Cashless payment: behavior changes and gender dynamics during the COVID-19 pandemic

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Abstract

Purpose – The objective of this study is to investigate the impact of the COVID-19 pandemic on the consumer payment behavior in Italy by correlating financial literacy with digital payment awareness, examining media anxiety and financial security, and including a gender analysis.

Design/methodology/approach – Consumers' attitudes toward cashless payments were investigated using an online survey conducted from November 2021 to February 2022 on a sample of 836 Italian citizens by considering the behavioral characteristics and aspects of financial literacy. Structural equation modeling (SEM) was used to test the hypotheses and to determine whether the model was invariant by gender.

Findings – The analysis showed that the fear of contracting COVID-19 and the level of financial literacy had a direct influence on the payment behavior of Italians, which was completely different in its weighting. Fear due to the spread of news regarding the pandemic in the media indirectly influenced consumers' noncash attitude. The preliminary results of the gender multigroup analysis showed that cashless payment was the same in the male and female subpopulations.

Originality/value – This research is noteworthy because of its interconnected examination. It examined the effects of the COVID-19 pandemic on people's payment choices, assessed their knowledge, and considered the influence of media-induced anxiety. By combining these factors, the study offered an analysis from a gender perspective, providing understanding of how financial behaviors were shaped during the pandemic.

Keywords Cashless payment, Gender analysis, Financial literacy, SEM, Social media anxiety, COVID-19, Financial security

Paper type Research paper

1. Introduction

According to Paul Coelho, "Sometimes you have to decide between one thing you are used to and another that you would like to know."

This statement can also be applied to the choice of payment method for shopping. In fact, choosing a payment method means choosing between cash, which we have always been used to, and digital payments, which we would like to know because they are a part of a fascinating world to discover.

Consumer payment behavior is important for a real economy and the efficiency of payment systems (Kotkowski and Polasik, 2021; Zhang *et al.*, 2019).

The fear of the COVID-19 pandemic severely affected communities and economies around the world, affecting different sectors of society in different ways (Eger *et al.*, 2021; Wisniewski

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et al., 2021), because of the increase in the number of COVID-19 infections and the declaration of the pandemic health crisis, offices, businesses, and shops closed or suffered from capacity constraints and many people stayed at home, mostly avoiding shopping for themselves (Green *et al.*, 2021).

Therefore, the rapid growth of cashless payments has aroused the interest of academia and businesses in the changes that have occurred in the global economy as a result of the progressive spread of cashless payments (Gorshkov, 2022). In this type of payment, consumers make cashless transactions and use contactless cards, electronic methods, and mobile payments (Fachrudin and Silalahi, 2022).

Unlike traditional cash transactions, digital payments make robberies and other cash-related crimes (Armey *et al.*, 2014) more difficult because people hold less paper money (Rahman *et al.*, 2020).

However, some consumers still seem to resist these technological and secure alternatives, and cash still dominates payments worldwide.

Italy was reluctant to accept cashless payments until the COVID-19 pandemic (Di Iorio and Rocco, 2022).

On the basis of these assumptions, we examined the factors that led consumers to predominantly use cashless payments during the pandemic in Italy.

Therefore, this study first addressed the question of how the fear of COVID-19 contagion influenced the acceptance of cashless payments in Italy, as well as the expectations resulting from financial literacy. It then examined how homogeneous the acceptance of cashless payments was among consumers of different genders to identify the common dynamics that influenced the choice of this particular payment method. The research then examined the factor of financial security and its positive influence on consumers' use of cashless payments. The analysis also addressed the negative influence of information on consumers' perception of the security of digital payment systems.

Thus, a detailed picture of the key factors influencing consumer payment behavior in Italy was created to promote deeper understanding and more effective adoption of digital payments in a changing environment.

In the research landscape, there has been a lot of focus on the impact and changes in spending habits due to the pandemic in Italy. However, our study used an approach that examined the role of fear of contagion and financial literacy. We also delved into gender differences in relation to payment adoption during this context. One of the main unique aspects of our approach is this integrated perspective, which considers gender variations in how people react to the epidemic situation and psychological and economic factors.

Using a model that incorporates these factors, along with data gathered from a survey representing the Italian population, including detailed demographic information, we gain more comprehensive understanding of how digital payment adoption dynamics work.

As a result, our study fills the gap in literature by offering a more thorough and nuanced examination of gender-related characteristics.

The remainder of this paper is organized as follows. Section 2 presents the literature review and research hypotheses. The sample and methodology used in the analysis are discussed in Section 3, and the results are discussed in Section 4. Section 5 describes the implications, limitations, and future research directions.

2. Literature review and development of research hypotheses

2.1 COVID-19 and payment decisions

Consumer payment behavior has changed dramatically in recent decades, making it necessary to explore how consumers view the security of payment instruments and how this affects people's payment decisions (Kosse, 2013), especially in consideration of the COVID-19

pandemic, which is a unique situation worldwide. Given these issues, it is critical to understand how customers evaluate the security of payment instruments and how this affects their payment decisions (Kosse, 2013). This section describes how these aspects have been addressed in the literature over time.

On the basis of a survey of more than 5,000 respondents from 22 European countries, Kotkowski and Polasik (2021) showed that consumers who made cashless payments before the pandemic were even more likely to do so after the pandemic.

Alaimo *et al.* (2022) conducted a study on customer satisfaction with ordering food online during the pandemic in Italy. An online questionnaire was used to collect data on two factors of customer satisfaction. The findings suggest that internet buying might minimize food waste while also providing a satisfaction index that could affect sales methods in online commerce.

According to Ramos de Luna *et al.* (2023), perceived safety, perceived usefulness, perceived compatibility and subjective norms have a significant influence on the intention to use, with subjective norms being particularly important when a user has the option of mobile payment and adequate information.

Elsotouhy *et al.* (2023) explored the influence of perceived value and sacrifices on customers' satisfaction with mobile payment services. Using a structural equation model and a sample of 430 Egyptian banking clients, they showed that perceived value positively increased user happiness whereas sacrifices had a negative impact. Furthermore, user happiness had a substantial impact on retention intention, shopping effectiveness, quality of life, and stickiness with mobile payment services.

Graziano *et al.* (2023a, b) examined consumer payment behavior in Italy during the COVID-19 lockdown using structural equation modeling and an OLS regression analysis of data from 2,872 respondents (May 2020 to June 2020), revealing a significant positive impact of COVID-19 fears on payment behavior.

Rahman *et al.* (2020) collected 301 questionnaires from Malaysian consumers and used an SEM to investigate the factors that influence the adoption of cashless payments in Malaysia. The results showed that service expectation and facilitating conditions have the greatest influence on the adoption of cashless payments and that perceived technological security has a strong relationship with the adoption of cashless payments.

Kee *et al.* (2021) investigated the consequences of using digital payments during the COVID-19 epidemic, concentrating on the experience of Malaysia's largest bank, Maybank. The results of a consumer-targeted questionnaire demonstrated that digital payment usage had various beneficial effects throughout this period, considerably altering customer behaviors. The convergence of the COVID-19 pandemic and technological improvements boosted digital payment usage, influencing Maybank user experiences. Users express satisfaction with applications such as Maybank2u and other e-payment systems, highlighting the importance of technological advancements in establishing client confidence.

Valaskova *et al.* (2021) surveyed 425 Slovak citizens during the COVID-19 pandemic and found that consumers' income, age, and employment sector played an important role in the context of new purchase behavior using Pearson's chi-square test and correspondence analysis.

Using online questionnaires with SEM, Lin *et al.* (2020) examined the behavioral motivations behind individuals' intentions to continue using mobile payments and showed that perceived value, social norms, and social self-image played key roles in the intention to use mobile payment services.

Tripathi and Dave (2022) examined the connection between payments and e-commerce in India. They also explored the factors that contributed to the growth of this sector. Using questionnaires and factorial analysis, they showed that the pandemic heightened the importance of shopping. During that time, digital payments became a convenient method for making purchases. Online shoppers value this mode of payment because it offers

convenience, a range of product options, and easy price comparisons and eliminates the need to wait in queues.

Kulisz *et al.* (2021) examined how Poles felt regarding payments and the potential risk of contracting COVID-19. They surveyed 1,000 participants and discovered that during the pandemic, people reduced their use of cash and opted for transactions to minimize physical contact with money. In addition, participants showed a preference for shopping from local stores rather than international ones, such as AliExpress. However, they also demonstrated a sense of caution when managing their resources.

Wisniewski *et al.* (2021) examined preferences for cash and cashless payments at the point of sale during the COVID-19 pandemic by surveying 22 European countries and found that consumers preferred cashless transactions when they felt that handling cash carried a higher risk of infection. Payment behavior was also indirectly transmitted through the impact of the pandemic on daily activities.

These arguments lead to the hypothesis that concerns regarding the COVID-19 pandemic led to the more frequent use of cashless payments. Therefore, Hypothesis 1 is as follows.

H1. COVID-19 concerns directly and positively affected the use of cashless payment.

2.2 Financial literacy and cashless payment awareness

The financial inclusion of as many people as possible for various social and economic reasons (Lusardi, 2019) benefits all economies. According to Grohmann and Menkhoff (2017), the main driver of financial inclusion is the spread of financial knowledge across the population. Using a cross-country approach, the authors showed that higher levels of financial literacy had a greater impact on the use of financial products and payment services in more advanced economies. Using data from the National Financial Capability Study, Liao and Chen (2020) examined the relationship between financial literacy and the use of mobile/electronic payments in the US. They found a negative and significant relationship between financial knowledge and mobile payment use, indicating that people with higher financial knowledge are less likely to use mobile payments. Gender, age, and income level are also important factors that influence the use of mobile payment services. People who are younger, who are more educated, and who have higher incomes are more likely to use mobile payment services. Therefore, this study found that improving and expanding people's financial literacy are critical in the age of FinTech and expansive financial services. Previous studies have shown a link between financial literacy and payment behavior (Hamid and Loke, 2020; Klapper and Lusardi, 2019; Nicolini and Haupt, 2019; Lusardi *et al.*, 2015; Shefrin and Nicols, 2014; Disney and Gathergood, 2013). Consumers who are more financially literate are less likely to use expensive credit products, for example, in the context of revolving credit card use (Farias, 2019; Lusardi and de Bassa Scheresberg, 2013), whereas people with lower financial literacy engage in risky and suboptimal behaviors when using credit cards (Mottola, 2013).

Using SEM and 100 interviews with Indonesian students, Gunawan and Pulungan (2023) showed that financial technology payments and financial education have a major impact on consumer behavior.

Rahman *et al.* (2022) developed and tested a seven-factor model based on the TOE framework and a partial least squares (PLS) statistical approach and examined the antecedents of cashless payment systems among 200 small businesses in urban Malaysia that have access to the latest business payment technologies. The results showed that technological compatibility and competence have significant relationships with the adoption of cashless payment systems. Management support, firm critical mass, competitive pressure, and information intensity are significantly related to the adoption of cashless payment systems, whereas firm size is not.

Lahiri and Biswas (2022) found that greater financial knowledge leads to better financial planning, which can improve financial behavior.

When investigating the impact of FinTech on the financial decisions of US millennials, Lusardi *et al.* (2018) found that young users with low financial knowledge mainly use the M-payment channel, through which they adopt costly financial behaviors, such as spending more than they earn.

The study conducted by Jain and Raman (2023) sought to comprehend the factors that influence the uptake of financial services. In particular, they focused on identifying elements that either facilitate or impede this adoption. By examining data from 411 participants and utilizing PLS-SEM analysis, the researchers discovered that individuals' perceptions of benefits have a greater influence on their adoption behavior than their perceptions of risks. In addition, when considering disparities, it was noted that Generation Z places an emphasis on the benefits compared to millennials.

Using data from the 2017 China Household Finance Survey, Chen and Jiang (2022) examined the relationship between FinTech payments and consumers' financial satisfaction with cashless payments and found that FinTech payments are positively associated with financial satisfaction with cashless payments. In particular, they found that FinTech payments contribute to greater convenience and perceived popularity among consumers, as well as a lower perceived risk, thereby improving financial satisfaction with cashless payments. According to Meyll and Walter (2019), consumers with less financial knowledge who use their smartphones to make payments show a riskier behavior and spend more money on the same income (Dahlberg *et al.*, 2008, 2015).

What is the relationship between financial knowledge and the use of cashless payment instruments such as contactless cards and mobile payments? Did Italians have financial knowledge to use cashless payment instruments?

These considerations lead to the hypothesis that during the COVID-19 pandemic, the higher the level of financial literacy was, the more frequent cashless payments were used. Therefore, Hypothesis 2 is as follows:

H2. During the COVID-19 pandemic, the level of financial literacy had a direct and positive effect on the use of cashless payments.

2.3 COVID-19 pandemic and the anxiety caused by the media

During global pandemics, crisis communication is crucial to dispel fears and uncertainties and to unite people around the world in a common fight against health threats. Therefore, inadequate crisis communication can have disastrous personal and economic consequences. Understanding the factors that contribute to increased emotional distress from the pandemic is of paramount importance, especially as experts warn of rising case rates (Su *et al.*, 2021; Heffner *et al.*, 2021).

Liu *et al.* (2020) clarified the factors influencing the extent of Chinese people's fear during the COVID-19 pandemic, focusing on media exposure to various types of information regarding COVID-19. Their results showed that media exposure to COVID-19 information was associated with fear to varying degrees and that levels of fear were elevated among respondents who personally knew someone infected with COVID-19 or who lived in an area with reported cases. During the COVID-19 pandemic, information from social networks led to increased levels of anxiety (Garfin *et al.*, 2020; Carrasco *et al.*, 2023; Chen *et al.*, 2023; Song *et al.*, 2023). Mertens *et al.* (2020) examined how anxiety affected information processing in the context of COVID-19 and found that anxiety amplified the impact of media information on risk perception.

Chaudhuri *et al.* (2023) explored how consumer's concerns regarding privacy affect their willingness to share information online. The researchers also considered the influence of

government regulations in this context. To investigate these factors, they reviewed literature and theories and then developed a theoretical model. They validated this model using data collected from 309 participants using a technique called least squares structural equation modeling. The findings of the study indicated that people's awareness of privacy, their experiences, personal traits, and cultural differences play significant roles in shaping their concerns regarding privacy. These concerns subsequently affect their decisions regarding sharing information. In addition, the study highlighted that government regulations have an influence on individuals' choices regarding information disclosure.

Wang *et al.* (2021) measured the impact of social media on its users in China as they are most often influenced by shocking news in a cautionary and destructive manner, showing the negative influence of social media anxiety on employee performance and the moderating influence of the COVID-19 vaccine on the relationship between social media anxiety and employee performance.

These aspects lead to the hypothesis that media information regarding COVID-19 induced anxiety and fear, that is, COVID-19 concerns. Therefore, Hypothesis 3 is as follows:

H3. Media information on COVID-19 generated fear and anxiety, i.e. it positively affected concerns.

2.4 COVID-19 pandemic and financial security

During the COVID-19 pandemic, consumer behavior strongly influenced financial security and coercive information affected financial security.

Hu *et al.* (2021) examined the mediating role of economic insecurity and mental health literacy in the relationship between COVID-19 stress and anxiety and showed that COVID-19 stress was positively associated with economic insecurity and anxiety and negatively associated with mental health literacy, which, in turn, was negatively associated with anxiety. Yenerall and Jensen (2022) found that job loss and the use of savings to pay household bills were significantly associated with both lower food security and more days of poor mental health during the pandemic.

Clark *et al.* (2021) conducted a survey of older people aged 45–75 years between April and May 2020. They found that approximately one in five respondents were financially strapped and would have difficulty coping with a medium-sized emergency expenditure and that those who were more financially literate were able to cope better with such shocks, suggesting that knowledge may provide additional protection during a pandemic.

Ratna *et al.* (2023) thoroughly explored the benefits and obstacles associated with blockchain technology, financial technology (FinTech), and knowledge management (KM) in the tourism and hospitality sector. The latter include the establishment of traceable systems that address security concerns, improve the efficiency and reliability of financial transactions, and foster innovation through effective knowledge management strategies. The analysis indicated that adopting these technologies could create opportunities and markets within the industry, offering insights into the current state and implementation of knowledge-based technologies during crisis phases and in the digital context.

Emerson *et al.* (2021) compared the short-term effects of the 2020 COVID-19 pandemic and the first lockdown on the employment and financial security of working-age adults with and without disabilities. They found that in the first three months of the COVID-19 lockdown in the UK, respondents with disabilities were more likely to work shorter hours than their peers were and experienced higher levels of financial stress. These differences were attenuated, but not eliminated, when the estimates were adjusted for prelockdown financial circumstances.

Using a hypothetical method in which investors develop depression based on the understanding proposed by various departments of green finance, Tan *et al.* (2021) concluded

that the effect of sentiment indices on jump volatility changes when the proportional number of traders exceeds the behavior of the stock market.

These arguments lead to the assumption that financial security, undermined by media information, makes cashless payments easier for consumers. Therefore, Hypothesis 4 is as follows.

H4a. Financial security positively affects consumers' cashless usage.

H4b. Information from the media negatively affects the perception of financial security.

3. Methodology

The aim of modeling the relationships between noncash payment habits and factors was pursued using structural equation modeling (SEM). SEMs help in discovering the direct or indirect effects of influencing factors on the development of a target factor. SEM is a set of different multivariate techniques including measurement theory, path analysis, correlation and regression, and factor analysis applicable to different fields. Typically, an SEM consists of two components.

(1) A measurement model to test the relationships between variables (indicators) and latent factors (constructs), represented by confirmatory factor analysis (CFA).

(2) A Structural model that relates latent variables

The SEM was estimated using the R package lavaan. The model was applied after a brief description of the sample. There were some tables and graphs created using the Power BI software.

3.1 Data collection

The data used in this study were obtained from a survey conducted in Italy between November 2021 and February 2022. The data were collected using a computer-assisted web interview. The questionnaire was sent to approximately 2,000 people through social networks, such as Facebook, WhatsApp, Instagram, Twitter, and LinkedIn, and 864 compilations were collected. These were reduced to 836 complete cases, as is common in applied studies (Schlomer *et al.*, 2010). The response rate was 42%.

The questionnaire consisted of 35 questions, and the average response time of the compilation was calculated to be 7 min and 23 s.

3.2 Questionnaire structure

The questionnaire used for data collection was divided into five sections. The first section addressed COVID-19 concerns and was organized according to the first version of the "Survey Tool and Guidance: Behavioural Insights on COVID-19" by the World Health Organization (WHO). The second section was regarding financial literacy and was based on the methodology proposed by Klapper and Lusardi (2019). The third section explored the change in Italians' payment habits during the COVID-19 pandemic. The fourth section explored their level of anxiety/confidence regarding their own financial affairs.

Lastly, the fifth section contained the sociodemographic data of the respondents. The topics explored included age, gender, civil status, place of residence, size of residence, education level, occupation, and net income. The questionnaire also included two questions on purchasing habits to determine respondents' confidence in mobile payments and transactions of market goods and services between producers and consumers over the internet. With these questions, we wanted respondents to provide the average amount paid

using mobile payments in the previous month and the number of times that they purchased goods and services through e-commerce channels in a month. The main summary of the items can be found in Graziano *et al.* (2023a, b). The characteristics of the samples are shown in Figure 1. The sample was composed of people from all Italian regions and was quite balanced between men (54%) and women (46%). Young people were the most represented: almost 58% of the respondents were younger than 35 years. The respondents were mainly single and had a modest income, and most of the respondents had not earned more than 25,000 euros in the previous year. Interestingly, more than 50% of the samples were represented as follows: approximately 40% of people use M-payment and spend, on average, less than 100 euros; those who use M-payment and spend an average of more than 500 euros per month were approximately 13%.

4. Results

The SEM model was used to determine the factors that determine the use of choices in cashless payments. Only those items that were measured with a seven-point Likert scale were included in the model, which was subsequently reduced to five points to avoid computational problems due to the scatter of the data. Subsequently, only significant variables were retained for the model. The variables included in the model, their original membership dimension in the questionnaire, and their expressions are listed in Table 1.

It is worth noting that we consider the financial literacy index to be the composition of a number of observed variables. First, we included the Big Five questions that covered the basic concepts of economics and finance encountered in everyday life, such as simple calculations on interest rates (fixed and variable), inflation, individual stock investment versus mutual fund investment, and the relationship between interest payments and mortgage maturity. Second, there was only one correct answer to each question. To calculate the financial literacy index, we relied on several previous studies (Bumcrot *et al.*, 2011; Nicolini and Haupt, 2019). We constructed the financial literacy index based on the number of correct answers provided by each respondent to the five financial literacy questions. An individual who correctly answered all five questions had a financial literacy index of 5. An individual who did not correctly answer the five questions had a financial literacy index of 0 (Bumcrot *et al.*, 2011).

4.1 Measurement model results

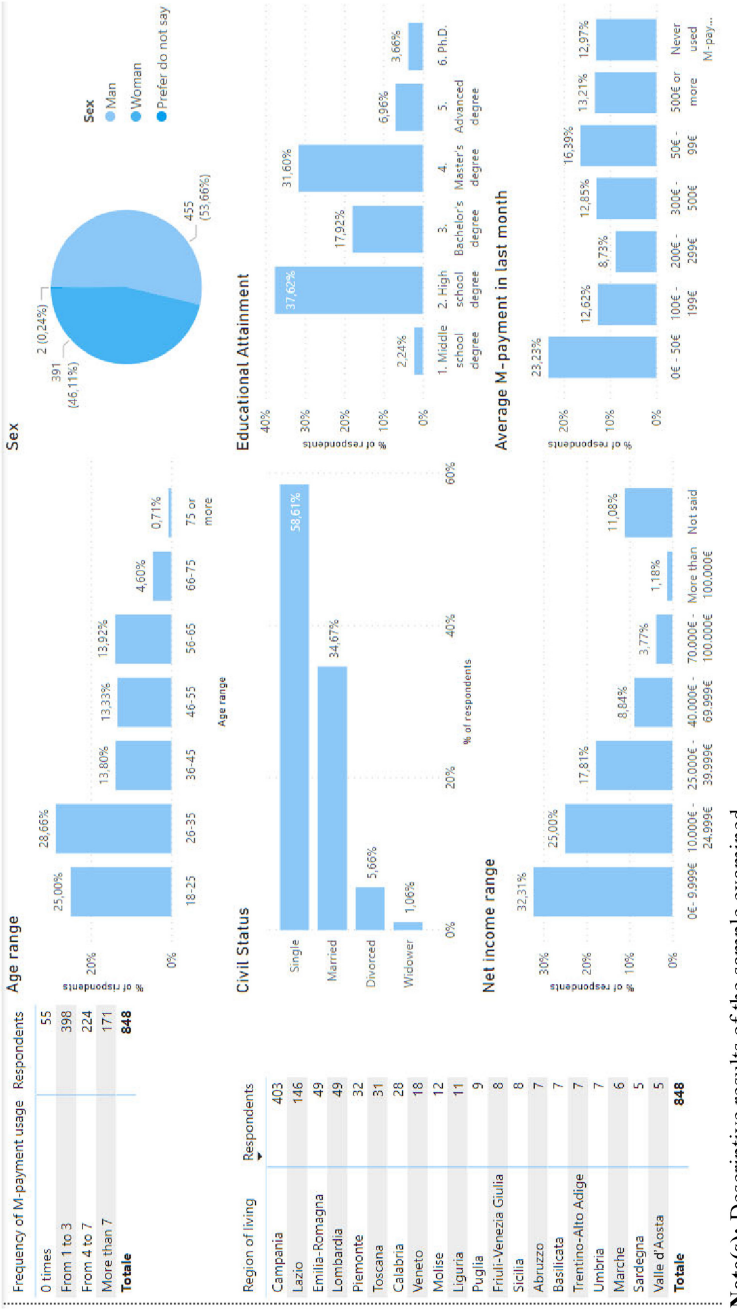
In SEM, the measurement model is a confirmatory factor analysis (CFA) estimated to test the existing relationships between the items (observed variables, also called indicators) and latent factors (which may correspond to the questionnaire dimensions). After the first model was run, the items were rearranged slightly according to the modification index, resulting in a set of four latent dimensions. According to some studies (Hulland, 1999; Truong and McColl, 2011), only items associated with a standardized factor loading of more than 0.5 were considered meaningful for latent factors. The status of the measurement model is presented in Tables 2 and 3.

(1) The resulting set of latent factors states the following:

(2) COVID-19 concerns mainly relate to getting sick;

(3) COVID-19 concerns due to information deluge can be declared as *social media anxiety*;

(4) In the payment preference dimension, questions regarding the role and importance of cashless payments form a latent factor, that is, *cashless payment usage*.



Note(s): Descriptive results of the sample examined

Source(s): Figure created by authors

Figure 1.
Descriptive results

Dimension	Item	Variable in the model	States
COVID worries	Q11	How often do you look for information on COVID-19 in the media?	from 1 to 5
	Q12	How reliable do you consider media reports (TV, newspapers, etc.) on COVID-19 to be?	from 1 to 5
	Q13	How concerned are you about getting infected with COVID-19?	from 1 to 5
	Q14	How worried are you that someone close to you may get sick from COVID-19?	from 1 to 5
Payment preferences	Q21	How do you rate the payment by credit card?	from 1 to 5
	Q22	How do you rate the cash payment by debit card?	from 1 to 5
	Q23	How do you rate contactless payments?	from 1 to 5
	Q24	How do you rate the payment via the app?	from 1 to 5
	Q28	How do you rate the importance of digital payment?	from 1 to 5
Financial security/anxiety	Q41	I feel safe with respect to my financial situation	from 1 to 5
	Q42	I feel calm with respect to my financial future	from 1 to 5
Financial literacy index (%)	Q15-19	FL index	from 0 to 5
Profiling	Q1	Age range	18–25; 26–35; 36–45; 46–55; 56–65; 66–75; >75 years old
	Q2	Sex	Male, Female, Prefer not to say
	Q3	Civil Status	Married, Single/Unmarried, Divorced/ Separated, Widowed
	Q4	Educational Attainment	Middle school degree, High school degree, Bachelor's degree, Master's degree, Advanced degree, Ph.D.
	Q9	Net Income Range	€0–€50, €50–€99, €100–€199, –€200 –€299, €300–€500, €500 or more, not said
	Q10	Average M-payment in the last month	€0–€9.999, €10.000–€24.999, €25.000–€39.999; €40.000–€69.999, €70.000–€100.000, more than €100.00, Never used it
	Q4	Italian Region of living	Italian Regions

Table 1. List of variables included in the model

Source(s): Table created by authors

(5) *Financial security* excludes financial anxiety, which may be completely replaced by the anxiety triggered by communication regarding COVID-19. This may be due to the period during which the questionnaire was submitted.

The measurement model compiled in Table 2 was confirmed as all standardized factor loadings were greater than 0.5, the p-values were statistically significant (<0.05), and R^2 indicated the moderate explanatory power of the items on the factors.

Latent factor (alpha = 0.75)	Items	Estimate	Std.Err	*z*-value	$p(>\|z\|)$	Std.lv	Std.all	R^2	AVE
COVID_Worries	Q13	1.00				0.84	0.84	0.71	0.73
(alpha = 0.77)	Q14	1.03	0.08	13.72	0.000	0.86	0.86	0.75	
Social_media_Anxiety	Q11	1.00				0.71	0.71	0.50	0.50
(alpha = 0.60)	Q12	0.95	0.10	9.94	0.000	0.67	0.67	0.45	
Financial_security	Q41	1.00				0.85	0.84	0.71	0.82
(alpha = 0.85)	Q42	1.15	0.17	6.80	0.000	0.96	0.96	0.93	
Digital_Payment_usage	Q21	1.00				0.62	0.62	0.38	0.56
(alpha = 0.82)	Q22	0.96	0.05	20.59	0.000	0.6	0.60	0.35	
	Q23	1.34	0.06	23.81	0.000	0.83	0.83	0.69	
	Q24	1.33	0.05	24.54	0.000	0.82	0.82	0.68	
	Q28	1.38	0.06	23.57	0.000	0.85	0.85	0.73	

Source(s): Table created by authors

Table 2. Measurement model results

	COVID worries	Social media anxiety	Financial security	Cashless payment usage
COVID worries	*0.85*			
Social media anxiety	0.57	*0.71*		
Financial security	−0.03	0.23	*0.90*	
Cashless payment usage	0.41	0.35	0.05	*0.75*

Source(s): Table created by authors

Table 3. Divergent reliability results

Table 2 shows the reliability and convergent validity values of each latent factor.

Reliability can be interpreted as internal consistency that is, the extent to which a set of items is coherent in measuring the same construct. Internal consistency is usually measured using Cronbach's alpha. Following Hair *et al.* (2019), we interpreted a set of items with an alpha of at least 0.6 (acceptable in an exploratory approach) and no more than 0.9 (fairly redundant) as coherent. The resulting latent factors were reliable because Cronbach's alpha was always greater than 0.6.

Convergent validity tests the sensitivity of the items to be correlated with the latent construct, and it is measured using the average variance extracted (AVE) index counting the variance captured by the latent factor in relation to the latent error. Convergent validity was demonstrated because the AVE values were equal to or greater than 0.5 (as shown in Table 2).

Discriminant validity is useful for testing discrimination between constructs and is verified when the correlation between constructs is less than the root square of the AVE (Engellant *et al.*, 2016). This was demonstrated for all factors (see Table 3, where the diagonal numbers representing the root squares of the AVEs are always larger than the correlations).

After estimating the measurement model, the research hypotheses were tested using a structural model as described below.

4.2 SEM results

In SEM, the structural model relates latent variables to each other to determine the unobservable relationships between the concepts underlying the data. Therefore, the structural model is usually appropriate for testing whether the hypotheses (HP) are fulfilled.

The adequacy of an SEM was assessed using goodness-of-fit (GOF) indices. A plethora of indices can also be used. The most common are as follows:

Chi-square (X^2) measures the discrepancy between the covariance matrix implied by the model and the original covariance matrix, and a p-value >0.5 indicates the best fit. According to some authors, the index may fail when the sample size is large, as in this case.

The root mean square error of approximation (RMSEA) measures the discrepancy per degree of freedom of the model. Normally, 0 means the best fit, a value between 0.05 and 0.08 means minimal error, and a value > 0.08 means that the model can be rejected.

The standardized root mean square residual (SRMR) measures the proportion of variance in the covariance matrix. If the value was 0.06, the model was optimally fitted.

The goodness-of-fit index measures the proportion of the observed variance explained by the expected model. The closer the value is to 1, the better is the fit.

The comparative fit index (CFI) indicates the proportion of variance in the covariance matrix. The model is considered good if the index is ≥ 0.95.

The Tucker–Lewis index (TLI) is a non-normalized fit index that is independent of sample size. It is acceptable to use a model with TLI ≥0.90.

The GOF indices are listed in Table 4. Although the above results confirmed that the chi-square was significant, the other indices were good as they met the usual thresholds.

Table 5 presents the status of the hypotheses. Most of the relationships were significant ($p < 0.05$) and positive, although moderate.

Thus, the first hypothesis was supported. Indeed, COVID-19 concerns had a positive impact on cashless payment usage. The strength of the impact was moderate, with an estimated burden of 0.325. The second hypothesis was supported by the fact that cashless payment usage was moderately positively affected by the financial literacy index. However, the strength of this association was small (0.079). The third hypothesis was supported because there was a direct relationship between social media anxiety and physical concerns. This effect was strong and positive (0.671). In addition, there was an indirect pathway

Index	Value
Chi-squared (df)	180.562 (48)
RMSEA (90% CI)	0.057 (0.048–0.066)
SRMR	0.050
GFI	0.992
CFI	0.982
TLI	0.980

Table 4.
SEM GOF results

Source(s): Table created by authors

HPs	Predictor	Dependent	Estimate	SE	p-value	Status
H1	COVID_Worries	Cashless_Payment_usage	0.325	0.034	0.000	supported
H2	Financial Literacy index	Cashless_Payment_usage	0.079	0.017	0.000	supported
H3	Social_media Anxiety	COVID_Worries	0.671	0.064	0.000	supported
H4a	Financial Security	Cashless_Payment_usage			>0.05	not supported
H4b	Social_media Anxiety	Financial Security	0.164	0.056	0.003	supported

Table 5.
Status of hypothesis

Source(s): Table created by authors

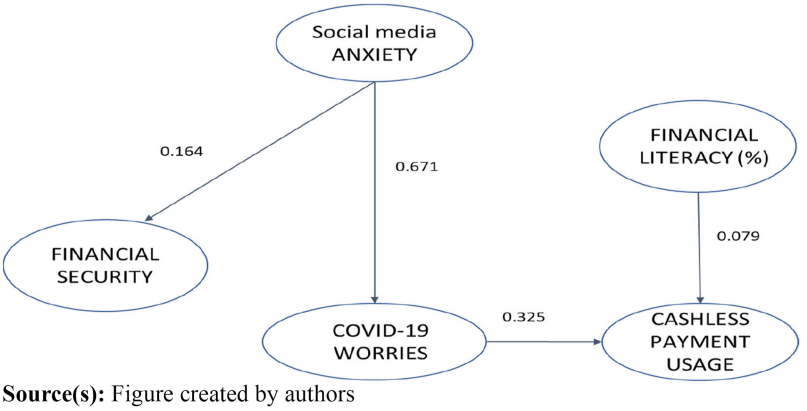
between social media anxiety and cashless payment usage passing by COVID-19 concerns. The strength of the indirect effect between social media anxiety and cashless payment use was moderate (0.218, calculated by multiplying 0.671 by 0.325). H4a was not supported. However, H4b was supported as the model showed a moderate impact of social media anxiety on financial security (0.164). A pictorial representation of the model is shown in Figure 2, where the numbers at the edges represent the value of the regression coefficient between the predictor and dependent variable.

4.3 Gender analysis

Several studies have examined whether gender influences consumers' payment attitudes, particularly the perceived usefulness of cashless payments (Riquelme and Rios, 2010; Leong *et al.*, 2013; Tan *et al.*, 2014; José Liébana-Cabanillas *et al.*, 2014). According to Riquelme and Rios (2010), there are no moderating effects of gender on the relationship between perceived utility and intention to adopt mobile payment services, whereas Leong *et al.* (2013) and Tan *et al.* (2014) confirmed this relationship in the case of NFC-enabled mobile credit card acceptance. The moderating effects of gender on perceived ease of use and its influence have been investigated in several studies. According to many studies (José Liébana-Cabanillas *et al.*, 2014; Leong *et al.*, 2013; Riquelme and Rios, 2010), gender is a significant predictor of perceived ease of use when evaluating mobile service adoption. Liébana-Cabanillas *et al.* (2022) found that men are more likely to use mobile payments than women are and are therefore less influenced by the potential risks associated with them. Considering these earlier findings, it is worth checking whether the statistical model used to study the use of cashless payments during the pandemic performed equally well in the male and female subpopulations. Thus, a multigroup analysis was conducted to check whether the model was invariant between men and women. From a statistical perspective, four types of invariance can be tested in an SEM to test the validity of the model across different groups (subpopulations):

(1) Configural invariance means that the number of factors and pattern of loadings are the same for all groups. Once configural invariance is verified, other measurement invariances can be examined.

(2) Metric invariance (also called weak invariance) means that the factor loadings are the same for each item in all groups.



Source(s): Figure created by authors

Figure 2. Pictorial representation of the model

(3) Strong invariance (scalar) means that the intercepts can also be considered equal across groups.

(4) Strict invariance requires that variance and covariance are the same in all groups.

To test for invariance, we usually compare the base model, which is estimated by considering all statistical units (men and women), with a multigroup model in which restrictions are added stepwise. Model fit is traditionally assessed by comparing the chi-square difference test and, more recently, by comparing the variation in RMSEA and CFI. Most authors assume that a change in CFI >0.01 means a different fit. Following this modern approach, we focus on a change in CFI <0.01 to represent measurement invariance. To assess the configuration model for each group, we used Hu and Bentler's (1999) guidelines for model fit indices: comparative fit index (CFI) > 0.95, Tucker–Lewis index (TLI) > 0.95, and root mean square error of approximation (RMSEA) < 0.06. Looking at the results of the estimates in the two groups, we can assess the following: The goodness-of-fit indices worsened progressively. As shown in the estimation of the same structural model in the two groups, the CFI decreased by up to 0.979, the TLI decreased by up to 0.980, the SRMR increased by up to 0.052, and the RMSEA reached 0.060, but they remained quite good. These results indicated that configuration invariance was verified. We then examined other types of invariance. The results presented in Table 6 show that the changes in the GOF indices were not statistically significant.

We can conclude that the model is invariant and holds in both subpopulations.

5. Discussion and conclusions

This study investigated the drivers of cashless payment usage by examining the behavioral characteristics and aspects related to financial literacy during the COVID-19 lockdown. Although payment behavior has been extensively studied under normal circumstances, it is important to analyze it during the COVID-19 pandemic, including emotional characteristics, which we examined by considering fear of COVID-19 contagion, financial security, and financial literacy levels, as well as the fears caused by the spread of news regarding the pandemic on networks and social media, which might have influenced their sensitivity to cashless payments.

We focused on Italy in our study because it is the first Western country to be severely affected by COVID-19.

This makes it ideal to test how the pandemic affects attitudes toward cashless payments. Most previous studies have not examined the direct impact of the fear of COVID-19 contagion on consumers' payment decisions but have considered the impact of COVID-19 on people's purchasing behavior, for example, due to lockdown (Hashem, 2020; Hoekstra and Leeflang, 2020; Sheth, 2020), which, in turn, influences payment behavior.

Our results showed that despite the importance of financial awareness, fear of COVID-19 contagion was the most important motivator for the acceptance of cashless payments. This suggests that the pandemic crisis had a significant impact on consumer behavior in relation

Table 6. Table of measurement invariant

Model	X^2	df	RMSEA	SRMR	CFI	Delta CFI	Different?
Baseline	180.56	48	0.057	0.050	0.982	NA	N/A
Configural	238.70	72	0.060	0.052	0.979	NA	N/A
Metric	250.36	79	0.072	0.055	0.978	0.001	No significant different
Scalar	296.54	108	0.064	0.053	0.976	0.002	No significant different
Strict	296.54	108	0.064	0.053	0.976	0.000	No significant different

Source(s): Table created by authors

to cashless payments as many people now prefer this option for safety and hygiene reasons. According to Wisniewski *et al.* (2021), consumers favor cashless transactions if they perceive handling cash as a higher risk of infection. In a country like Italy, where cash is widely used, an exogenous shock such as the COVID-19 pandemic leads to a dramatic change in consumer behavior.

It is also worth noting that our findings suggest that gender disparities do not affect the acceptability of cashless payments. This shows that regardless of gender, the fear of a pandemic equally affected both men and women in their decision to use cashless payment systems.

Furthermore, our work contributes to behavioral theory by demonstrating how fear generated by the broad coverage of the pandemic in the media and social media indirectly influenced consumer attitudes regarding cashless payments, as mediated by COVID-19 concerns. This concern had a direct impact on perceptions of financial stability. Excessive media coverage of pandemic-related news had no direct impact on payment decisions. Nonetheless, excessive media coverage indirectly affected their attitudes toward cashless payments by raising concerns regarding virus propagation and fear of contagion (Wang *et al.*, 2021; Liu *et al.*, 2020).

5.1 Theoretical and practical implications

The findings of this study offer several implications for both research and practice.

From a theoretical perspective, this study enriches a niche in the literature that connects four important strands of study: (1) literature on payment behavior, (2) studies on the consequences of virus spread, (3) financial literacy research, and (4) implications on gender analysis.

From a business perspective, the new payment habits of Italians and the open banking models introduced by Payment Services Directive 2 (PSD2) could have a significant impact on the Italian banking market. The possibility of traditional bundling and the opportunity to exploit synergies between collection services and the increasing digitalization that the world of payment services is experiencing will pose challenges to incumbents. Therefore, the changes highlighted in this study are pushing banks to adopt innovative processes quickly. The assumption that COVID-19 concerns positively influenced the use of digital payments can have crucial management implications. By understanding this link, companies in the financial sector can adapt their service offerings, must invest in secure digital infrastructures, and must offer solutions that meet the growing needs of consumers during health crises. The fact that there is a link between related anxiety and the adoption of cashless payments emphasizes the need for managers to develop targeted marketing and communication strategies. In addition, investing in technological solutions to meet the rising demand for convenient digital payments becomes crucial.

According to a recent study, more than half of Italian banks are involved in the development of projects aimed at innovation in the payment sector. Therefore, it is necessary for traditional intermediaries to move as quickly as possible toward the introduction of digital technologies in business areas such as customer payments because there is a risk that they will be completely displaced by companies from the nonbanking sector, which are highly disruptive, especially among customer groups such as millennials, who are absolutely accustomed to using devices such as smartphones and tablets. In particular, banks, financial intermediaries, and institutions could run more promotional campaigns on cashless payments, highlighting their benefits and ease of use. This could attract consumers' attention and thus could contribute to the acceptance of cashless payments (Oliveira *et al.*, 2016). Specific marketing strategies could also be useful in reducing the gap in payment behavior between men and women.

From an operational perspective, as the use of cashless payment services increases, the ability of payment service providers in Italy to obtain free customer information also increases. Access to data is the value chain with the greatest added value to payment services.

From a regulatory perspective, the increasing use of mobile payment services may expose users to an increased risk of fraud and abuse in the processing of personal data. This issue, which has long been the subject of policy debates at the European and national levels, must increasingly aim to defend the profiling of customer data to protect personal information in line with EU Regulation 2016/679 (General Data Protection Regulation). In this context, policymakers and regulators need to design rules that ensure ever-stronger protection of customers, including the most vulnerable groups, especially those with less financial literacy. Economic and financial education programs are essential to make users (buyers and sellers) aware of the differences between payment services and to educate them regarding the opportunities, costs, and risks associated with each service, thus reducing the gender gap.

Conversely, although it is often noted that there are gender disparities in payment behavior (Riquelme and Rios, 2010; Leong *et al.*, 2013), it appears that during the period under analysis these differences held no significance. The lack of variations in payment behavior between men and women could suggest convergence in the adoption and usage patterns of payment methods during this specific timeframe. Nevertheless, it will be important in the future to adopt an inclusive approach that addresses all segments of the population.

Finally, it is crucial to invest in technological innovation to develop and promote payment solutions that are easy for users to navigate. It is also important to work with educational institutions and organizations to offer literacy programs and make educational resources available, and to provide support and technical assistance to those who encounter difficulties in using digital payments, ensuring a smooth and safe transition. These effective strategies aim to influence the acceptance of payments in crisis situations such as pandemics. The strategies are aimed at encouraging the efficient use of cashless payment options, ultimately contributing to the ease of use of payments and thus to the well-being of individuals.

5.2 Limitations and future lines of research

Despite positive progress in several areas, this study has some limitations.

First, the generalizability of the findings of this study might be limited because of the sample size of the Italian population. To understand cash and digital payment usage patterns, it would be beneficial to expand the research. This expansion should include not only Neo-Latin countries but also diverse cultural and financial regions. By doing so, a wider range of behaviors can be captured, leading to a more inclusive and comprehensive view of how digital payment adoption dynamics vary across different contexts.

Second, it might be beneficial to consider implementing a range of sampling methods to enhance the inclusivity and representation of the research. By incorporating techniques that encompass all individuals, including demographics and geographical areas, we can minimize the potential of excluding specific categories of people.

Third, the use of a nonprobability sample due to the online administration of the questionnaire, which excluded a part of the population from the outset, also limited the generalization of the results from the sample to the population.

Henceforth, future investigations will focus on deepening research, expanding their focus to include a variety of factors influencing the adoption of digital payments. In addition, sociocultural elements will also be considered, as indicated in previous studies (Ardizzi *et al.*, 2020; Di Iorio and Rocco, 2022; Kee *et al.*, 2021; Elsotouhy *et al.*, 2023). The aim of this extension is to improve the analysis by considering a wider range of related aspects.

Finally, future research directions will involve conducting surveys in other countries and gathering probabilistic data related to a new population. This will be achieved using more complex multivariate statistical models to capture dependencies among the analyzed

variables. Employing advanced statistical models could allow more detailed understanding of the relationships between variables. The use of sophisticated multivariate techniques might reveal more intricate interactions or subtler dependencies among the variables, thereby enriching the understanding of financial behavior.

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