

eHEALTH BEFORE AND DURING COVID-19: DOES DEPRESSIVE SYMPTOMATOLOGY INFLUENCE ATTITUDES OF CAD PATIENTS, HEALTHCARE STUDENTS AND PROFESSIONALS?

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Summary

Background: This study aims to clarify CAD patients' attitudes towards telemedicine-and-telecare before and after the pandemic and to compare views with those of healthcare students and professionals (doctors), while taking into consideration the influence of depressive symptomatology.

Methods: All participants completed a modified version of the Information Technology Attitude Scales for Health (ITASH), the Center for Epidemic Studies Depression Scale-CES-D and a demographics questionnaire.

Results: All three groups showed statistically significant more positive views towards eHealth in the retest condition on all questions. CAD patients held the least positive views compared to healthcare students and professionals in both time points. The majority of the participants from all three groups reported that since their initial examination they still lacked educational experience regarding eHealth. Depressive symptomatology was found not to have an influence on eHealth reports.

Conclusions: eHealth plays an important role both in prevention, treatment and care, but attitudes may act as an obstacle in using them. Future research should further investigate in more depth the complex influence of additional sociocultural and/or psychological factors for the reported differences.

Keywords: eHealth, attitudes, depressive symptomatology, COVID-19

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INTRODUCTION

In a recent article, researchers mention a number of eHealth questions that arise not only concerning ophthalmology, but also other medical specialties (Gunasekeran et al. 2021). The increasing importance of eHealth during COVID-19 pandemic (Thulesius 2020) is becoming even more complex when additional factors are taken into consideration such as the links of eHealth literacy to positive attitudes and psychological wellbeing (e.g. in China) (Yang et al. 2021). Nevertheless, attitudes towards various parameters of telehealth are not systematically investigated so far in patients, doctors and healthcare students, although the COVID-19 pandemic has posed several challenges on healthcare systems around the world, while applying eHealth for pandemic management has become a new trend in different countries (Kouroubali et al. 2020).

There are few studies comparing the views of healthcare experts and healthcare students regarding eHealth. More specifically, a pre-COVID study from Austria indicated that healthcare professionals expressed moderate knowledge of eHealth and telemedicine concepts, but they reported higher levels compared to students. In addition to that, healthcare students were less convinced that

online health information improves patient knowledge, but they were more optimistic that telemedicine reduces healthcare costs (Wernhart et al. 2019). A post-COVID study from China indicated that medical major students are frequent eHealth users and they frequently searched health databases, but at the same time these same students are skeptical about eHealth (Liu et al. 2022). A similar study from the Netherlands examining only healthcare students indicated that they consider themselves insufficiently prepared for the digital aspect of their future medical practices and that they support greater attention to eHealth in the medical curriculum (Vossen et al. 2020). Although research supports that heavy users of technology are twice as likely as light users to be depressed or have low well-being (Twenge 2020), no research so far examines the link between depression and the attitudes that individuals hold about eHealth.

Still there is no systematic research to explore eHealth attitudes during COVID-19 pandemic, and whether these attitudes can change over time in chronic patients, such as those suffering from Coronary Artery Disease (CAD) in a country (such as Greece) where eHealth has been rapidly inserted in healthcare services, and its use is imposed on all groups of the population as well as healthcare professionals in private and public practice during

the COVID-19 pandemic (Giannouli & Hyphantis 2017). In addition to that, especially for CAD patients apart from findings supporting the importance of eHealth applications in medical care (Brørs et al. 2019), there is also a plethora of separate research supporting the psychological influences of comorbid depressive symptomatology in CAD (Rudish & Nemeroff 2003; Zellweger et al. 2004), which so far have not been examined regarding the formation of general attitudes, and more specifically those attitudes towards eHealth.

So, based on the above-mentioned empirical findings, three hypotheses are tested in this research and presented in the form of questions: 1) Is there a difference among students, professionals as well as patients regarding their attitudes towards eHealth? 2) Is there a difference in attitudes in pro-and during-COVID-19 era? And 3) what is the influence of depressive symptomatology on expressed eHealth attitudes?

SUBJECTS AND METHODS

The participants [82 university students who were first-year at the initial examination ($M_{\text{age}} = 19.00$, $SD = .00$, $M_{\text{education}} = 12.98$, $SD = .11$) and fourth-year undergraduates at the retest, 70 doctors ($M_{\text{age}} = 38.66$, $SD = 6.8$, $M_{\text{education}} = 24.50$, $SD = .057$) working in hospitals and private practice, and 80 patients with a diagnosis of Coronary Artery Disease (CAD) ($M_{\text{age}} = 56.69$, $SD = 9.99$, $M_{\text{education}} = 12.32$, $SD = 3.71$) living in different Greek geographical areas and with different occupations], came from a prior study conducted three years before. Individuals took part in 2017 and were contacted (winter of 2020) and asked to complete a reassessment on the same set of questionnaires. Although attrition was present as is usual in longitudinal studies, this was not due to withdrawal of consent, but to a change in the eligibility for the majority of the participants (health status-death) and/or because they had changed home addresses and/or cancelled their previous telephone numbers.

Attitudes were measured with a modified 4-point Likert scale version of the 'efficiency to ICT in care' scale of the Information Technology Attitude Scales for Health (ITASH) (see Table 1). This questionnaire containing four points from 1 = strongly disagree to 4 = strongly agree, was based on the scale introduced by Ward et al. (2009). Sixteen items were presented and participants had to answer in a paper-and-pencil way or online, with a total score ranging from a min=16 points to a max=64 points. The Center for Epidemiologic Studies Depression Scale-(CESD) (Fountoulakis et al. 2001) which consists of 14 questions was used a measure of depressive

symptomatology with scores ranging from 0 to 3 for each item (0 = rarely or none of the time, 1 = some or little of the time, 2 = moderately or much of the time, 3 = most or almost all the time). Total scores range from 0 to 60, with high scores indicating greater depressive symptoms.

The three groups presented similar means regarding their gender distribution [$\chi^2(2) = 4.363$, $p = .113$]. This study was approved by the Ethics Committee of the University of Western Macedonia, and it was conducted according to the Helsinki Declaration of 1975. All the participants gave their written informed consent before participating.

RESULTS

A repeated measures ANOVA (a within- and between-subjects design presenting comparisons among three groups in two time points-before and during COVID-19) was performed for all questions and total scores. Results revealed that for the total score of the questionnaire as well as for each one of the 16 questions and groups of participants, there was a significant main effect of group ($F(1,131) = 20.284$, $p < .001$, $\eta^2 = .236$), a significant main effect of time ($F(1, 131) = 32.827$, $p < .001$, $\eta^2 = .200$), and there was also an interaction between time x group in terms of eHealth preference scores ($F(2, 131) = 9.184$, $p < .001$, $\eta^2 = .123$) (see Table 1).

The three groups did not differentiate regarding depressive symptomatology ($F(2, 212) = .528$, $p = 5.91$) [$M_{\text{students}} = 22.36$, $SD = 7.37$; $M_{\text{doctors}} = 22.43$, $SD = 7.55$; $M_{\text{patients}} = 23.58$, $SD = 9.00$]. At retest, the Linear Regression model, "Enter" method indicated that no variable (CES-D, age, education in years) predicted the total score of attitudes towards eHealth ($F(3, 175) = 1.720$, $p = .165$ with an R^2 of .029).

DISCUSSION

The majority of healthcare professionals (both at baseline and retest) had more positive attitudes towards eHealth attributes compared to healthcare students (who represent the next generation of professionals who will take care of patients). Positive attitudes about the possibilities of eHealth implementation specifically have been also expressed by cardiologists in the past coming from the Netherlands (Treskes et al. 2019) as well as by German physicians (Kirchberg et al. 2020), and medical students from the Netherlands who are in favor of incorporating eHealth into the medical curriculum and their future practice (Vossen et al. 2020). Greek CAD patients

Table 1. Attitudes towards eHealth expressed by healthcare students, doctors and Coronary Artery Disease patients before and during the COVID-19 in Greece

Questionnaire	Pre-COVID-19 pandemic attitudes				Attitudes during the COVID-19			
	Students Mean (SD)	Doctors Mean (SD)	Coronary Artery Disease patients Mean(SD)	<i>F value*</i>	Students Mean (SD)	Doctors Mean (SD)	Coronary Artery Disease patients Mean(SD)	<i>F value*</i>
Total score	33.35 (7.66)	38.96 (6.15)	26.07 (3.55)	86.022	37.14 (10.89)	40.45 (7.18)	36.62 (9.36)	3.350
1. Engaging in eHealth will improve patient/client health.	1.57 (.95)	2.52 (.65)	1.40 (.67)	43.427	1.88 (1.14)	2.74 (1.09)	2.63 (1.20)	12.750
2. The information that we will get from electronic health records will help give better care to patients.	1.67 (.91)	2.30 (.77)	1.26 (.50)	34.739	2.60 (1.13)	2.21 (1.06)	2.17 (1.00)	4.061
3. Using ICT will make the communication with other health professionals faster.	1.74 (.87)	2.62 (.70)	1.43 (.72)	45.789	2.37 (1.14)	2.32 (.99)	2.46 (1.11)	0.283
4. I worry that the use of eHealth applications in healthcare delivery will undermine patient confidentiality.	2.45 (1.01)	2.43 (.58)	1.97 (.89)	7.723	2.39 (1.05)	2.58 (1.18)	2.05 (.91)	5.058
5. I believe that eHealth will help the delivery of individualised care.	1.52 (.98)	1.27 (.56)	1.34 (.71)	2.082	2.70 (1.04)	2.74 (1.25)	2.72 (1.11)	.018
6. Using ICT will make communication with other health professionals less reliable.	2.30 (.81)	2.76 (.78)	1.70 (.86)	30.571	2.71 (1.09)	2.18 (1.06)	2.81 (1.19)	6.686
7. The cost of implementing eHealth will be better used to employ more staff.	2.32 (.97)	2.72 (.70)	1.43 (.88)	43.567	2.45 (1.06)	2.21 (1.05)	2.22 (1.05)	1.258
8. The time that a doctor spends with patients will reduce because of the time that they spend working with eHealth tools.	2.50 (.82)	3.18 (.87)	1.73 (.97)	48.851	3.17 (.94)	2.65 (1.11)	2.64 (1.13)	6.357
9. I think we are in danger of letting eHealth take over traditional health practices.	2.58 (.98)	2.56 (.77)	1.76 (1.16)	16.690	3.06 (1.02)	2.25 (1.09)	2.36 (1.23)	11.711
10. eHealth will help to improve the way healthcare is delivered.	1.82 (1.12)	2.18 (1.22)	1.11 (.36)	22.432	2.97 (1.07)	2.80 (1.05)	2.96 (1.18)	.503
11. The speed with which healthcare experts are able to access information using eHealth applications will help them give better care to patients.	2.15 (1.04)	1.50 (.72)	1.24 (.61)	22.045	2.28 (.99)	3.00 (1.00)	2.35 (.91)	12.099
12. Time spent on eHealth will be out of proportion to its benefits.	2.51 (.99)	3.00 (1.06)	1.66 (1.04)	31.387	2.76 (.98)	2.87 (1.07)	2.57 (1.15)	1.463
13. Use of electronic health records will be more of a hindrance than a help to patient care.	2.46 (1.06)	2.86 (.68)	1.88 (.97)	20.952	2.19 (1.09)	2.58 (1.05)	1.78 (.75)	11.976
14. I feel that there are too many eHealth devices around now.	2.70 (1.10)	2.63 (.66)	2.09 (.92)	9.694	2.14 (1.04)	2.17 (1.02)	1.75 (.91)	4.276
15. Engaging in eHealth will make healthcare staff less productive.	2.14 (.73)	2.43 (.81)	2.09 (.88)	3.727	1.84 (.80)	1.85 (.84)	1.64 (.70)	1.685
16. Engaging in eHealth will be more trouble than it will worth.	2.40 (.86)	2.79 (.70)	2.24 (1.08)	7.035	2.50 (1.15)	2.60 (1.15)	1.85 (.92)	8.930

*Note: For all variables degrees of freedom = (2, 224), $p < .001$.

held the least favorable attitudes towards eHealth. This was also found in a previous study regarding the general Greek population (Giannouli et al. 2021). Although for patients with cardiovascular diseases it has been proven that patient education delivered with technology can help people to modify their risk factors (Halldorsdoatiertir et al. 2020).

In addition to that, the current pandemic has changed attitudes in a favorable way towards eHealth for all groups, with healthcare professionals holding the most favorable attitudes, and CAD patients the least favorable. A novel finding of this research focuses on the influence of COVID-19 crisis on eHealth attitudes, thus rendering eHealth in cardiology, cardiac nursing and other medical areas a necessity. During COVID-19 the shift in attitudes towards eHealth may be explained by the necessity of healthcare provision as indicated in a relevant survey in patients with chronic diseases from Saudi Arabia (ALshariff 2022) or in cancer (hematological-oncological) patients from Germany who had a positive attitude towards eHealth and the dissemination of internet-enabled devices (Holderried et al. 2023).

Although the present preliminary study presents a research conducted for the first time not only in Greece, but worldwide, there are some limitations, such as the use of CES-D. Although this is a valid and reliable tool in Greece (Fountoulakis et al. 2001; Giannouli and Stoyanova 2014), there was no clinical examination with an interview or other additional instruments for depression, and anxiety as well as perceived hubris (especially in the case of healthcare experts who may believe in their own strength and disregard new technologies and relevant assistance as not worthy) (Giannouli & Syrmos 2021) were not included in the present assessment as possible psychological factors that could directly or indirectly influence attitudes.

CONCLUSIONS

The present data highlight a new question for reflection on eHealth attitudes not only across cultures, but also across healthcare specialties. Greek CAD patients at two time points (that is before and during the pandemic) did improve their attitudes towards eHealth, but overall when compared to individuals with prior medical knowledge (even basic as is the case of healthcare students), they did not present higher engagement with eHealth applications or lower fear for confidentiality issues. In addition to that,

CAD patients raised productivity issues for healthcare personnel due to eHealth applications, they believe that eHealth is not reliable and they have concerns about the multiplicity of available unknown devices and electronic systems. Finally, CAD patients perceived eHealth as posing obstacles in individualized care and as overriding successful/established classic healthcare/medical practices. On the other hand, healthcare students express positive attitudes, but perhaps due to restricted clinical experience and education, they do not have so positive attitudes as healthcare professionals, who possibly due to real clinical practice and therapeutic management of cases of several patients in their professional life have cultivated positive attitudes towards the benefits of eHealth. These benefits are exactly those mentioned as negative points by CAD patients, such as increased reliability, speed, confidentiality, and productivity.

Although, these findings of least favorable attitudes towards eHealth for CAD patients can not be generalized in other cultural settings (even in countries sharing similar values that is the case of the Balkans), as demonstrated in a cross-cultural comparison focusing on healthcare students and professionals (Giannouli et al. 2021), given that healthcare professionals as well as patients suffering with mental disorders seem to greatly benefit from telepsychiatry and related eHealth applications (Basavarajappa et al. 2022; Ćosić et al. 2020), future research could focus particularly on groups of healthcare experts with different mental health specialties by examining the relation of other psychological factors (such as anxiety, burn-out) on eHealth attitudes.

Statement of Ethics

The research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. In the manuscript, authors should state that subjects (or their parents or guardians) have given their written informed consent and that the study protocol was approved by the institute's committee on human research.

Conflict of Interest Statement

The author has no conflicts of interest to declare.

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Author Contributions

VG: conception and design of the work, and the acquisition, analysis, and interpretation of data, literature revision, work draft, and final approbation.

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