	
Secondary school	97	*(2.5)*	17	*(2.9)*	80	*(2.4)*	
High school	1330	*(34.2)*	209	*(35.6)*	1121	*(33.9)*	
College/university	1778	*(45.7)*	250	*(42.6)*	1528	*(46.2)*	
Postgraduate	675	*(17.3)*	108	*(18.4)*	567	*(17.2)*	
Missing	*11*	*(0.3)*	*2*	*(0.3)*	*9*	*(0.3)*	
Income							**0.000**
<=15.000	424	*(10.9)*	87	*(14.8)*	337	*(10.2)*	
15.001-25.000	491	*(12.6)*	98	*(16.7)*	393	*(11.9)*	
25.001-35.000	417	*(10.7)*	77	*(13.1)*	340	*(10.3)*	
35.001-50.000	438	*(11.3)*	61	*(10.4)*	377	*(11.4)*	
>50.001	1316	*(33.8)*	129	*(22)*	1187	*(35.9)*	
Missing	*807*	*(20.7)*	*135*	*(23)*	*672*	*(20.3)*	
Household type							**0.005**
One-member	497	*(12.8)*	85	*(14.5)*	412	*(12.5)*	
Shared/multiple occupation	806	*(20.7)*	110	*(18.7)*	696	*(21.1)*	
Nuclear family without children	701	*(18)*	78	*(13.3)*	623	*(18.8)*	
Nuclear family with children/others	1745	*(44.8)*	291	*(49.6)*	1454	*(44)*	
Single-parent family/others	126	*(3.2)*	20	*(3.4)*	106	*(3.2)*	
Missing	*18*	*(0.5)*	*3*	*(0.5)*	*15*	*(0.5)*	
Region of residence							**0.006**
North-West	1460	*(37.5)*	179	*(30.5)*	1281	*(38.7)*	
North-East	535	*(13.7)*	93	*(15.8)*	442	*(13.4)*	
Centre	471	*(12.1)*	76	*(12.9)*	395	*(11.9)*	
South	1106	*(28.4)*	180	*(30.7)*	926	*(28)*	
Islands	276	*(7.09)*	49	*(8.3)*	227	*(6.9)*	
Missing	*45*	*(1.2)*	*10*	*(1.7)*	*35*	*(1.1)*	
Tourism dependency							**0.000**
Not at all	2066	*(53.1)*	268	*(45.7)*	1798	*(54.4)*	
Slightly	466	*(12.0)*	86	*(14.7)*	380	*(11.5)*	
Moderately	699	*(18.0)*	112	*(19.1)*	587	*(17.8)*	

Considerably	270	(6.9)	39	(6.6)	231	(7.0)
Extremely	357	(9.2)	77	(13.1)	280	(8.5)
Missing	35	(0.9)	5	(0.9)	30	(0.9)

To further differentiate the two clusters, comparisons were made for overall perceptions toward

COVID-19, vaccine history, social media usage, misinformation, travel history, and travel

intentions. The results are shown in Appendix 1.

4.2. Threat appraisal perceptions

Regarding the overall perception toward COVID-19, the HCG tended to consider the disease as a

higher risk, in terms of both severity ($\varDelta M$=1.1, p=0.000) and vulnerability ($\varDelta M$=.68, p=0.000).

HCG members considered themselves high-risk (42.2% of the HCG compared to 22.8% of the

LCG). A recent study by market research group BVA Doxa in Italy has shown that individuals

who are at risk and over 65 years old were generally more confident in taking the vaccine

(Ananasso, 2021), supporting the findings that risk perception might increase COVID-19 vaccine

confidence. As the COVID-19 vaccination program in Italy had started shortly before data

collection, which was in February 2021, only 2.4% of the sample had taken the COVID-19

vaccine. This was approximately in line with the percentage of the overall Italian population

which had taken the vaccine at the time (Il Sole 24 Ore, 2021). More members of the HCG had

taken the vaccine (2.7% of the HCG compared to 1% of the LCG, χ^2=0.016). Additionally, the

HCG was very likely (mean score of 4.58, out of 5-point Likert scale) and more likely to take the

vaccine than the LCG ($\varDelta M$=1.61, p=0.000). The majority of the former (79.9%) also planned to

take the vaccine as soon as possible, while the LCG tended to wait and even 29% of them

indicated to never take the vaccine. The findings, in this case, show that within the LCG, there is

a significant number of individuals (29%) who might never take the vaccine and compromise the

success of the overall campaign.

This also reflects in the history of vaccine uptakes among the respondents. In terms of vaccine history, the LCG were more likely to previously have refused, delayed, or taken vaccine with concern (19.4%, 17%, 26.1% compared to 3.4%, 3.8%, and 15.5% of the HCG, respectively, χ^2=0.000). These numbers suggest that within the LCG, there might be individuals who have refused vaccines in the past due to ideological reasons or previous bad experiences (Suryadevara 2021). Recent manifestations of "no-vax" groups in Italy have indeed shown that a significant number of protesters were allied with groups adhering to the extreme right, anarchists, and conspiracy theorists (ANSA, 2021).

4.3 Coping Appraisal Perceptions

This study considered efficacy, safety, time, and autonomy vaccine concerns (Adongo *et al.,* 2021) and compared them among the two groups. Significant differences were found in all 18 items of vaccine cost perceptions with p values less than 0.001. Particularly, the mean values for these items of the LCG were around 3 (out of a 5-point scale), while these values of the HCG were near 2. The LCG showed a higher level of negative perceptions towards the safety, efficacy, and time of the COVID-19 vaccine. The data of this study shows that there is indeed a significant difference in safety and efficacy concerns, with the LCG scoring higher in both. Time perceptions were significantly different between the clusters, common for vaccines with multiple doses (Steffen and Connor 2005). Findings of this study show that time constraints are also perceived as being more salient in the LCG, potentially suggesting lower confidence in the institutions in charge of administering the vaccine (Andersen 1995; Dassah *et al.* 2018; Donabedian 1973). This was generally also true for autonomy, which is specifically related to institutions (Yaqub *et al.* 2014) and the LCG showing more related concerns. The differences in

autonomy concerns, nonetheless, were interesting, with two items yielded the opposite results, with the HCG showing greater concerns. The first (VacCon16) is related to the right to refuse the vaccine for travellers, and (VacCon17) is related to the cancellation and delays of trips. The explanation, therefore might be found in the demographic analysis, where the HCG is usually higher income and prone to more business travel and more frequent travel. With these two exceptions, the LCG expressed greater autonomy concerns, in line with the previous literature. Regarding social media usage, the LCG has slightly more friends or followers, with a higher proportion having more than 400 friends/followers (39.2% compared to 31.5% of the HCG, χ^2=0.007). However, the HCG claimed to have a slightly more regretful feeling if social media shut down (ΔM=0.38, p=0.000). This is in contrast with the high focus in the media, which has been paid on social media misinformation and the influence it has on COVID-19 vaccine confidence (Menichini 2021). The findings, however, show that in the case of Italy, more use of social media does not lead to lower vaccine confidence. On the contrary, data shows that the HCG would feel more regret if social media would shut down.

Another indicator for this is that the differences between groups were also found in terms of COVID-19 misinformation perception. While both groups perceived that information regarding COVID-19 was conflicting across sources, the LCG were more likely to indicate such a perception, indicating by 73.3% members, in compared to 57.9% of the HCG (χ^2=0.000). Similarly, the LCG considered a larger amount of information on COVID-19 that seemed fake or made up (ΔM=0.2, p=0.000).

Frequencies pre-COVID travel within the region, nation, and outside of Europe and travel intention post-COVID were compared across the groups. In terms of travel frequency pre-COVID, differences were not found in terms of travel frequencies pre-COVID within the region,

Italy, and outside of Europe. The only significant difference was found for the number of trips within Europe, where the LCG travels less frequently. Among this group, a high proportion (20%) did not travel in the year before COVID-19. As mentioned previously, the HCG tends to be older, higher income, living in smaller households, and be more concentrated in the North-west of the country, which is also the part of Italy that experienced COVID-19 from the very beginning and with higher severity. In other words, individuals being more directly impacted by the effects of COVID-19 in their daily life could be more prone to undertake the vaccine. There are several possible relationships to past travel which can be drawn from the cluster profiles obtained. The high confidence cluster shows characteristics of likely businessmen and women living in the urban centres of northwestern Italy.

Lombardy, the region where most respondents from the HCG were related, is the first region of Italy for economic importance, contributing to about one-fifth of the national gross domestic product. It also hosts many of the country's major industrial, commercial, and financial businesses, and its per capita income exceeds the European average by 35% (Regione Lombardia 2021). The per capita GDP sees the North-West area at the top of the ranking with a nominal value of over 36 thousand euros, almost double that of the South, equal to about 19 thousand euros per year (Teleborsa 2021). While this did not reflect on internal and extra-European travel, business travel has likely enhanced trips from the Northwest to geographically close neighbouring countries, such as Switzerland, France, Austria, and Germany.

On the other hand, the intention for travelling abroad was not significantly different among the two groups, with both were quite neutral/undecided about their travels outside of Italy (mean values around 3 out of 5-point scale). Yet, significant differences were found in terms of their intention to travel within Italy, where the HCG were more likely to travel within Italy in the next

12 months (ΔM_{it1}=0.33, p=0.000 and ΔM_{it2}=0.33, p=0.000). This might be due to several reasons. First, Italians, like many other countries tend to favor proximity and domestic tourism (L'Agenzia di Viaggi 2020; Del Chiappa,2021). Second, business travel could have shifted from international to regional trips within Italy, which were allowed even in quarantine conditions, (Ministero della Salute, 2021).

5. Discussion and Conclusion

The goal of this study was to explore residents' perceptions of a voluntary health behavior (COVID-19 vaccination) and interest in tourism activities. The findings identified two segments (i.e., "High Confidence Group (HCG)" and "Low Confidence Group (LCG)") of Italian residents based on their COVID-19 vaccine confidence level and identified the differences between segments of PMT theoretical constructions of risk perceptions and coping perceptions along with social media engagement and travel behavior.

First, a significant percentage of the LCG showed a history of vaccine skepticism or outright refusal, with 19.4% having refused other vaccines in the past. A surprisingly high number of the LCG members (29%) indicated that they would never take a COVID-19 vaccine. This suggests not only a relationship between vaccine history and COVID-19 vaccine confidence but might also hint at ideological positions or overall misinformation at the base of lower confidence which can influence risk perceptions and efficacy perceptions (Suryadevara 2021; Williams *et al.* 2020). These might be especially important factors to consider as those individuals might be hard to convince to undertake the vaccine, which might jeopardize the success of the vaccination campaign. Potentially related to this, our findings contradict previous studies, which suggest a relationship between social media usage and vaccine hesitancy (Stecula, Kuru &, Jamieson

2020). Recent work suggests that online influencers may be less effective in the presence of mass advertising (Rossman &, Fischer 2021). It may be possible that since the vaccination program has been promoted widely, the effectiveness of online influencers has been reduced. The data shows no significant difference in the levels of social media usage between the groups, but they show that the LCG perceives these sources of information as more conflicting than the HCG. This might thus suggest that not the levels of social media usage, but rather the exposure and consideration of sources of misinformation might influence the level of vaccine confidence (Williams *et al.* 2020).

Second, the findings have shown that overall vaccine perceptions related to COVID-19 match the previous literature on general travel vaccine perceptions (Adongo *et al.* 2021), showing the LCG worrying more about efficacy, safety, time, and autonomy. This suggests that governmental bodies should conduct COVID-19 vaccine information campaigns on the same basis as traditional vaccine information campaigns are conducted. As mentioned before, the focus for this should lie on combatting misinformation about the vaccines themselves and the institutions delivering them (Andersen 1995; Dassah *et al.* 2018, Donabedian 1973).

Third, demographic factors' differences between the groups contradict previous research on vaccine confidence. The findings of this study show that generally, older, higher-income males, with smaller households, and in the economically most developed regions of Italy tend to show higher levels of COVID-19 vaccine confidence; while strong indicators such as education (e.g., Danis *et al.* 2010; Tian *et al.* 2019) were not significantly different among the groups. As noted earlier, PMT enables the examination of context-specific factors that can influence the adoption or rejection of health behaviors. This may assist public stakeholders to effectively develop tailored promotion campaigns and media coverage with the final aim of increasing the level of

vaccine confidence of specific groups of individuals. For example, the majority of individuals belonging to LCG were reported residing in the North-East part of Italy. Therefore, policymakers could consider adapting their vaccination promotion campaigns according to geographical reference.

Possible reasons therefore, could be found in the intrinsic characteristics of the COVID-19 pandemic in Italy, where the urbanized area in the Northwest was hit the hardest (Landi 2021), and the death rate among the elderly was significantly higher (Ministero della Salute 2021a). Indeed, findings have also shown a significant difference in risk-perception in the groups, with the HCG perceiving a higher risk related to the disease (Mesch and Schwirian 2019). These findings thus suggest a relationship among personal experiences with the virus in the hardest-hit regions, personal risk-perception, and increasing vaccine confidence. It also might hint that the pandemic has affected different strata of society differently (Milano & Koens, 2021), which might reflect on their vaccine-related behavior.

Fourth, the willingness to uptake the vaccine as quickly as possible in the HCG could also explain the significant difference in their travel plans, with confident respondents wanting to restart their travelling on the national territory earlier, potentially for the upcoming summer season or business travel-related reasons. These findings suggest that higher vaccine confidence might lead to a willingness to undertake at least regional travel as soon as possible. In these terms, our findings have also shown that the HCG might be more prone to business travel and that this group would see the inability to undertake the vaccine as soon as possible as a barrier to their autonomy to do so.

Finally, the findings of this study show important implications for the tourism industry. Quite surprisingly, the LCG showed significantly higher levels of dependency on tourism than the

HCG. This occurs even though one could assume that people with high economic reliance on tourism activity should be those individuals more prone to undertake vaccination as a way to contribute to render their business and the destination within which they work, safe and healthy, with this somehow helping to restart the tourism, travel and hospitality activity as soon as possible. Furthermore, the hospitality industry was hardly hit and depending on the destination, has often not gotten enough financial support throughout the pandemic (Dube, Nhamo, & Chikodzi, 2021; Khalid, Okafor, & Burzynska, 2021). On the contrary, our findings seem to highlight that many tourism workers have a lower level of confidence towards the COVID-19 vaccine. Hence, our findings suggest policymakers and destination marketers in Italy plan institutional campaigns aiming at sensitizing tourism workers on the need to undertake vaccination as a "precondition" to effectively restart the tourism sector and to invigorate the economy and quality of life.

In terms of tourism, it is thus vital not only to focus on vaccination passports for incoming tourists but also to guarantee a "safe hosting destination" where workers in contact with tourists are vaccinated. Academics and future studies should also focus on vaccine confidence (and uptake levels) not only for tourists but also for other stakeholders involved in the industry. Although this study helps to fill a gap in the existing knowledge in the literature and proposes some implications for practitioners, limitations remain. Firstly, although the sample size is relatively big, it is highly site-specific (i.e. Italy) and utilized a convenience sample derived from a web-based survey with a snowball sampling approach, thus rendering findings hardly generalizable both at a national level and yet more in other countries. In this vein, it appears that the convenience sampling technique adopted in this study has to some extent skewed the data for certain sociodemographic variables, for example, as reflected by the higher average income

compared to the overall national population of Italy. Future studies might aim at replicating the study aiming at collecting a representative sample of the overall population and/or applying the data collection to other countries to draw cross-cultural comparisons. Further, the study was not able to capture and expand the knowledge about the factors that might contribute to explain the relatively low level of vaccine confidence in certain groups of individuals. Future studies might aim to apply a mixed method or multiple mixed-method approaches to overcome this limitation and give a more detailed and accurate overview of the main variables (i.e. personality traits, moral values, etc.) that may explain different levels of vaccine confidence. Finally, this study was carried out at the beginning of the vaccination campaign in Italy. Hence it was not able to capture the extent to which other contextual factors (e.g. vaccine passport prospects, Astrazeneca scandal, etc.) might contribute over time to increase/decrease the vaccine confidence of Italians and to accelerate/decelerate the success of the vaccination campaign. Based on this evidence and the considerations drawn from it, a call for future studies aiming to adopt a longitudinal approach is made.

References

Ananasso, A. 2021, March 14. "Doxa, italiani 'scettici', propensi a vaccinarsi ma vorrebbero scegliere. AstraZeneca ultimo in classifica". La Repubblica. Retrieved from https://www.repubblica.it/cronaca/2021/03/14/news/doxa-291978512/

ANSA 2021a, March 20. "No Mask e No Vax in piazza a Torino: una denuncia, 30 multati e un agente ferito." Retrieved from https://www.ansa.it/sito/notizie/cronaca/2021/03/20/no-mask-e-no-vax-in-piazza-a-torino-30-multati_95fdd450-0106-4735-a5a2-d27dbad58fec.html

Auerbach, C. F., and Silverstein, L. B. 2003. "*Qualitative Data: An Introduction to Coding and Analysis."* New York: New York University Press.

Boulware, L.E., Cooper, L.A., Ratner, L.E., LaVeist, T.A. and Powe, N.R. 2016. "Race and trust in the health care system." *Public health reports.*

Buchanan Pitrelli, M. 2021, Jan 14. "No vaccine, no service: How vaccinations may affect travel plans in the future." CNBC. Retrieved from https://www.cnbc.com/2021/01/14/will-vaccines-be-required-to-fly-or-travel-its-likely-say-experts.html.x

Craven, J. 2021, April 21. "Covid-19 vaccine tracker." Retrieved from https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker

Del Chiappa. G. 2021. "Come cambia il comportamento dei turisti al tempo del COVID-19: un'indagine esplorativa in Italia", in Morvillo A., e Becheri E, (Eds), (2020) Rapporto sul Turismo Italiano 2019-2020 XXIV Edizione. CNR Edizioni: Roma.

Dolnicar, S., and Grün, B. 2008. "Challenging "factor-cluster segmentation"". *Journal of Travel Research,* 47, 63–71.

Dubé, E., Laberge, C., Guay, M., Bramadat, P., Roy, R., and Bettinger, J.A. 2013. "Vaccine hesitancy: an overview." *Human vaccines and immunotherapeutics*, 9(8), pp.1763-1773.

Dube, K., Nhamo, G., & Chikodzi, D. (2021). COVID-19 cripples global restaurant and hospitality industry. Current Issues in Tourism, 24(11), 1487-1490.

Earle, T. and Siegrist, M. 2008. "Trust, confidence and cooperation model: a framework for understanding the relation between trust and risk perception." *International Journal of Global Environmental Issues,* 8(1-2), pp.17-29.

Enkel, S.L., Attwell, K., Snelling, T.L., and Christian, H.E. 2018. "'Hesitant compliers': Qualitative analysis of concerned fully-vaccinating parents." *Vaccine*, 36(44), pp.6459-6463.

Fedeli, G. 2020. ""Fake news" meets tourism: a proposed research agenda", *Annals of Tourism Research.* doi: 10.1016/J.ANNALS.2019.02.002.

Floyd, D.L., Prentice-Dunn, S. and Rogers, R.W., 2000. A meta-analysis of research on protection motivation theory. *Journal of applied social psychology*, *30*(2), pp.407-429.

Fredline, E., and Faulkner, B. 2000. "Host community reactions: A cluster analysis." *Annals of Tourism Research* 27(3), 763-784.

Gerend, M.A. and Shepherd, J.E., 2012. Predicting human papillomavirus vaccine uptake in young adult women: comparing the health belief model and theory of planned behavior. *Annals of Behavioral Medicine*, *44*(2), pp.171-180.

Goldenberg, J., S. Han, Lehmann, D., and Hong, J. 2009. "The Role of Hubs in the Adoption Processes." *Journal of Marketing*, 73 (2): 1-13.

Hair, J.F. JNR, Black, W.C, Babin, B.J., and Anderson, R.E. 2010. "Multivariate data analysis: a global perspective." 7th ed. Upper Saddle River: Pearson Prentice Hall.

Harrison, E. A., and Wu, J. W. 2020. "Vaccine confidence in the time of COVID-19." *European journal of epidemiology*, 35(4), 325-330.

Khalid, U., Okafor, L. E., & Burzynska, K. (2021). Does the size of the tourism sector influence the economic policy response to the COVID-19 pandemic?. Current Issues in Tourism, 1-20.

Kim, M. J., Bonn, M., & Hall, C. M. (2021). What influences COVID-19 biosecurity behaviour for tourism?. Current Issues in Tourism, 1-7.

Kowalski, R.M. and Black, K.J., 2021. Protection motivation and the COVID-19 virus. Health communication, 36(1), pp.15-22.

Kumar, S., and Shah, N. 2018 "False Information on Web and Social Media: A Survey", arXiv. arXiv.

Larson, H. J., De Figueiredo, A., Xiahong, Z., Schulz, W. S., Verger, P., Johnston, I. G., ... and Jones, N. S. 2016. "The state of vaccine confidence 2016: global insights through a 67-country survey." *EBioMedicine*, 12, 295-301.

Larson, H. J., Schulz, W. S., Tucker, J. D., and Smith, D. M. 2015. "Measuring vaccine confidence: introducing a global vaccine confidence index." *PLoS currents*, 7.

Larson, H.J., Clarke, R.M., Jarrett, C., Eckersberger, E., Levine, Z., Schulz, W.S., and Paterson, P., 2018. "Measuring trust in vaccination: A systematic review." *Human vaccines and immunotherapeutic*s, 14(7), pp.1599-1609.

Lee, J.J., Kang, K.A., Wang, M.P., Zhao, S.Z., Wong, J.Y.H., O'Connor, S., Yang, S.C. & Shin, S., 2020. "Associations between COVID-19 misinformation exposure and belief with COVID-19 knowledge and preventive behaviors: cross-sectional online study". *Journal of medical Internet research*, *22*(11), p.e22205.

Little, K.E., Goodridge, S., Lewis, H., Lingard, S.W., Din, S., Tidley, M., Roberts, R.J., Williams, N.S., and Hayes, S. 2015. "Occupational vaccination of health care workers: uptake, attitudes and potential solutions." *Public Health*, 129(6), pp.755-762.

Menichini, R. 2021, March 13. "No vax e complottisti: i social corrono ai ripari contro la disinformazione." La Repubblica. Retrieved from https://www.repubblica.it/esteri/2021/03/13/news/no_vax_e_complottisti_i_social_corrono_ai_ripari_contro_la_disinformazione-292022010/

Milano, C., & Koens, K. (2021). The paradox of tourism extremes. Excesses and restraints in times of COVID-19. Current Issues in Tourism, 1-13.

Milano, R., Baggio, R., and Piattelli, R. 2011. "The effects of online social media on tourism websites", *Information and Communication Technologies in Tourism*, pp. 471–483. doi: 10.1007/978-3-7091-0503-0_38.

Moreno-González, A.A., León, C.J., and Fernández-Hernández, C. 2020. "Health destination image: The influence of public health management and well-being conditions." *Journal of Destination Marketing and Management*, 16, p.100430.

National Vaccine Advisory Committee 2015. "Assessing the state of vaccine confidence in the United States: recommendations from the National Vaccine Advisory Committee." *Public Health Reports,* pp.573-595.

Nguyen, K. H., Srivastav, A., Razzaghi, H., Williams, W., Lindley, M. C., Jorgensen, C., ... and Singleton, J. A. 2021. "COVID-19 Vaccination Intent, Perceptions, and Reasons for Not Vaccinating Among Groups Prioritized for Early Vaccination—United States, September and December 2020". *Morbidity and Mortality Weekly Report*, 70(6), 217.

Paterson, M. 2021, April 2. "Global vaccine divide – More science collaboration needed." Retrieved from https://www.universityworldnews.com/post.php?story=20210402151906225

Pinna, A. 2021. "Sardegna zona bianca, passaporto vaccinale al debutto da domani: si entra solo con il certificato di immunità o il tampone." Corriere della Sera. Retrieved from

https://www.corriere.it/cronache/21_marzo_07/sardegna-zona-bianca-passaporto-vaccinale-debutto-domani-si-entra-solo-il-certificato-immunita-o-tampone-42c6efc4-7f17-11eb-b700-62d4180eb118.shtml

Quinn, S.C., Jamison, A.M., Freimuth, V.S., An, J. and Hancock, G.R. 2017. "Determinants of influenza vaccination among high-risk Black and White adults." *Vaccine*, 35(51), pp.7154-7159.

Rather, R. A. (2021). Monitoring the impacts of tourism-based social media, risk perception and fear on tourist's attitude and revisiting behaviour in the wake of COVID-19 pandemic. Current Issues in Tourism, 1-9.

Read, J. 2021, January 4. "What COVID-19 vaccines mean for the return of travel. National Geographic." Retrieved from https://www.nationalgeographic.com/travel/article/what-will-COVID-19-vaccines-mean-for-travel-coronavirus.

Regione Lombardia 2021. "Scheda Informativa: Economia." Retrieved from https://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioRedazionale/scopri-la-lombardia/economia/economia-lombarda

Rossman, G., and Fisher, J.C. 2021. "Network hubs cease to be influential in the presence of low levels of advertising. "*Proceedings of the National Academy of Sciences*, 118(7).

Siegrist, M., and Zingg, A. 2014. "The role of public trust during pandemics: Implications for crisis communication." *European Psychologist*, 19(1), 23–32. https://doi.org/10.1027/1016-9040/a000169

SkyTG 24 2021. "Turismo, sold out in molte regioni italiane per l'estate 2021: ecco dove." Retrieved from https://tg24.sky.it/economia/2021/04/01/estate-2021-regioni-turismo

Stecula, D.A., Kuru, O., and Jamieson, K.H. 2020. "How trust in experts and media use affect acceptance of common anti-vaccination claims." *Harvard Kennedy School Misinformation Review,* 1(1).

Suryadevara, M. 2021. "Vaccine Confidence and Vaccine Hesitancy", *Vaccines* (pp. 447-465). Springer, Cham.

Tian, C., Wang, H., Wang, W., and Luo, X. 2019. "Characteristics associated with influenza vaccination uptake among adults." *Journal of Public Health*, 41(3), e267-e273.

UNWTO 2021. "Tourism Covid-19." Retrieved from https://www.unwto.org/tourism-covid-19-2020

van der Weerd, W., Timmermans, D.R., Beaujean, D.J., Oudhoff, J. and van Steenbergen, J.E., 2011. "Monitoring the level of government trust, risk perception and intention of the general public to adopt protective measures during the influenza A (H1N1) pandemic in the Netherlands." *BMC public health*, 11(1), pp.1-12.

Wang, M., Kunasekaran, P. and Rasoolimanesh, S.M., 2021. What influences people's willingness to receive the COVID-19 vaccine for international travel?. *Current Issues in Tourism*, pp.1-6.

WHO 2021. "Rolling updates on Coronavirus Disease." Retrieved from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen

Williams, N. L., Wassler, P., and Ferdinand, N. 2020. "Tourism and the Covid-(Mis) infodemic." *Journal of Travel Research*, 0047287520981135.

Woelfert, F.S., and Kunst, J.R. 2020. "How Political and Social Trust Can Impact Social Distancing Practices During COVID-19 in Unexpected Ways." *Frontiers in psychology*, 11.

Wrenn, B., Stevens, R. E., and Loudon, D. L. 2007. "*Marketing research: Text and cases*." Psychology Press.

Xiang, Z., and Gretzel, U. 2010. "Role of social media in online travel information search. "*Tourism Management*, 31(2), pp. 179–188. doi: 10.1016/j.tourman.2009.02.016.

Zeng, B., and Gerritsen, R. 2014. "What do we know about social media in tourism? A review." *Tourism Management Perspectives*, 10, pp. 27–36. doi: 10.1016/j.tmp.2014.01.001.

Appendix 1. Comparisons between the clusters

	Total (3893)		Low Confidence (587)		High Confidence (3306)		P value (of Chi-Square or t tests)
	N	*(% or SD)*	N	*(% or SD)*	N	*(% or SD)*	
COVID-19 & VACCINE							
Taken COVID-19 vaccine							0.016
Yes	95	*(2.4)*	6	*(1)*	89	*(2.7)*	
No	3784	*(97.2)*	579	*(98.6)*	3205	*(96.9)*	
Missing	*14*	*(0.4)*	*2*	*(0.3)*	*12*	*(0.4)*	
Likelihood to take COVID-19 vaccine *	4.34		2.97		4.58		**0.000**
Timeframe for taking COVID-19 vaccine							**0.000**
As soon as possible	2757	*(70.8)*	116	*(19.8)*	2641	*(79.9)*	
3-6 months after eligibility	492	*(12.6)*	105	*(17.9)*	387	*(11.7)*	
6 months to a year after eligibility	184	*(4.7)*	74	*(12.6)*	110	*(3.3)*	
More than a year after eligibility	156	*(4)*	112	*(19.1)*	44	*(1.3)*	
Never	182	*(4.7)*	170	*(29)*	12	*(0.4)*	
Missing	*122*	*(3.1)*	*10*	*(1.7)*	*112*	*(3.4)*	
High COVID-19 risk							**0.000**
Yes	1530	*(39.3)*	134	*(22.8)*	1396	*(42.2)*	
No	1664	*(42.7)*	314	*(53.5)*	1350	*(40.8)*	
I don't know	691	*(17.7)*	138	*(23.5)*	553	*(16.7)*	
Missing	*8*	*(0.2)*	*1*	*(0.2)*	*7*	*(0.2)*	
COVID-19 is a serious threat *	4.45	*(1.05)*	3.52	*(1.32)*	4.62	*(0.90)*	**0.000**
The risk of infection with COVID-19 while travel is high *	3.8	*(1.32)*	3.22	*(1.51)*	3.9	*(1.25)*	**0.000**
VACCINE HISTORY							
Refuse vaccine							**0.000**
Yes	227	*(5.8)*	114	*(19.4)*	113	*(3.4)*	
No	3588	*(92.2)*	446	*(76)*	3142	*(95)*	
Missing	*78*	*(2)*	*27*	*(4.6)*	*51*	*(1.5)*	
Delay vaccine							**0.000**
Yes	227	*(5.8)*	100	*(17)*	127	*(3.8)*	
No	3582	*(92)*	457	*(77.9)*	3125	*(94.5)*	
Missing	*84*	*(2.2)*	*30*	*(5.1)*	*54*	*(1.6)*	
Taken vaccine with doubt							**0.000**
Yes	664	*(17.1)*	153	*(26.1)*	511	*(15.5)*	
No	3138	*(80.6)*	406	*(69.2)*	2732	*(82.6)*	
Missing	*91*	*(2.3)*	*28*	*(4.8)*	*63*	*(1.9)*	
TRAVEL VACCINE CONCERNS*							
Efficacy							

VacCon1	1.88	*(1.13)*	2.96	*(1.19)*	1.69	*(1.01)*	**0.000**
VacCon2	2.01	*(1.19)*	3.16	*(1.21)*	1.81	*(1.06)*	**0.000**
VacCon3	2.17	*(1.4)*	2.75	*(1.27)*	2.07	*(1.40)*	**0.000**
VacCon4	2.31	*(1.29)*	3.82	*(1.10)*	2.05	*(1.13)*	**0.000**
Safety						
VacCon5	1.86	*(1.16)*	3.12	*(1.24)*	1.63	*(0.99)*	**0.000**
VacCon6	2.31	*(1.28)*	3.83	*(1.14)*	2.04	*(1.11)*	**0.000**
VacCon7	1.79	*(1.25)*	3.45	*(1.45)*	1.50	*(0.94)*	**0.000**
VacCon8	1.34	*(0.85)*	1.79	*(1.23)*	1.26	*(0.73)*	**0.000**
VacCon9	1.77	*(1.12)*	2.78	*(1.42)*	1.59	*(0.95)*	**0.000**
VacCon10	2.56	*(1.32)*	3.37	*(1.34)*	2.42	*(1.27)*	**0.000**
Time						
VacCon11	2.97	*(1.2)*	3.68	*(1.09)*	2.84	*(1.18)*	**0.000**
VacCon12	2.07	*(1.19)*	2.83	*(1.26)*	1.93	*(1.13)*	**0.000**
VacCon13	2.03	*(1.21)*	2.75	*(1.28)*	1.90	*(1.15)*	**0.000**
VacCon14	3.53	*(1.30)*	3.65	*(1.31)*	3.51	*(1.30)*	**0.000**
Autonomy						
VacCon15	2.53	*(1.44)*	3.77	*(1.29)*	2.31	*(1.35)*	**0.000**
VacCon16	3.57	*(1.48)*	2.37	*(1.48)*	3.78	*(1.38)*	**0.000**
VacCon17	3.50	*(1.23)*	3.04	*(1.38)*	3.58	*(1.19)*	**0.000**
VacCon18	2.11	*(1.47)*	3.61	*(1.55)*	1.84	*(1.29)*	**0.000**
SOCIAL MEDIA						
Social Media platform (most used)							**0.136**
Messaging	1929	*(49.6)*	274	*(46.7)*	1655	*(50.1)*	
Sharing	1909	*(49)*	304	*(51.8)*	1605	*(48.5)*	
Missing	55	*(1.4)*	9	*(1.5)*	46	*(1.4)*	
Social Media friends							**0.007**
50, or less	589	*(15.1)*	75	*(12.8)*	514	*(15.5)*	
51–100	541	*(13.9)*	62	*(10.6)*	479	*(14.5)*	
101–150	359	*(9.2)*	51	*(8.7)*	308	*(9.3)*	
151–200	334	*(8.6)*	54	*(9.2)*	280	*(8.5)*	
201–250	211	*(5.4)*	32	*(5.5)*	179	*(5.4)*	
251–300	210	*(5.4)*	25	*(4.3)*	185	*(5.6)*	
301–400	265	*(6.8)*	38	*(6.5)*	227	*(6.9)*	
More than 400	1271	*(32.6)*	230	*(39.2)*	1041	*(31.5)*	
Missing	113	*(2.9)*	20	*(3.4)*	93	*(2.8)*	
Social Media usage							**0.080**
Less than 30 mins	409	*(10.5)*	61	*(10.4)*	348	*(10.5)*	
30mins -1 hour	750	*(19.3)*	89	*(15.2)*	661	*(20)*	
1-2 hours	780	*(20)*	119	*(20.3)*	661	*(20)*	
3 hours	692	*(17.8)*	107	*(18.2)*	585	*(17.7)*	
4-5 hours	589	*(15.1)*	105	*(17.9)*	484	*(14.6)*	
More than 6 hours	623	*(16)*	98	*(16.7)*	525	*(15.9)*	
Missing	50	*(1.3)*	8	*(1.4)*	42	*(1.3)*	
Social media intensity*						
SMintensity1	3.6	*(1.3)*	3.54	*(1.3)*	3.61	*(1.3)*	**0.240**
SMintensity2	1.96	*(1.1)*	1.92	*(1.1)*	1.97	*(1.1)*	**0.306**
SMintensity3	3.15	*(1.4)*	3.09	*(1.4)*	3.16	*(1.4)*	**0.255**

SMintensity4	2.23	*(1.3)*	2.14	*(1.2)*	2.24	*(1.3)*	**0.053**
SMintensity5	2.5	*(1.3)*	2.42	*(1.3)*	2.52	*(1.3)*	**0.094**
SMintensity6	2.93	*(1.4)*	2.61	*(1.4)*	2.99	*(1.4)*	**0.000**

MISINFORMATION

COVID-19 information						**0.000**
Same information across sources	1525	*(39.2)*	152	*(25.9)*	1373	*(41.5)*	
Conflicting information across sources	2343	*(60.2)*	430	*(73.3)*	1913	*(57.9)*	
Missing	*25*	*(0.6)*	*5*	*(0.9)*	*20*	*(0.6)*	
COVID-19 misinformation **	2.87	*(0.85)*	3.04	*(0.87)*	2.84	*(0.85)*	**0.000**

TRAVEL FREQUENCY PRE-COVID

Regional trips						**0.226**
None	602	*(15.5)*	91	*(15.5)*	511	*(15.5)*	
Less than 2 trips	1064	*(27.3)*	160	*(27.3)*	904	*(27.3)*	
2-5 trips	1496	*(38.4)*	208	*(35.4)*	1288	*(39)*	
6 trips or more	551	*(14.2)*	97	*(16.5)*	454	*(13.7)*	
Missing	*180*	*(4.6)*	*31*	*(5.3)*	*149*	*(4.5)*	
Trips within Italy						**0.207**
None	171	*(4.4)*	31	*(5.3)*	140	*(4.2)*	
Less than 2 trips	1303	*(33.5)*	209	*(35.6)*	1094	*(33.1)*	
2-5 trips	2023	*(52)*	280	*(47.7)*	1743	*(52.7)*	
6 trips or more	348	*(8.9)*	53	*(9)*	295	*(8.9)*	
Missing	*48*	*(1.2)*	*14*	*(2.4)*	*34*	*(1)*	
Trips within Europe						**0.000**
None	576	*(14.8)*	120	*(20.4)*	456	*(13.8)*	
Less than 2 trips	2140	*(55)*	293	*(49.9)*	1847	*(55.9)*	
2-5 trips	978	*(25.1)*	134	*(22.8)*	844	*(25.5)*	
6 trips or more	101	*(2.6)*	24	*(4.1)*	77	*(2.3)*	
Missing	*98*	*(2.5)*	*16*	*(2.7)*	*82*	*(2.5)*	
Trips outside Europe						**0.261**
None	1764	*(45.3)*	269	*(45.8)*	1495	*(45.2)*	
Less than 2 trips	1613	*(41.4)*	230	*(39.2)*	1383	*(41.8)*	
2-5 trips	350	*(9)*	53	*(9)*	297	*(9)*	
6 trips or more	55	*(1.4)*	13	*(2.2)*	42	*(1.3)*	
Missing	*111*	*(2.9)*	*22*	*(3.7)*	*89*	*(2.7)*	

TRAVEL INTENTION *

TraInt_it1	4.16	*(1.32)*	3.88	*(1.51)*	4.21	*(1.27)*	**0.000**
TraInt_it2	4.11	*(1.33)*	3.83	*(1.52)*	4.16	*(1.29)*	**0.000**
TraInt_it3	3.51	*(1.61)*	3.38	*(1.67)*	3.53	*(1.6)*	**0.057**
TraInt_ab1	3.39	*(1.6)*	3.35	*(1.61)*	3.39	*(1.6)*	**0.607**
TraInt_ab2	3.31	*(1.6)*	3.24	*(1.63)*	3.32	*(1.6)*	**0.330**
TraInt_ab3	2.88	*(1.67)*	2.93	*(1.7)*	2.87	*(1.67)*	**0.498**

* 5-point scale ** 4-point scale

Appendix 2. The measurement items

Measurement items

TRAVEL VACCINE CONCERNS

Efficacy Concerns

VacCon1	I do not trust the COVID-19-vaccine to protect me from the disease while traveling abroad effectively.
VacCon2	I am not confident in the COVID-19-vaccine helping me stay healthy while abroad
VacCon3	The COVID-19-vaccine can prevent my body from naturally fighting against the disease
VacCon4	I worry about the long-term effects of the COVID-19-vaccine on my health.

Safety Concerns

VacCon5	I am not sure that the COVID-19 vaccine will guarantee my travel safety
VacCon6	I worry about the side effects of the COVID-19-vaccine.
VacCon7	Taking the COVID-19-vaccine for traveling abroad makes me feel uncomfortable
VacCon8	I fear the injection when taking the COVID-19-vaccine because of the pains.
VacCon9	I worry that the side effects of the COVID-19-vaccine while abroad can decrease my enjoyment of the holiday experience
VacCon10	I fear that I may not readily get medical assistance if experiencing the side effects of the COVID-19-vaccine while abroad.

Time

VacCon11	The COVID-19-vaccine can be time inconvenient
VacCon12	Consultation with health care providers concerning the COVID-19-vaccine can be time-wasting
VacCon13	I am concerned that the COVID-19-vaccine has to be taken early enough before the actual travel
VacCon14	The number of doses required for the COVID-19-vaccine delays travel time

Autonomy

VacCon15	Travel is a means through which the COVID-19-vaccine is forced on travellers
VacCon16	Travellers are not given the right/freedom to refuse the COVID-19 vaccine
VacCon17	A trip is sometimes cancelled/delayed because you cannot get access to a mandatory vaccine
VacCon18	Making the COVID-19 vaccine mandatory is unfair to travellers

Social Media Intensity

SMintensity1	Social Media is part of my everyday activity
SMintensity2	I am proud to tell people I'm on Social Media
SMintensity3	Social Media has become part of my daily routine
SMintensity4	I feel out of touch when I haven't logged onto Social Media or a while
SMintensity5	I feel I am part of the Social Media community
SMintensity6	I would be sorry if Social Media shut down

TRAVEL INTENTION

Domestic Travel Intention

TraInt_it1	I intend to travel within Italy in the next 12 months
TraInt_it2	It is likely that I will travel within Italy in the next 12 months
TraInt_it3	I plan to travel within Italy in the next 12 months

International Travel Intention

TraInt_ab1	I intend to travel abroad in the next 12 months
TraInt_ab2	It is likely that I will travel abroad in the next 12 months
TraInt_ab3	I plan to travel abroad in the next 12 months