

Digital health literacy and quality of life association with perceptions about the disease COVID-19 in public health services

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ABSTRACT

Background: Digital health literacy and quality of life association with perceptions about the disease COVID-19 in public health services may have been little studied to date to examine socio-demographic parameters.

Materials & methods: This research was conducted using self-report about digital health literacy, and quality of life questionnaires to participants attending in the Hippocrates Hospital Athens Greece (n=167). Initially, participants were asked to answer questions regarding the impact of the COVID-19 pandemic. The data of the study were analyzed using SPSS 26 IBM.

Results: Study's findings from has to do with the role of age. People who are younger in age seem to be more likely to think that quality of life is just a flu-like illness and generally harmless. In addition, the stronger the perceived impact of the pandemic, the higher the digital health literacy of the participants.

Conclusions: The findings of this study regarding the relationship between socio-demographic variables and the examined parameters are in line with previous literature. Moreover, this study highlights the central role of digital health literacy in relation to the perception of the severity of the situation during quality of life associated with pandemic.

Keywords: COVID-19 coronavirus, digital health literacy, hesitancy, vaccination, pandemic, public health services

INTRODUCTION

Individuals with higher digital health literacy are better equipped to access a wide range of digital resources, including official health websites, online articles, and social media. This enables them to stay informed about the latest developments regarding COVID-19, including symptoms, preventive measures, and treatment options. Management crises are a more general field of study in public administration. The concept of crisis is central to the effort to study the most appropriate ways of dealing with it. Crises refer to phenomena with great variation between them, as some of them may be anthropogenic while others are non-anthropogenic. In addition, their effects may concern the built environment or humans. Therefore, crises vary considerably in nature, but also in the threats they pose to humans and the environment [1]. Digital health literacy contributes to a better understanding of the virus itself. People with higher digital health literacy are more likely to grasp the biological aspects of the virus, how it

spreads, and the potential severity of the illness. This understanding can influence their perceptions of the risk associated with COVID-19.

Pandemic crises can also be classified into two distinct groups. The first relevant group concerns python-style crises. Crises of this category manifest themselves in a progressive and gradual manner, over a long period of time and perceiving their effects progressively. The second category has to do with cobra-type crises. These manifest themselves in a rapid and non-linear manner. They entail a multitude of problems and negative effects within shorter periods of time compared to crises in the above category. Therefore, crises such as climate change can be included in the first group, while in the second group those related to communicable diseases [2]. Digital health literacy contributes to awareness of public health measures recommended to curb the spread of COVID-19. This includes understanding the importance of practices such as social distancing, mask-wearing, and hand hygiene. At the level of public health, the most important change that has

taken place during the last century has to do with the effective control of infectious diseases. The improvement in hygiene conditions and the wider progress of primary care has led to the complete elimination of important communicable diseases that have been of concern to humanity over time. Consequently, health policies began to focus to a greater extent on chronic diseases rather than communicable ones [3].

Despite their importance, there are currently only a few tools available to measure digital health literacy. Although it was managed to identify 109 means of measuring health literacy in their review, they refer almost exclusively to the non-digital context [4]. Although various screening tools now exist, digital health literacy has not yet been mapped sufficiently comprehensively, i.e., in all its individual dimensions [4]. Currently, there is no tool that adequately captures digital health literacy for adults either. Numerous publications point out that certain criteria for measuring health literacy should be defined, which should be used as theoretical frameworks for the development of questionnaires. These include, for example, a previously defined model, a clear underlying definition, and realistically measurable sub-components [5].

In the context of their high daily penetration and use, digital media also play an increasingly important role for health-related concerns. It can therefore be assumed that due to accessibility and the availability of a wealth of health information, a high degree of individual skills is required to select the appropriate information and assess its reliability. In addition, media users should not only have passive access, but also actively participate in the production and dissemination of health-related information content. Digital health literacy in this sense means not only receiving and processing messages, but also the ability to participate appropriately in multidirectional digital communication. The corresponding interaction skills have so far been comparatively rarely represented in conceptual-theoretical discussion [6]. In any case, there is not yet a sufficient empirical basis to estimate the extent of digital health literacy in the general population. Indeed, research on health literacy is so far from presenting a single model. This can certainly be a reason for the current lack of interventions to promote digital health literacy [7].

Intervention to promote digital health literacy should start at an early age. School is a suitable environment for implementation, as children and adolescents spend a large part of their day there, but also because in various countries, such as Germany, government initiatives are being taken to promote digital literacy, as part of a broader education of young people in the digital world [7]. It is a fact that the advent of the pandemic became the dominant news on the internet, in a world that is also distinguished by low health literacy [8]. According to a large-scale national survey, more than one in three adults in America have low health literacy [9]. Only 8.8% of people in China were health literate in 2012, which led China's National Health Commission to issue a new strategic plan in the year 2014 to increase the health literacy of the population to 20.0% by 2020 [10].

In the United Kingdom, four in 10 adults find it difficult to understand health information intended for the public, and more than six in 10 adults struggle with health-related information that includes numbers and statistics [11]. In

addition, people with a low level of health literacy skills are more likely to report poor health than people with a higher level of health literacy skills [12]. COVID-19 affected people with insufficient health literacy more and more frequently compared to people with satisfactory levels of health literacy, due to the former's inability to properly understand and follow health-related recommendations [13].

As regards digital health literacy during the pandemic, few studies have been conducted so far. It was assessed COVID-19 digital literacy levels in the general population in Ghana, a low-income country, using the eHealth literacy scale eHEALS [14]. The majority of respondents to their study not only showed a poor ability to find information about COVID-19 online, but also showed relatively low skills in distinguishing scientific and non-scientific information online. Female gender, old age, and low knowledge of COVID-19 were predictors of low levels of digital literacy [14]. Another study in the United States looked at digital health literacy during the pandemic. This survey found that 57.0% of participants had satisfactory levels of digital health literacy; higher levels were associated with greater willingness to accept a coronavirus vaccine and belief that contracting the disease would have significant negative consequences [15]. An additional study in Germany looked at a sample of 14,916 university students for levels of digital literacy. It was found that 42.3% of participants could rate the reliability of health-related information online, which is certainly quite low. In fact, women had lower values of digital health literacy than men, while frequent use of social networks was paradoxically associated with lower levels of digital literacy due to a lower ability of participants to assess quality of the information they found [16]. However, only these three studies have been conducted so far to investigate digital health literacy during the pandemic, thus leading to a relevant literature gap.

In particular, this research examines hesitancy, the perceived impact of the pandemic, quality of life and digital health literacy in relation to all the above parameters. The Aims of this study were the following:

1. The factors are related to the perceived impact of the pandemic, digital health literacy, perceived health, and attitudes and perceptions.
2. The relationship between digital health literacy, perceived health, attitudes and perceptions and the perceived impact of the pandemic during COVID-19.

MATERIALS & METHODS

Research Methodology

The purpose of this research was to investigate citizens' attitudes and opinions towards the COVID-19 disease and quality of life association with perceptions about the disease COVID-19 in public health services. The specific objectives include understanding how the population perceives this disease, and investigating how they are adequately informed about, their attitudes towards general quality of life association with perceptions against COVID-19 and the impact on society of the opinion of those who are negative towards in general.

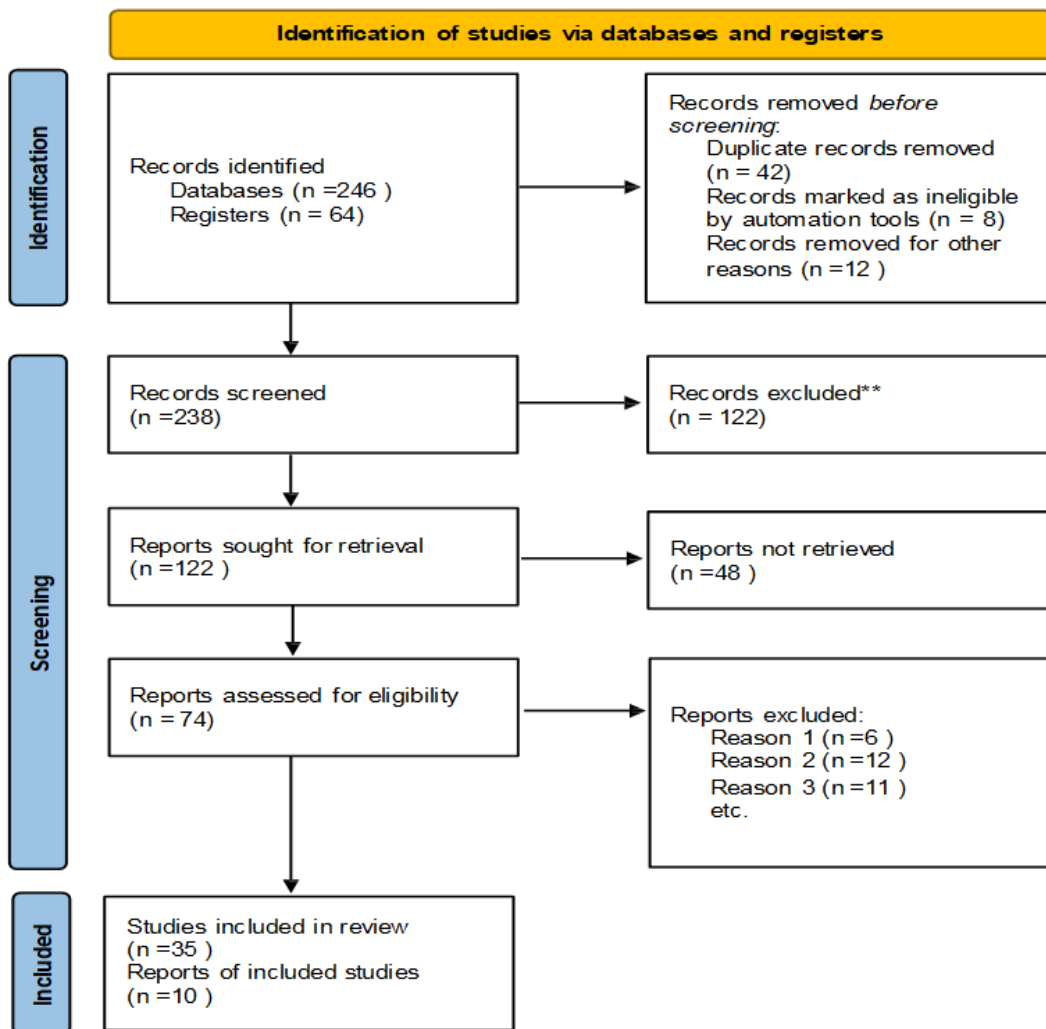


Figure 1. Identification of studies via databases & registers articles used for study (Source: Authors' own elaboration, flow diagram under PRISMA Guidelines [16, 17])

Study Design

This study was quantitative and cross-sectional. Quantitative surveys are those in which measurements are made using numerically analyzed data, refer to those in which measurements are made at a single time [16]. This survey was quantitative and cross-sectional since all measurements were carried out using questionnaires at a single point in time.

Sample Participants & Data Collection

The survey participants were n=167, criterion for inclusion in the survey was that the participating adults should be present in a public hospital of Athens. Data was carried out using a self-report questionnaire. The relevant measuring tool is SPSS v. 26 IBM. Initially, questions were 15 and the answers were given on a five-interval Likert-like scale. The Cronbach index for this leg was 0.85. The second part of the questionnaire that participants were asked to complete concerned digital health literacy and included 10 questions with answers on a five-space Likert scale. Cronbach index for this leg was 0.76.

The third part of the questionnaire consisted of questions assessing attitudes and perceptions about coronavirus infection and vaccination. In addition, the measurement tool

for assessing good health status developed by the World Health Organization was administered. This measurement tool consists of five sub-questions, scored on a Likert-like scale with values from zero to five. For this leg Cronbach index was 0.83. The last part of the questionnaire included sociodemographic data related to the gender of the participants, their age, their educational lev3.2 study design. The data analysis of this survey was performed using the program SPSS, version 26 for Windows.

More specifically, descriptive statistical analysis was initially performed on the examined variables, using mean values and standard deviations for quantitative variables and absolute values and percentages for categorical variables. We download from different database articles to used in the literature systematic review introduction and discussion of this study as refer in flow diagram PRISMA 2020 in **Figure 1** [16, 17].

Participants were stressed the anonymity and confidentiality of their participation, and that the data would be used for research purposes only. Before the start of the study, permission was obtained from the National and European Union Legislation for the protection of personal data and the study was carried out with the highest instructions of quality assurance and according to the Declaration of Helsinki.

RESULTS

Subsequently, the regularity of the distribution of quantitative variables of the survey was studied in order to decide on the use of parametric or non-parametric analyses. In the case, where the regularity of the distribution was not violated, the analyses were performed using independent sample control, variance analysis, and Pearson correlation coefficient, while in the case, where the regularity of the distribution was violated, the analyses were performed using Mann-Whitney, Kruskal Wallis, and Spearman's correlation coefficient. In addition, relationships between categorical variables were examined using Chi-square. The significance index was set at 0.05 for all analyses. **Table 1** shows the results of ANOVA test.

Table 2 shows the relationship between educational attainment and study and work in a crowded environment, as calculated through a Chi-square analysis. As found, there were statistically significant relationships between the two variables.

Table 3 presents the variations in the values of perceived pandemic impact, digital health literacy and perceived health status based on age group, as calculated based on the Kruskal-Wallis test. As can be seen, only in the case of perceived health status were there statistically significant differences ($p=0.000$).

Figure 2 shows Q-Q plot while **Figure 3** shows box plot of digital health literacy associated with perceived impact of the COVID-19 pandemic and quality of life.

Table 1. One-way ANOVA test: Digital health literacy associated with perceived impact of COVID-19 pandemic & quality of life

ANOVA		Sum of squares	df	Mean square	F	Significance
Perceived impact of pandemic	Between groups	790.806	2.0	395.403	6.405	0.002
	Within groups	10,124.871	164	61.737		
	Total	10,915.677	166			
Digital health literacy	Between groups	425.070	2.0	212.535	9.808	0.000
	Within groups	3,553.768	164	21.669		
	Total	3,978.838	166			
Quality of life	Between groups	44.979	2.0	22.489	1.540	0.217
	Within groups	2,394.722	164	14.602		
	Total	2,439.701	166			

Table 2. Chi-square test: Digital health literacy associated with perceived impact of COVID-19 pandemic & quality of life

Chi-square tests	Value	df	Asymptotic significance (2-sided)
Pearson Chi-square	11.187	6.0	0.083
Likelihood ratio	13.634	6.0	0.034
Linear by linear association	0.210	1.0	0.647
Number of valid cases	167	0.0	0.000

Table 3. Differentiating perceived impact of pandemic, digital health literacy, & perceived health status based on age group

		n	Average	Standard deviation	p
Perceived impact of pandemic	Under 30 years old	17	46.352	5.830	0.668
	31-35 years	26	46.730	8.062	
	36-40 years	26	45.500	10.214	
	41-45 years	32	49.125	7.794	
	46-50 years	21	47.666	8.696	
	51-55 years	21	46.904	8.209	
	Over 55 years old	24	49.666	6.748	
	Total	167	47.521	8.109	
Digital health literacy	Under 30 years old	17	32.705	5.120	0.275
	31-35 years	26	30.846	5.903	
	36-40 years	26	34.192	3.521	
	41-45 years	32	33.062	2.839	
	46-50 years	21	33.809	4.479	
	51-55 years	21	32.381	6.621	
	Over 55 years old	24	34.791	5.081	
	Total	167	33.113	4.895	
Perceived health status	Under 30 years old	17	20.058	3.325	0.000
	31-35 years	26	15.692	2.328	
	36-40 years	26	16.538	3.569	
	41-45 years	32	17.562	1.812	
	46-50 years	21	14.809	4.534	
	51-55 years	21	14.857	3.054	
	Over 55 years old	24	15.541	5.532	
	Total	167	16.389	3.833	

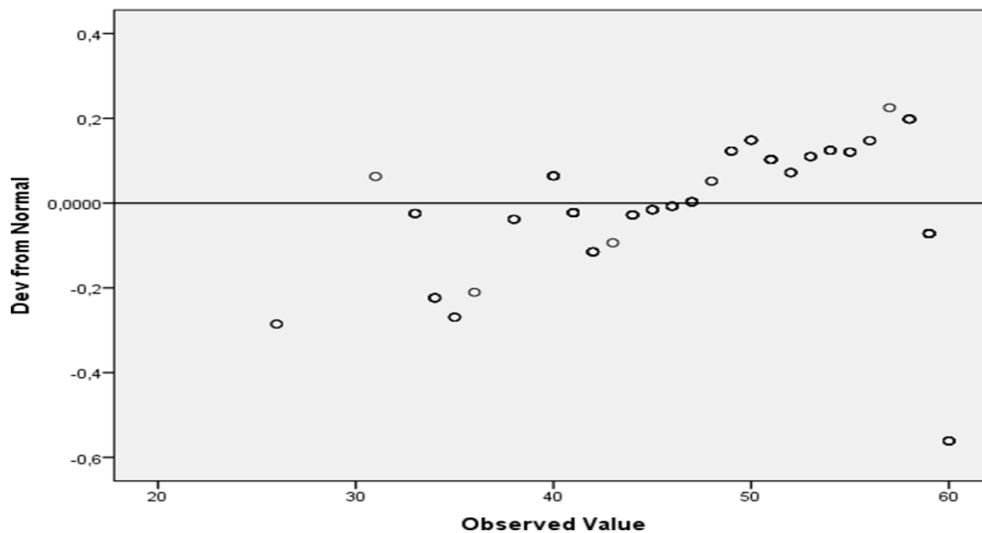


Figure 2. Q-Q plot: Digital health literacy associated with perceived impact of COVID-19 pandemic & quality of life (Source: Authors' own elaboration, using SPSS v. 26 IBM)

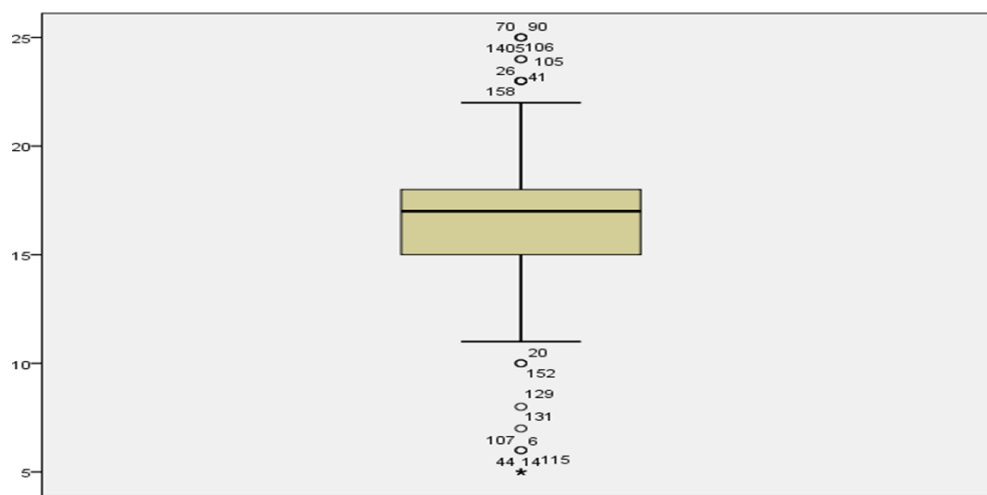


Figure 3. Box plot: Digital health literacy associated with perceived impact of COVID-19 pandemic & quality of life (Source: Authors' own elaboration, using SPSS v. 26 IBM)

DISCUSSION

The current pandemic has brought about structural changes in a multitude of parameters for modern societies [8, 16]. In this context, this research focused on examining the perceived impact of the pandemic, digital health literacy and perceived health status on a sample of the general population. On the basis of the analyses carried out, a number of key findings can be drawn. First, women think vaccines cause harm to a greater extent than men in the study. However, men are more likely to have refused any of the recommended vaccines for themselves and their children. The finding of more intense hesitancy on the part of women is consistent with the previous literature. For example, a related study in France found that women were more vaccine hesitant than men [18].

However, this study also highlights a broader vaccine hesitancy among men, which generally concerns vaccines rather than those developed to treat COVID-19. Therefore, this study highlights vaccine hesitancy as an issue that affects men and women differently. A second finding from this study is that

people who are younger seem to think to a greater extent that the infection is just a flu-like illness and generally harmless, and that vaccines have side effects and cause long-term damage. And this finding is in line with the above-mentioned study in France [18], which also found that vaccine hesitancy is more pronounced in younger people. A third finding of this study has to do with relationship of educational level with the side effects of vaccines and the long-term damage they entail.

As can be seen, there was a differentiation based on educational level, which concerned PhD holders compared to all others. The role of educational level is highlighted through previous research. For example, a relevant study in Great Britain found that people with lower educational attainment also had greater hesitancy towards vaccination [19].

Similarly, something similar was found in a recent survey in our country. The contribution of this study concerns the specification of these differences, as it seems that only people who hold a doctoral degree differ compared to all others. Therefore, this research suggests that there is a relative effect in terms of educational level, which concerns only highly

educated individuals. Another finding of particular interest concerns the relationship between quality of life and the perceived impact of the pandemic. As found by this study, this relationship was not statistically significant. This finding may lead to the realization that quality of life is a multidimensional concept that could not be significantly affected only by the experience of the pandemic. Indeed, quality of life reflects a multitude of different parameters related to mental, social, physical and spiritual well-being. It could therefore be considered that the experience of the pandemic cannot affect all these individual dimensions of quality of life, with the result that there is no statistically significant correlation of its perceived impact with it. A limitation of this research has to do with the possibility of generalizing the findings from this study. This research sought to reach some broader findings on digital health literacy, quality of life and the perceived impact of the pandemic. As can be seen from the above, the perceived impact of the pandemic is not statistically significant related to quality of life. However, quality of life is a multidimensional concept. Therefore, it is necessary to examine a possible relationship between the perceived impact of the pandemic and its individual dimensions. Over the past few years, several research and articles and papers at international conferences have been published on the organizational aspects and sociopsychological dangers in the workplace of public health services in Greece and how they affect employees [20-27]. Authorities oversee public health audit services [28-33]. Another issue influencing performance and the delivery of high-quality services to society is employee dissatisfaction with their jobs, as well as the necessity for training and great education among public health workers. Political and administrative pressure, combined with metropolitan and semi-urban contexts, have a negative impact on the operation of public health services. Negatively effects the operation of public health services, as was especially obvious during the COVID-19 pandemic [21-23, 27, 28, 33, 34]. Employees experience burnout, which is influenced and exacerbated by political interventions. Leadership in the service sector is critical for ensuring effective operation, openness, and government control over Greece's administrative apparatus, and effects above climate change [35, 36].

CONCLUSIONS

Digital health literacy is a central issue in the effort to promote Public Health campaigns. This study examined this parameter in relation to quality of life and the perceived impact of the pandemic. As shown by the analysis carried out, people who perceive more strongly the threat of the relevant pandemic are also distinguished by higher health education. However, perceived health status is not related to digital health literacy. This research also confirms previously known relationships of sociodemographic variables with hesitancy, in particular in terms of age, educational level and gender. But, in the case of gender, there is also a reluctance on the part of men, which needs to be investigated further. This research recommended to investigate digital health literacy and its correlation with the perceived impact of the pandemic and perceived health status, to the perception of the severity of the situation during quality of life associated with pandemic.

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Declaration of interest: No conflict of interest is declared by the authors.

Ethical statement: The authors stated that ethical approval of this study was carried out in accordance with the rules and current bioethics legislation, all the conditions and specifications of the National and European Union Legislation for the protection of personal data as well as in accordance with the instructions of quality assurance and the study was carried out according to the Declaration of Helsinki. The authors uphold high ethical standards in this study.

Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

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