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Anxiety, fear and stress feelings of road users during daily walking in COVID-19 pandemic: Sicilian cities

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Abstract

The COVID-19 pandemic has significantly influenced people's lifestyles including their travel choices. The pandemic resulted in placing restrictions in travelling throughout Italy due to the obligatory need for social distancing and changes in public transport services. City residents changed their mobility patterns and started using their private vehicles more often instead of public transport, while choosing to walk or cycle for short distance trips. Governments and local authorities encouraged citizens to use sustainable travel modes, particularly walking, during the pandemic period. However, the high number of infections and deaths, especially in Italy, has strongly influenced the propensity of walking due to the emotional aspects of travelling. This paper presents a statistical analysis based on data gathered through a questionnaire in urban areas of Sicily focusing on travel by walking for either leisure or work. The evaluation of negative emotions that people who habitually walk for short distances in the study areas is the main focus of the present work. The data indicated a variation between three emotions: anxiety, stress, and fear. These emotions had a potential to influence people's daily life and, as a result, their travel habits.

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1. Introduction

Leaving home to go to work, flying to visit a distant relative, and planning holidays abroad are all activities that due to the COVID-19 pandemic have been significantly affected or eliminated and are no longer part of people's normal routine. COVID-19 has not only threatened global health but it has also influenced one of the cornerstones of modern life: freedom of movement (Politis et al., 2021a). Sustainable travel modes, particularly walking, have emerged during this period. Walking is an efficient way to counteract the feeling of isolation and it offers multiple mental and physical benefits that could be considered a stress remedy (Kelly et al., 2014). However, after the outbreak of the pandemic, walking has generated emotional states in walkers since it brought them into close contact with the environment, infrastructure and other people (Campisi et al., 2020a).

Throughout the pandemic, people received an overwhelming amount of misinformation, known to cause negative psychological effects such as confusion, uncertainty, heightened or diminished risk perception or fear (Han et al., 2018). In this environment of uncertainty, constant change and anticipation of normality, people had to adapt to a new rhythm of life and rules of behaviour designed to prevent it (Politis et al., 2021b). When the environment changes, people have the propensity to experience anxiety and feel unsafe (Usher et al., 2020).

The emotional health of the population is a crucial casualty of the COVID-19 pandemic. Fear of death and increased anxiety regarding the future are common phenomena that are uniformly observed among individuals (Davis, 2020). Fear is often manifested during infectious outbreaks and different reactions to the perceived threat can occur. Specifically, anxiety and fear of infection can lead to racial discrimination. At the same time, people might develop defence mechanisms like projection, where they blame others for their misfortunes, and develop aggressive behaviour towards people who are ill or perceived as ill (Usher et al., 2020). Anxiety, fear of losing control or being trapped as well as spread of rumours are "symptoms" associated with the pandemic quarantine, where people are socially isolated and less resilient to distress. A study on the psychological effects of quarantined individuals discovered that the longer the duration of the quarantine, the higher the possibility of observing posttraumatic stress disorder or depression symptoms (Perrin et al., 2009). In the case of rumours and misinformation, possible reactions such as confusion, pessimism, feelings of vulnerability (Canet Juric et al., 2020) and anger are often socially amplified (Han et al., 2018).

During the pandemic period, there has been a general increase in stress, anxiety and fear, which could be partly reduced by walking. These three emotions are associated with a state of excessive alertness and can occur in short or long periods of time (Xiong et al., 2020). Therefore, this study aimed to explore the influence of stress, anxiety and fear as barriers for walking considered as an urban mobility mode during the COVID-19 pandemic. The paper starts with a brief introduction considering the Italian context during the pandemic followed by the development and administration of a questionnaire completed in Sicily. The results of the analysis are discussed, and conclusions are drawn. These results would not only be helpful in preventing the negative effects caused by COVID-19 but could also bring permanent changes for improving urban transportation.

2. COVID-19 effects on Italian mobility

The pandemic period can have severe implications on people's mental and emotional health. Such implications can strongly influence travel choices in terms of both means of transport and frequency, causing an imbalance between transport demand and supply, especially in the most dramatic periods such as pandemics. Therefore, this research aims to investigate the psychosocial aspect related to the simplest form of travel, i.e., walking. In March 2020, Italy was the first European country officially affected by the pandemic, just after China. Several contagions developed from northern Italy across the country and the Italian Government implemented a travel restriction (lockdown) allowing only travel for health personnel and for the purchase of essential goods. National public transport use declined by 80% from March to May 2020, while private vehicle use increased immediately after the lockdown (Google LLC, 2021). The pandemic emergency has led the Italian Government to adopt measures to limit travel and at the same time promote a healthy lifestyle. Certain disease-related health conditions such as diabetes, cardiovascular disease, cancer, and chronic respiratory disease have made people even more fragile and potentially exposed to the spread of COVID-19. The presence of previous chronic diseases influences the prognosis in people with COVID-19. Therefore, it is important to consider lifestyle changes after the end of the pandemic that would alleviate these diseases and promote healthier behaviour (Li et al., 2020). During the pandemic, many companies and schools have adopted teleworking,

reducing the demand for home-school and home-work trips by up to 70% (Google LLC, 2021). Italian Government has issued eight recommendations for the local public transport sector, concerning the respect of safety distances, the use of frequent sanitation, placement of information signs and anti-droplet plexiglass dividers.. The shared mobility sector also declined, especially car sharing, while the shared micro-mobility sector increased (Campisi et al., 2020d; Torrìsi et al., 2021). In addition to the recommendations, the Italian Government, in agreement with the EU, has set up a series of measures to encourage the purchase of electric bicycles and scooters and at the same time improve cycling and walking infrastructure. Transport companies have had to limit the number of seats and sometimes reduce the frequency of bus, tram, and train services, while a growing fear of increased contagion in public transport systems has resulted in lower ridership. To re-establish a balance between demand and supply of transport, it is necessary to analyse the travel habits and mode of transport before and during the various phases of the pandemic. It is also necessary to understand the psychosocial state of users to implement a series of short- and medium-term strategies aimed at improving public transport, while discouraging the use of private vehicles.

Therefore, the assessment and understanding of the fear of contagion, stress and anxiety when choosing a transport mode is fundamental to implement a series of mitigation actions. In this study we assessed the psychological and emotional trend that defined a sample of users who preferred to walk during the various phases of the pandemic. The research focused on the dissemination of an online survey in the Sicilian territory in southern Italy. Sicily was chosen because of:

- absence or reduced presence of transport infrastructures in the island compared to the rest of the country and therefore greater problems in extra-regional travel. During the various pandemic phases, the island had one of the highest rates of COVID-19 cases in southern Italy and was one of the regions to have been affected immediately after Lombardy;
- general lack of public transport service with a reduced presence of the railway system and multimodal areas;
- high number of immigrants arriving at the Sicilian coast with a high risk of possible transmission of virus variants; and
- stricter rules that were immediately in effect in Sicily than in the rest of Italy, with further orders by the President of the Region and the Regional Government.

3. Methodology and data collection

The following six steps were undertaken for the completion of the study:

- Identification of the emotions/perceptions of road users and their travel behaviour before, during and after a pandemic or catastrophic event by means of a literature review.
- Observation of internal variables (gender and age group of the road user, previous experiences, psycho-physical state/period of the event) and external variables (respect for social distance, contingency of the means of transport, confinement to home, smart-working) that could modify the emotional aspect and the choice of emotions to be investigated.
- Determination of the selection method for sampling the participants in the survey study.
- Development of an online survey and collection of data.
- Analysis of the walking frequency.
- Assessment of the relationship between socio-demographic variables (i.e., gender and age group) and emotional trends of stress, fear, and anxiety during travel by walking.

3.1. Survey design

The survey data are gathered in Sicily where there were approximately 78,200 cases and 2,000 deaths since March 2020 (<https://news.google.com/COVID19>). The trend in Sicily is among the highest in central and southern Italy (<https://news.google.com/COVID19>). The acquisition of variables was conducted by planning and disseminating a survey through the Computer-Assisted Web Interviewing (CAWI) method. The data gathered include sociodemographic information (gender, age, size of the city of residence) and variables related to walking habits in different time periods, i.e., before COVID-19, post lockdown and beginning of the second phase of the pandemic

considering home-work (H-W) and home-leisure (H-L) trip purposes. Additional information includes the anxiety, stress and fear experienced by the user while walking.

The questionnaire survey was divided into 3 sections: Sociodemographic characteristics: gender, age group, and size of the city of residence.

- Frequency of walking during predefined periods (pre-pandemic phase, post lockdown phase and second pandemic phase)
- Psychological and emotional variables (Likert scale): feelings of fear, stress and anxiety while walking (1-not at all/2-lightly/3-moderately/4-strongly/5-definitely)

The first step of the research focused on the construction of the questionnaire, identifying its main objective. Therefore, considering the numerous restrictions of movement during the different phases of the pandemic and considering the possible fear of contagion, it was decided to evaluate the simplest and shortest form of movement, i.e. walking. In particular, the study focused on the evaluation of the frequency and reason for movement through walking during the pre- and post-pandemic phases and the opinion of users in terms of stress and anxiety and pause.

After the evaluation of the absence of questionnaires available in the literature for this purpose, it emerged the need for a new instrument by preparing appropriate items. The items have been modulated according to the main objective, to the secondary ones assigning a sort of importance classification to the various dimensions of investigation. The three sections correspond to the evaluation that goes from the general socio-demographic data to the specifics connected to the emotional aspect of the user. The use of single responses and the Likert scale allowed for the creation of items that were simple, short, and written in language familiar to the target respondents.

Table 1 summarises the three sections of the questionnaire.

Table 1. Survey questions

| Section 1: Sociodemographic details | | Section 2: Walking frequency | | Section 3: Walker perceptions |
|-------------------------------------|--|--|--------------------------|---|
| 1.1 gender | male; female | | reason H-W | |
| 1.2 age | 18-25;26-40; 41-55;56-70; over 70 | 2.1 | reason H-L | 3.1 Walking is an anti-stress method |
| 1.3 study level | high school diploma; Bachelor’s degree/ Master degree; other | Before COVID-19 2.2. After lockdown | reason H-W | 3.2 The pandemic has affected the feeling of stress when walking |
| 1.4 city of residence | metropolitan area; medium cities; small town | | reason H-L | 3.3 The pandemic has affected the feeling of |
| 1.5 car ownership | yes and I drive it; yes I have but I don’t drive it; no. I have not a driver license | 2.3 During II phase of pandemic | reason H-W reason H-L | 3.4 The pandemic has affected the feeling of anxiety when walking 3.4 The pandemic has affected the feeling of fear when walking |
| | | Likert scale (from 1 to 5) 1=never; 2=several times in a week; 3= one time in a day; 4=two-three times in a day; 5=more than three times in a day | | Likert scale (from 1 to 5) 1=strongly agree; 2=disagree; 3= neither agree nor disagree; 4=agree; 5=strongly agree |

3.2. Analysis approach and survey area

A descriptive statistical analysis was conducted to explore the characteristics of the variables. The results have led to reflections that can be implemented, such as a general review of social and planning policies to promote a set of incentives aiming to increase safe walking and the spread of participatory planning. To better understand the extent to which the size of the city can generate a different emotional state during walking, it was decided to investigate three different types of urban areas described as metropolitan areas, medium- sized cities and small cities as illustrated in the Figure 1.

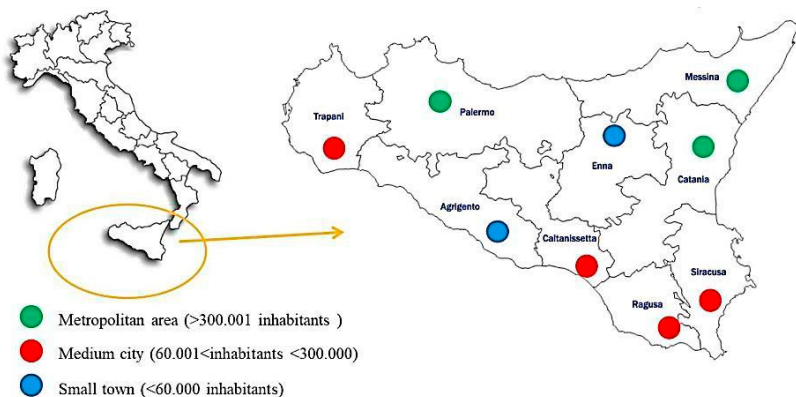


Fig. 1. Urban areas with survey participants

The movement habits of Sicilians compared to the pre-COVID period have been tracked by various platforms including Google, which has periodically provided movement trends. From 25 September to 6 November 2020, movements in Sicily for "retail and leisure" were reduced to an overall 39% of all trips (the national average is 40%) (Google LLC, 2021). This category includes destinations such as restaurants, bars, shopping centres, theme parks, museums, libraries, and cinemas.. At a regional level, journeys to work dropped by 28% and trips made by public transport reduced by 45%: in these two cases (as in the case of leisure), the surveys show that the reduction of trips was progressive over the course of the weeks.

4. Results and discussion

The COVID-19 pandemic has radically altered the lives and habits of residents in cities across the world. Most people's travel habits as well as the transport provisions to accommodate travel needs have changed significantly in a few months. The propensity to adopt transport planning strategies to increase the number of short trips as well as the dissemination of technology (i.e. 5G network and sensors) were analysed considering the size of the cities in which the surveyed users reside. The results illustrate the walking frequency of habitants of Sicilian areas including metropolis, medium-sized cities and small urban centres. With the use of descriptive statistics, it is concluded that before COVID-19 almost half of the respondents used to walk at least once a day for work. Between the 1st and 2nd phase of the pandemic, only one third of the respondents walk to work; a change that could be attributed to remote working. Additionally, more than half of the respondents strongly agree to the fact that walking is an anti-stress method as shown in Table 2.

Table 2. Walking as an anti-stress method.

| Walking is an anti-stress method | Frequency | Relative frequency |
|----------------------------------|-----------|--------------------|
| Strongly disagree | 1 | 0,1% |
| Disagree | 15 | 2,1% |
| Neither agree nor disagree | 57 | 8,1% |
| Agree | 241 | 34,4% |
| Strongly agree | 386 | 55,1% |
| Total | 700 | 100% |

Table 3 presents the respondents' opinion concerning their perceived levels of fear, stress and anxiety when walking during the pandemic period. Most of the respondents agree or strongly agree that these feelings influence walking. More specifically, comparing the results the respondents clearly experience more anxiety than stress or fear while walking. Most respondents (90,4%) strongly agree that anxiety has an impact on walking during the COVID-19 period. In the case of stress, a significant percentage of the respondent (39,4%) neither agrees nor disagrees with the judgment that stress influenced walking during the pandemic. However, more than half of the respondents (46,6%) agree or strongly agree with this.

Table 3. Feeling of stress, anxiety and fear while walking during the pandemic

| | Stress | | Anxiety | | Fear | |
|----------------------------|--------|-------|---------|-------|------|-------|
| | F | RF | F | RF | F | RF |
| Strongly disagree | 13 | 1,9% | 3 | 0,4% | 18 | 2,6% |
| Disagree | 85 | 12,1% | 3 | 0,4% | 94 | 13,4% |
| Neither agree nor disagree | 276 | 39,4% | 27 | 3,9% | 261 | 37,3% |
| Agree | 270 | 38,6% | 34 | 4,9% | 211 | 30,1% |
| Strongly agree | 56 | 8,0% | 633 | 90,4% | 116 | 16,6% |
| Total | 700 | | 700 | | 700 | |

F=frequency; RF=relative frequency

A further statistical analysis, using the SPSS software, was conducted to investigate possible correlations between the variables considered in this study. The examined correlations were between age groups - feelings (i.e., stress, fear and anxiety), gender – feelings and groups of cities - feelings (9 pairs in total). The analysis showed two correlations present: the one between age and anxiety and the one between gender and feelings. A Spearman's correlation was run to determine the relationship between the age groups and the feelings of anxiety, stress, and fear. There was a strong correlation between the age groups and the feeling of anxiety ($r_s = 0.75$, $N = 700$, $p < 0.05$) with anxiety increasing with age. This is an evidence of a statistically significant bivariate association between those two variables. The respondents' answers concerning the feeling of anxiety seem to be changed based on the age groups. Older people tend to feel more anxiety while walking during the pandemic period. Moreover, a Mann Whitney test was carried out to determine if the distribution of stress, fear and anxiety is the same in both men and women. It is found that the category "Male" has a larger mean rank than "Female" with respect to stress. The results indicate that more men than women tend to feel stressed while walking during the pandemic.

Three more Spearman's tests were run to investigate the presence of any correlations between the three feelings (stress, fear, anxiety) and the groups of cities (metropolitan, medium, small) of the respondents. No correlations were

found in these tests. The size of the cities (based on the population) does not seem to have an important effect on stress, anxiety and fear respondents feel while walking.

5. Conclusions

The recent COVID-19 pandemic has led to changes in people's lifestyles and emotional hopes. It has brought significant changes in mobility habits. It has also affected travel choices, attitudes, perceptions and transport-related lifestyle (e.g., online shopping, working from home, moving to a new home) during and after the pandemic (Downey et al., 2021). On one hand, walking can be considered a strategy to maintain a regular exercise routine during a period of enforced rest. On the other hand, it is necessary to evaluate the feelings experienced by people while walking in relation to certain psycho-social characteristics. People with mental health problems perceive a greater anxiety disturbance compared to people without disorders especially while using public transport such as trains. Public transport plays a significant role in social inclusion; however, it is surprising to find very little research about the relationship between good access to public transport and good mental health. Public transport is not generally recognised as being an integral part of a person's ability to recover from a mental health crisis. Lack of support and accessibility of public transport seem to be the two main areas that need to be improved.

The results of this report show a strong correlation between age and anxiety and between stress and gender. Anxiety can reduce the likelihood of leaving the house and thus reduce social relationships. Anxiety and fear reduce the propensity to use public transport as it is associated with an enclosed space where more contagions can occur and seen as undesirable and more dangerous. Governments and public transport operators must implement a service with greater hygiene services. Therefore, some good practices will have to be pursued for proper planning in the future that also accounts for the feelings mentioned above. In general, improved body hydration can help to combat stress, so drinking small sips of water can reduce the emotional state. The placement of benches and the presence of water dispensers or fountains near terminals can help with anxiety attacks (Liska et al., 2019). In addition, water dispensers, near terminals or in the streets, can reduce panic attacks. Signs could encourage people to breathe slowly since this can be seen, as the first actions to reduce stress. In addition, the implementation of prevention campaigns or counseling in specialized centers could alleviate the fear, anxiety and stress related to walking or moving generally in urban spaces by transport modes. Therefore, the results obtained here lay the groundwork for future research steps related to the planning of urban spaces and infrastructure, encouraging the evaluation of the emotional aspect as one of the useful factors for good design.

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