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

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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 programme. Using a survey held with 3893 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.

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COVID-19 vaccine; vaccine confidence; travel intention; protection motivation theory; vaccine hesitancy; Italy

1. Introduction

COVID-19 vaccination is one of the key factors that can help to restart travel and revive domestic and international tourism (Moreno-González et al., 2020; Sánchez-Cañizares et al., 2021; Wang et al., 2021), along with other biosecurity behaviour such as handwashing and wearing masks (Kim et al., 2021). However, there is still a lack of empirical studies devoted to analyzing COVID-19 vaccine confidence and tourism.

Recent research has examined the potential for using Protection Motivation Theory (PMT) to explore the willingness to obtain COVID-19 vaccination (Bhati et al., 2020; Kowalski & 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 et al., 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. In these scenarios, individuals cannot easily perform a rational assessment of risk and benefits (Quinn et al., 2017). Differing perspectives on the same issue as well as misinformation can influence the threat and coping appraisal processes (van der

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Weerd et al., 2011). For the threat approval process, research has identified that exposure to misinformation (Fedeli, 2020) may reduce compliance with COVID-19 protection measures by encouraging individuals to downplay the potential for infection as well as the impact (Lee et al., 2020). Further, exposure to misinformation has also been associated with doubts of the efficacy of COVID-19 vaccines, suggesting that it may influence the coping approval process (Loomba et al., 2021).

Using theoretical constructs derived from PMT, vaccine confidence, misinformation and social media usage, this paper seeks to explore the interaction between perceptions of voluntary health behaviours and interest in tourism activities in residents of Italy. 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 programme, 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

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 et al., 2015). Low confidence can lead to vaccine hesitancy, which has been defined as the delaying or refusing of available vaccines by individuals, which is a threat to the success of the COVID-19 vaccination campaign (Harrison & Wu, 2020). Individuals and groups can display a range of behaviours as a result of vaccine confidence, from vaccine promotion to refusal (Dubé et al., 2013). Individuals may also have a relatively high general vaccine confidence while rejecting a specific vaccine such as the COVID-19 one (Little et al., 2015) due to the novelty, composition (chemical formulation) or the process of delivery . Additional complexity is the evidence of low-confident, or often called hesitant compliers (Enkel et al., 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 behaviours 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 a rational assessment of the health threat and the required action is conducted before the behaviour is adopted. PMT, unlike other approaches, does not assume rationality and specific to this research, examines perceptions of response efficacy as part of the appraisal process. The initial formulation of PMT sought to explain how a fear appeal in health communications would encourage the adoption of protective actions (Rogers, 1975) and subsequent development expanded the perspective to incorporate individuals' evaluation of both the potential threat and the coping intervention (Prentice-Dunn & Rogers, 1986). The threat evaluation or appraisal process incorporates perceptions of risk severity and vulnerability along with perceived rewards of continuing negative behaviours (Tsang & Wong, 2021). If the perceived threat is high (severity and vulnerability) and the rewards are low, there is a higher propensity to adopt the protection measure. The coping appraisal process incorporates perceptions of the efficacy of the proposed response, perceptions of individual efficacy to perform required action along with perceptions of response costs to perform protective behaviours. The latter has been identified as costs (time, money, effort) to access the protective measure as well as the cost to overcome personal, interpersonal and geographic barriers (Floyd et al., 2000). These costs may not only be resource related as loss of autonomy or status can also be perceived as a response cost in PMT (Hagger et al., 2020).

In PMT, protective health behaviours, such as COVID-19 vaccination, will be adopted if individual believes that a threat is severe with a high probability of occurrence, proposed actions are effective in reducing the threat and perceived costs are acceptable (Ling et al., 2019). PMT also suggests that even if a credible protective option is available such as vaccination or personal protective equipment, individuals may reject voluntary or defy legally mandated behaviours if perceived costs are high (Burruss et al., 2021).

Recent work using PMT have contextualized COVID-19 vaccination response costs using the vaccination concern concept (Wang et al., 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). Cost and time are two factors related to affordability in income and time scarcity terms. 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 & 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.

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. Milano et al., 2011; Xiang & Gretzel, 2010), 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 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 et al., 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 et al. (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 their preferred type of vaccine. 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 survey was created in English by the team of 5 of which 3 members are bilingual in

English and Italian. The survey was then was translated to Italian 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 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) to provide 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 et al., 2007) and the social distancing rules and travel restrictions, especially across regions, imposed by the Italian government. Specifically, respondents were recruited employing 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 further 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 period of January 25th – 15th, February 2021. At the end of the data collection period, a total of 4020 surveys were obtained. Given that 157 surveys were eliminated due to the presence of partial entries in the data, a convenience sample of 3893 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 et al. (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 & Grün, 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 & Grün, 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

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 3893 cases were then included in a non-hierarchical clustering method, i.e. K-mean cluster. The results indicated a 'High Confidence' group ($N = 3306$) (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.

The distinction between the two clusters was also established using Chi-square tests (Table 2).

There were more male members in the HCG, with 58.8% male in the HCG and 49.6 in the LCG ($\chi^2 = 0.000$). 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 50,000 EUR in compared to 22% of the LCG ($\chi^2 = 0.000$). More HCG members were in the North-West (38.7%), whilst more LCG members were in the South (30.7%) ($\chi^2 = 0.005$). 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.

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 ($\Delta M = 1.1$, $p = 0.000$) and vulnerability ($\Delta M = .68$, $p = 0.000$). 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,

Table 1. Results of cluster analysis.

	Final cluster centres		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 programme 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 programme 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

Table 2. Cluster profile.

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

2021), supporting the findings that risk perception might increase COVID-19 vaccine confidence. As the COVID-19 vaccination programme 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, $\chi^2 = 0.016$). 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 ($\Delta M = 1.61$, $p = 0.000$). 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, $\chi^2 = 0.000$). 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. 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 & 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(. 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, $\chi^2 = 0.007$). However, the HCG claimed to have a slightly more regretful feeling if social media shut down ($\Delta M = 0.38$, $p = 0.000$). 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 ($\chi^2 = 0.000$). Similarly, the LCG considered a larger amount of information on COVID-19 that seemed fake or made up ($\Delta M = 0.2$, $p = 0.000$).

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. 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 ($\Delta M_{it1} = 0.33$, $p = 0.000$ and $\Delta M_{it2} = 0.33$, $p = 0.000$). This might be due to Italians, like many other countries tend to favour proximity and domestic tourism (Del Chiappa, 2021).

5. Discussion and conclusion

The goal of this study was to explore residents' perceptions of voluntary health behaviour (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 behaviour.

First, a significant percentage of the LCG showed a history of vaccine scepticism 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 (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.

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). The LCG perceptions of efficacy, safety, time, and autonomy partially aligns with existing COVID-19 research that suggests that response efficacy predicts the adoption of protection measures (Qiao et al., 2021). This suggests that governmental bodies should conduct COVID-19 vaccine information campaigns that combats misinformation about the vaccines themselves and the institutions delivering themDonabedian.

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 behaviours. 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, 2021). 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 & 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 behaviour.

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. This finding extends existing research that suggests potential travellers perceive local sites as lower risk to suggest that higher vaccine confidence might lead to a willingness to undertake at least regional travel as soon as possible (Moya Calderón et al., 2021). 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 severely hit and, depending on the destination, has often not received enough financial support throughout the pandemic (Dube et al., 2021; Khalid et al., 2021). On the contrary, our findings seem to highlight that many tourism workers have a lower level of confidence towards the COVID-19 vaccine. Reseachers have suggested that destinations should reorient tourism around sustainability and responsibility as part of the restarting process (Kuščer et al., 2021). Our findings suggest policymakers and destination marketers in Italy go somewhat further to 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.

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Appendix

Table A1. Comparisons between the clusters.

	Total (3893)		Low confidence (587)		High confidence (3306)		
	N	*(% or SD)*	*N*	*(% or SD)*	*N*	*(% or SD)*	*P* value (of Chi-Square or t tests)
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**

(*Continued*)

Table A1. Continued.

	Total (3893)		Low confidence (587)		High confidence (3306)		
	N	*(% or SD)*	*N*	*(% or SD)*	*N*	*(% or SD)*	*P* value (of Chi-Square or t tests)
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)*	
30 mins -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)*	

(*Continued*)

Table A1. Continued.

	Total (3893)		Low confidence (587)		High confidence (3306)		
	N	*(% or SD)*	*N*	*(% or SD)*	*N*	*(% or SD)*	*P* value (of Chi-Square or t tests)
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.

Table A2. 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 travelling 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 travelling 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