E-Health: Self-Care of Social Networks Users Concerning COVID-19

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ABSTRACT

Aims research aimed to study the effect of virtual social networks on self-care of the users concerning COVID-19.

Instrument & Methods This survey research was conducted from April to June 2020. The study sample included social network users (WhatsApp, Instagram and Telegram) in Hormozgan province who were selected by convenience sampling. The measuring instrument was an online questionnaire extracted from Dorthea E. Orem's self-care model, Gerbner's cultivation theory and Kaplan and Haenlein's media-richness-theory. Modeling was carried out using SPSS 28 and Amos 26 software.

Findings The results of explanation and modeling in the present research not only indicate a significant and direct relationship between the independent variables of Presence and interaction in the social networks and user orientation to the type of social network with the dependent variable of users concerning COVID-19 self-care (p<0.0009), but also, 45% of changes in COVID-19 self-care variable was covered by a set of social networking indices. Structural equation modelling in the self-care variable also showed that independent variables; Presence and interaction in the social networks and user orientation to the type of social network had the highest and lowest effects on the psychological support dimension with a standard coefficient of 0.99 and the dimension of awareness and attention to COVID-19 effects and outcomes with a standard coefficient of 0.95, respectively.

Conclusion As a result, we suggest that health officials and disease control and prevention centers use the potential of social networks such as WhatsApp and Instagram in self-care of users concerning COVID-19.

Keywords Online Social Networking; Self-Care; COVID-19; User-Computer Interface

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Introduction

COVID-19 pandemic, as the most challenging issue in current years, has profoundly affected all aspects of human life [1]. Finding out the lack of awareness [2, 3] as one of the main causes of the virus spread, World Health Organization (WHO) introduced self-care – the ability of individuals, families and communities to promote health, prevent disease, maintain health, and to cope with illness and disability with or without the support of a healthcare provider– as a key priority and also as an essential part of prevention, control, and treatment of the disease [4].

One of the effective solutions to improve self-care in communities is to educate people and also to improve access to healthcare information through a wide range of communication channels [5, 6]. Self-care education, especially in COVID-19 pandemic, is the most important form of primary care all over the world [7-10]. Virtual Social Networks (VSNs) are among the most widely channels used for self-care education in recent years for various diseases [11]. Applications of VSNs for self-care education can be summarized as follows: correcting unhealthy behaviors and habits, and improved self-care via continuous use of social networks such as Facebook, Telegram, and Instagram (especially in the 18 to 29-year old group) [12], improving the ability to understand health information through acquisition of self-education using audio visual supported educational material in VSNs [13], improving knowledge and awareness of people about their disease and its complications on a daily basis [14], relying on VSNs as the complements for the physician's instructions, performing self-care as per physician's instruction, and collaboration with healthcare providers [15], improving the quality of life and reducing fear of cancer recurrence , preventing depression in cancer patients by sharing experiences of other patients [14, 16-18], increasing users' knowledge and awareness about the signs, symptoms, and modes of transmission of diseases [19, 20].

During the COVID-19 epidemic, people have been increasingly engaged in seeking information from a variety of information resources. Meanwhile, information channels such as virtual social networks provide healthcare users with unique opportunity for educating them remotely. This; in turn, affects the health condition of the users [21]. However, this effect could be paradoxical, as accurate health information from reliable social networks helps to prevent, control and treat medical conditions, while sometime other times, non-scientific recommendations made for diseases in these networks can be harmful. However, many health care providers work on social networks such as Facebook, Twitter, WhatsApp, Telegram, Instagram, etc. all over the world. Also, these networks,

regardless of the time and place, act as interface between users and the health care centers [11].

Shoaei *et al.* reported that the content of tweeted messages were influenced by the crisis during COVID-19 pandemic. A wide range of individuals including common people and healthcare professionals shared their personal, scientific, and professional experiences and ideas. One of the main advantages of tweeter during the COVID-19 pandemic was the speed of sharing educational content addressing signs and symptoms, preventive measures, health care instructions, and protocols during lockdowns [7]. Another study reported on the positive impact of the Instagram on increased knowledge and awareness of the users concerning education and care, prevention instructions, complying with the health protocols, diet and healthy life style, diagnosis and treatment, being informed about unhealthy behavior, signs and symptoms, and COVID-19 transmission ways [9]. In their study, González-Padilla *et al.* showed that information provided on social media was complementary to health care providers' instructions. Using the services offered by these networks during the COVID-19 pandemic was able to improve people's knowledge in the fields of disease prevention, participation in the process of deciding on health status and Collaboration with physicians, and medical staff [10]. Zuo *et al.* also positively assessed the impact of psychological support and prevention of depression, and isolation on the individuals through sharing home sports, virtual sports, and the benefits of COVID-19 epidemic prevention on social media [22].

There are several reasons why carrying out a study on using virtual social networks for improving self-care is of importance. First of all, given COVID-19 pandemic, WHO set policies to increase access to information concerning healthcare services through local, national and virtual media [4, 23]. Secondly, although earlier studies have emphasized the effectiveness of the networks on information dissemination and health programs about COVID-19 [7, 9, 10, 22] regarding self-care, none of them discussed about the characteristics of the virtual networks such as type of the network, frequency, duration of membership, and rate of participation and activity. The last but not least, it seems there is a knowledge gap in this field. On the one hand, healthcare systems need to understand how virtual social networks affect the self-care of users; and on the other hand, users of the networks also need to effectively access to Information for the prevention, control and treatment of the disease to modify their self-care behaviors.

In the present study, two theoretical frameworks are relied on to study the effect of VSNs on the self-care of users concerning COVID-19: Media theories, and

Self-care theory. The first section includes the theories related to media: Gerbner's cultivation theory [24] and Kaplan and Haenlein's media-richness-theory [25]. The Garbner's cultivation theory addresses that the more the presence and interaction of the user with the media (including hours of using, duration of use, activity and participation) , the more the probability the affectability of the user is increased [26]. Moreover, Kaplen and Heinlan's network richness theory states that a network with higher media richness and sociability provides more virtual attraction, and this; in turns, causes the same level of user orientation to a particular network. Therefore, users spend more time doing online interactions on a particular social network [25].

The second theoretical framework is the Elizabeth Orem's self-care theory which is one of the most complete self-care theories. In this theory, self-care is divided into three groups: general necessities, growth-related self-care and disease-related self-care [27]. In Orem theory (disease-related self-care (is mentioned as measures to prevent, reduce pain, definitive treatment or control of diseases and life-threatening conditions of individuals. These measures include five dimensions, Acquiring specific knowledge about the signs and symptoms, and mode of transmission of the disease; Awareness and attention to the effects and results; Effective prevention and treatment; Collaboration with physicians and treatment staff after the onset of symptoms; Psychological support (control of negative emotions towards the symptoms) [28, 29]. In the present study, the third group of Orem self-care essentials has been used.

Considering the growing status of COVID-19 in Iran [30] and also the popularity of the VSNs in this country [31], this research aimed to study the effect of virtual social networks on self-care of the users concerning COVID-19.

Instrument and Methods

This cross-sectional applied online survey was carried out in Hormozgan province from April to June, 2020. The target population were invited by convenience sampling to fill out the online questionnaire via an invitation link shared with them through WhatsApp, Telegram, and Instagram. Since the samples filled out the questionnaire voluntarily, we did not need to obtain consent form. The objectives of the study had been stated at the beginning of the questionnaire. The sample size was estimated according to Bartlett's table, 623 users. Considering that factor analysis, multivariate regression and structural equation modeling should be used in this research, and considering the number of main structures or hidden variables, if the sample size is less than required, a confidence interval may be created, Has a length longer than acceptable, which reduces the accuracy of the

estimate. We tried to select the sample size so that it can be generalized to the target community. Based on convenience sampling, 662 users participated in the survey. Inclusion criteria included being a member of at least one of popular social networks (WhatsApp, Instagram and Telegram, as the most popular VSNs in Iran according to Alexa), being above 18 years old, and being a resident of Hormozgan province as stated by the responder.

The data collection instrument included a questionnaire adopted from Dorothea Elizabeth Orem's standard self-care model according to the study objectives. It includes three sections: 1- Demographics including age, gender, education level, and marital status, City of residence 2- Social networks consisting of two parts: a) Presence and interaction including hours of using VSNs, duration of use of VSNs (daily, weekly and monthly), the type of activity and participation in VSNs, and b) the tendency of the user to a particular type of social network [24, 25], and finally 3- Self-care consisting of 25 questions in 5 dimensions, including: 7 questions for acquiring specific knowledge about the signs and symptoms of COVID-19 and mode of transmission; 3 questions for attention to COVID-19 effects and outcomes; 5 questions for effective implementation of COVID-19 treatment and prevention practices; 5 questions regarding Collaboration with physicians and other healthcare staff after the onset of COVID-19 symptoms; and 7 questions concerning psychological support (control of negative emotions towards COVID-19 symptoms). The items were scored based on a 5-point Likert scale ranging from strongly agree=5 to strongly disagree=1 [27]. The content validity of the instrument for self-care was calculated using Content Validity Ratio (CVR). According to 10 specialists of infectious diseases, the CVR was 0.92. The measurement of the construct's validity using factor analysis technique and Kaiser Meyer Olkin (KMO) was 0.961. Obtaining such a high level of validity indicates the items in each dimension are highly correlated. Cronbach's alpha was used to assess the reliability of the questionnaire. Acquiring specific knowledge about the signs and symptoms, and mode of transmission of COVID-19 (0.89); Attention to COVID-19 effects and outcomes (0.91); Effective implementation of COVID-19 treatment and prevention practices (0.86); Collaboration with physicians and other healthcare staff after the onset of COVID-19 symptoms (0.92); Psychological support: control of negative emotions towards COVID-19 symptoms (0.83).

Descriptive data analysis was carried out using mean, standard deviation, mode, minimum, and maximum. Inferential data analysis was also performed using Kolmogorov-Smirnov test to measure the normality of the data, structural equation analysis (confirmatory factor analysis), path analysis, and goodness of fit test. Structural

equation analysis (confirmatory factor analysis) was used to determine the ability of a predetermined model to fit the data, and path analysis was used to measure the relationships of variables in a causal model. The standard beta coefficient of the regression shows the direction and intensity of the relationships between the variables and the value of the t-statistic are also significant. To fit the model, good fit indices including normalized fit index (NFI), comparative fit index (CFI), goodness-of-fit index (GFI), root mean square error of approximation (RMSEA), adjusted goodness of fit index (AGFI), incremental fit index (IFI), and non-normalized fit index (NNFI), standardized root mean squared residual (SRMR), and the ratio of chi-square (X^2)/degree of freedom (df) were used.

It is to say that, structural equation analysis was chosen for the present study due to two main reasons:

• The necessity of multivariate analysis given the nature of the research

• Investigating the conformity of the number of factors and factor loadings of the variables measured on these factors with the theoretical model

SPSS 28 and AMOS 26 software applications were used for the analysis and modeling processes in the present study.

Findings

Of total, 662 online questionnaires were completed and analyzed. Table 1 shows a summary of demographic characteristics of individuals, status of user's presence and interaction with VSNs and the tendency of the user to a particular social network. Most of users (70.54%) used the networks daily, and 62.68% of the whole participants used the networks for more than 4 hours daily. Also, in terms of user tendency to the type of network, Telegram was reported as the lowest used media (averagely of 2.77%).

As shown in Table 2 the most common activity and participation of the users regarding COVID-19 was "following the medical, scientific and nutrition pages" and the least common user activity was "just reading the comments and topics discussed on the VSNs".

In the dimensions of self-care, "psychological support (control of negative emotions to COVID-19)" with a Mean of 3.8 the highest, and "awareness and attention to the effects and results of COVID-19" with a Mean of 2.8 the lowest values (Table 3).

In the section of structural equations modeling and model fitting, each of the main components of self-care was explained using the second-order factor analysis. Second-order factor analysis, standard coefficients, and t-values were used to determine the effect of each of the variables and their importance.

The statistic values of the output of confirmatory factor analysis (second-order) including the X^2=796.264, df=318, and X^2/df =2.504 were within acceptable threshold. On the other hand, the fit indices of the main model such as CFI, IFI, NFI, and AGFI, were 0.953, 0.953, 0.924, and 0.919, respectively. They were also within acceptable and appropriate thresholds. The SRMR index value was 0.041. Therefore, all these indices showed the appropriateness of the second-order factor analysis model of the self-care components in the case of standard coefficients (Figure 1).

**Table 1)** Demographics of the Study Participants (n = 662)

Variable	Groups	N (%)	Mean±SD
Sex	Male	281 (42.44)	-
	Female	381 (57.55)	-
Age (Year)	≤ 20	40 (6.04)	-
	21-25	282 (42.59)	-
	26-30	86 (12.99)	-
	31-35	78 (11.78)	-
	36-40	138 (20.84)	-
	≥40	38 (5.74)	-
Level of education	Lower Diploma	50 (7.55)	-
	Diploma	78 (11.78)	-
	Associate	107 (16.16)	-
	Bachelor	114 (17.22)	-
	MA	211 (31.87)	-
	PhD	102 (15.40)	-
Marital status	Single	367 (55.43)	-
	Married	295 (44.56)	-
Hours of using	≤1	13 (2.94)	-
	1-2	15 (3.28)	-
	2-3	95 (14.35)	-
	3-4	127 (18.73)	-
	≥4	415 (62.68)	-
Duration of use	Daily	467 (70.54)	-
	Weekly	171 (25.83)	-
	Monthly	24 (3.62)	-
Network used	Instagram	-	4.01±.0.00
	WhatsApp	-	3.96±.0.00
	Telegram	-	2.77±.0.00

Table 2) Distribution of central and dispersion indices of activity and participation in VSNs

Variables	Mean±SD
Download and resend audio, video, text and … files about COVID-19	3.8±0.86
Just download audio, video, text and … files about COVID-19	3.4±0.75
Follow nutrition, science, medicine, etc. pages COVID-19	4.0±0.98
Just read the comments and topics discussed COVID-19	3.0±0.61
Frequently read and sometimes write the topics discussed COVID-19	3.3±0.79
Follow the link of news and topics about COVID-19	3.9±0.82

Table 3) Distribution of central and dispersion indices of self-care variable and its dimensions

Variables	Mean±SD
Specific knowledge about COVID-19	3.54±0.63
Awareness and attention to COVID-19 effects and outcomes	2.87±0.78
Effective implementation of COVID-19 treatment and prevention practices	3.13±0.74
Collaboration with physicians and other healthcare staff	3.31±0.78
Psychological support	3.84±0.84
Self-care ability	3.19±0.70
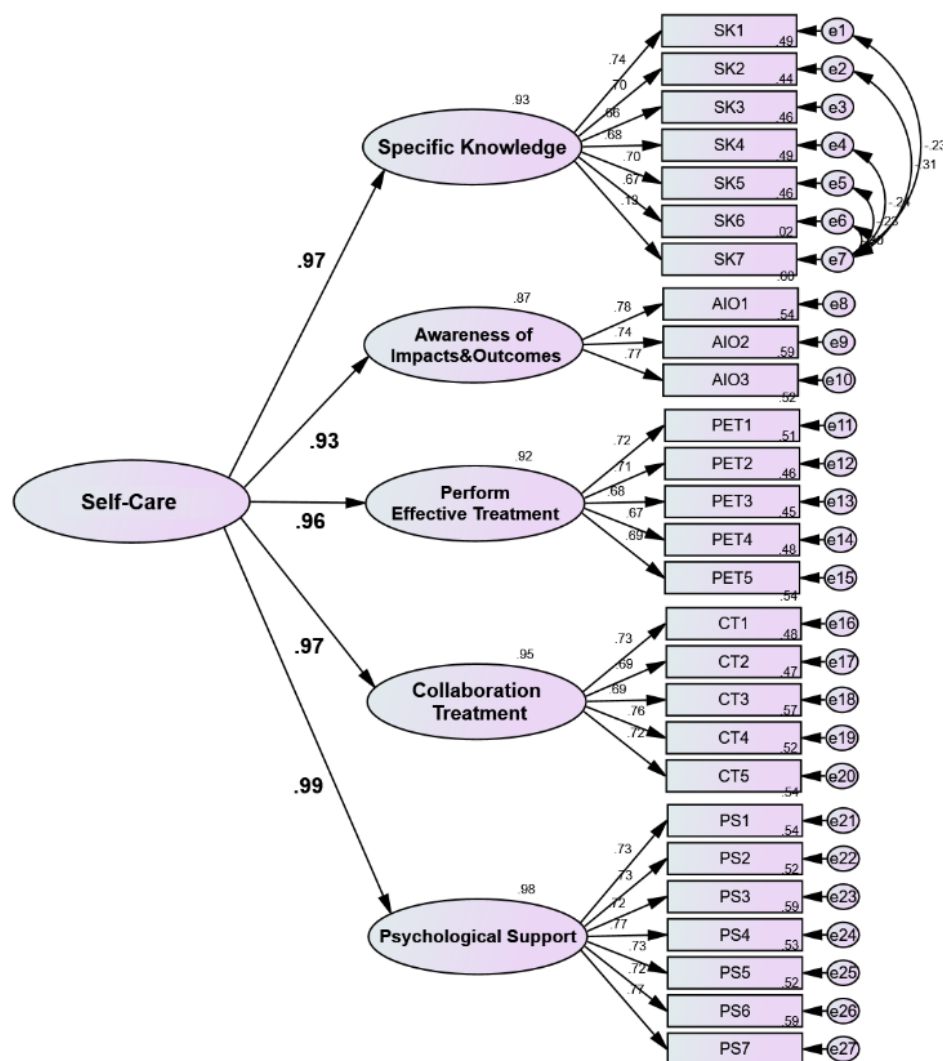
Chi_square=796.264; DF=318; P-VALUE=.000; GFI=.932;CFI=.953;RMSEA=.048

Figure 1) Self-care components in the case of standard coefficients

The result shows that there is a significant relationship between the variable of presence and interaction in VSNs and self-care and also the variable of tendency to the type of social networks and self-care. P-value≤0.05

Figure 2 shows the output of effects and relationships between each of the model dimensions in the case of standard coefficient. The variables of social networking and user orientation to the type of social networks have respectively the highest effect on self-care ability with standard path coefficients of 0.45 and 0.39. To be more accurate, 45% of the changes in the self-care ability variable are covered by a set of social networking usage indices. With regard to the usage variables of social networking, the greatest effect on users' self-care ability include the index for duration of use with a standard coefficient of 0.96, rate of user activity and participation in the networks (standard coefficient of 0.93), and the rate of continuous usage of the networks with a standard coefficient. With regard to the variables of user orientation to the type of social network, the highest orientation was for Instagram and WhatsApp with factor loadings of 0.64 and 0.63, respectively.

This model also showed that independent variables have the highest effect on the self-care ability variable dimensions, including psychological support (control of negative emotions towards the symptoms of COVID-19) with a standard coefficient of 0.99, Collaboration with physicians and treatment staff after the onset of COVID-19 symptoms with a standard coefficient of 0.98, acquiring specific knowledge about the signs and symptoms of COVID-19, and its route of transmission with a standard coefficient of 0.96, effective implementation of COVID-19 treatment and prevention practices with a standard coefficient of 0.96, and awareness and attention to the effects and results of COVID-19 with a standard coefficient of 0.95, respectively.
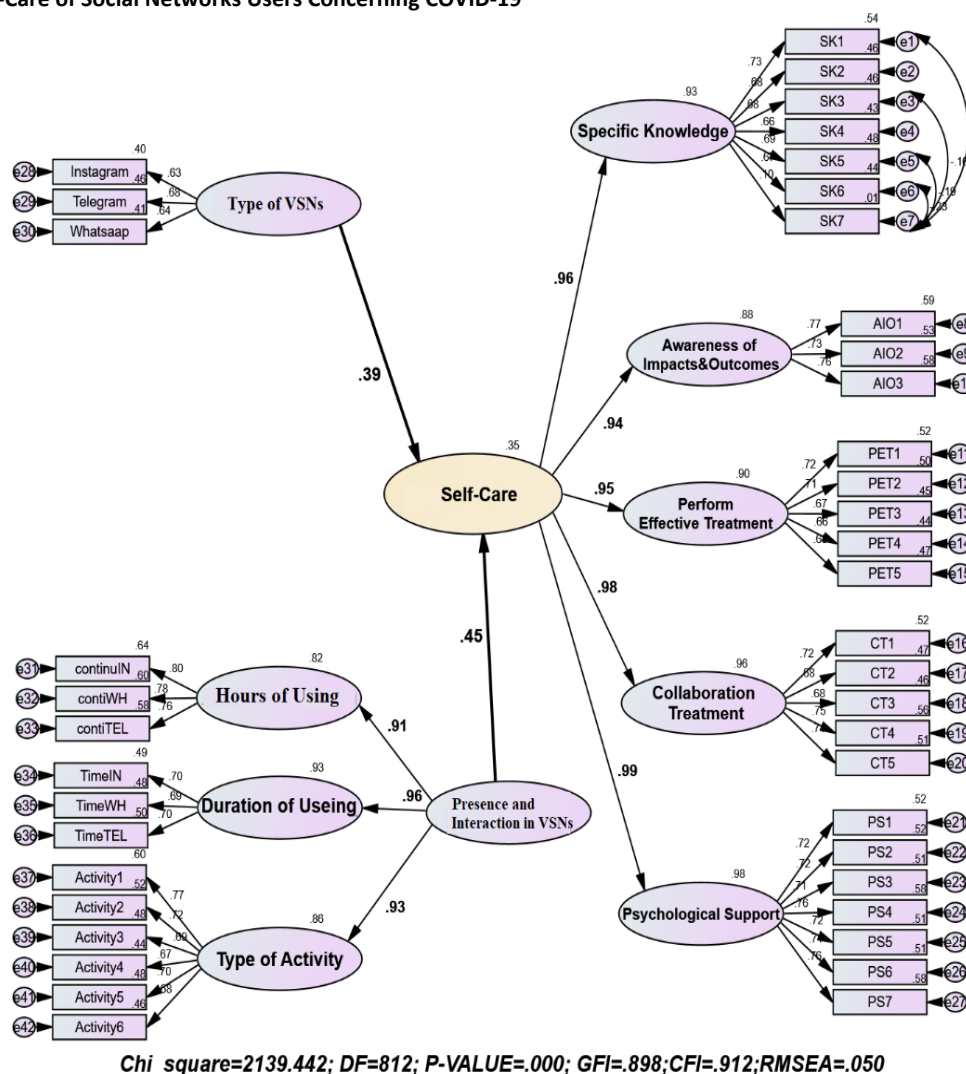
Chi_square=2139.442; DF=812; P-VALUE=.000; GFI=.898;CFI=.912;RMSEA=.050

Figure 2) Path analysis model of social networking indices with self-care ability indices

Based on the model outputs, the chi-square statistic value in the model was 2139.442, the degree of freedom of the model was equal to 812, the result of their ratio is equal to 2.635, which is an acceptable value. On the other hand, the value of fit indices of the main model such as CFI (0.912), IFI (0.912), NFI (0.865), and AGFI (0.886), all of which are in an acceptable and appropriate range, and value of SRMR index is also 0.054. Therefore, all these indices indicate the appropriateness of the model (Table 4).

Table 4) Final model fit indices

Fit indices	Acceptable value	p-value
X²	-	2139.442
P-Value	-	0.0000
df	df≥0	812
X²/df	X²/df<3	2.635
RMSEA	RMSEA<0.1	0.050
NFI	NFI>0.8	0.865
AGFI	AGFI>0.8	0.886
GFI	GFI>0.8	0.896
CFI	CFI>0.8	0.912
IFI	IFI>0.8	0.912
SRMR	The closer to zero	0.054

Discussion

The aim of this study was to identify the impact and relationship of virtual social networks on users' self-care concerning COVID-19 and also to achieve a structural equation model. The results showed that the use of social networks has not only had a positive effect on increasing self-care but also there is a positive and significant relationship between the use of social networks and each of the components of self-care. These results are also confirmed in the structural equation model.

More than half of users from different backgrounds and age groups used Instagram and WhatsApp for more than 4 hours a day 24/7. Their most important activities and participation included following the pages of nutrition, science, medicine, etc. related to COVID-19, following the links of news and topics related to COVID-19, downloading audio, video, text files and etc. about COVID-19 and then forwarding them to individuals and groups. These cases had the highest average compared to other activities. This statistic explicitly confirms the platform of the

virtual social networks as a convenient information carrier for acquiring and sharing health and care information related to COVID-19. The results of research by Sap *et al.* [32] and Kamel Boulos *et al.* [33] also showed that most patients use Instagram and WhatsApp networks. They reported that they use these media to receive health instructions. Moreover, La *et al.* emphasized that two factors stimulating change of incorrect health behaviors and habits of users were the constant use of social networks including Facebook, Telegram and Instagram (especially between the ages of 18-29) and sharing experiences [12].

In the modeling section, the results show a significant relationship between the variable of presence and interaction in social networks and the user's tendency to the type of social network used with the self-care variable compared to COVID-19. Our study showed that the most influential factors on self-care included hours of usage, type of activity and user's participation and the amount of continuity in using networks, respectively. Perhaps it could be judged that the desire for COVID-19 self-care has caused users to look for the best ways to take care of themselves via daily and long-term presence (being active and participation) in social networks. This is according to Gerbner's planting theory which suggests the user is more affected by the network if the user experiences the higher amount of usage, duration of use, participation and activity in the network [24]. The hypotheses of the literature reviewed also emphasized the relationship and the impact of patients' continuous and daily use of virtual social networks and self-care ability [17, 34, 35]. Some studies have also shown that patients' activities on social media led to a better understanding of health messages and care instructions for performing health care behaviors [7-9].

In the variable of user tendency to the type of social networks used, Instagram and WhatsApp were more effective than the Telegram network. The results indicate that the power of media richness (up-to-date health information, sharing, cheapness, availability, ease of use, etc.) should not be underestimated. Although the media richness of Telegram like Instagram and WhatsApp is generally considered as high, Telegram's richness is affected by the governmental ban in Iran. For accessing Telegram in Iran, the users have to use solutions for bypassing filtering. This considerably affects Telegrams advantage of availability and ease of use compared to the two mentioned networks. Therefore, the users consider Instagram and WhatsApp as the more appropriate tools for education and information in the field of self-care. In Kaplan & Heinlen's theoretical view, the higher the richness of the media and socialization of the network, the more users will be inclined to that network [25]. Investigating the users' viewpoints

regarding the value of social networks and quick absorption of users, Ukoha enumerated up-to-date health information, sharing, accessibility, and ease of use as the most effective factors [36]. Concerning the most important reasons for patients' tendency to use Instagram and WhatsApp, some studies listed easy access to health care information, the ability to understand information due to using audio-visual resources, and sharing experiences [14, 32, 33].

The structural equation model showed that component of psychological support (control of negative emotions towards COVID-19), Collaboration of patients with physicians and health care staff after emergence of clinical symptoms, obtaining specific knowledge about signs and symptoms, and the ways of transmission, taking effective preventive and treatment measures, and awareness and attention to the effects and results (outcome) of COVID-19 are highly affected by independent variables including Presence and interaction and type of social network. It could, therefore, be implied that social networks facilitate CIVID-19 self-care through providing access to health care information, controlling negative emotions such as stress, fear, anxiety, and etc. Studies have also positively evaluated the impact of social networks on reducing stress and preventing fear and depression in people with COVID-19. In this regard, the results of a study showed that the formation of discussion groups in WhatsApp not only reduced psychological stress among patients but also was an opportunity to share experiences, create empathy and psychological support among group members [9, 37]. According to Orem's theory individuals can make more informed decisions in sensitive situations if they improve their knowledge and awareness about their diseases, and accordingly they can take effective preventive and treatment measures [27]. In line with the results of this study, some studies have confirmed the positive effect of using social networks on increasing knowledge, attitude, ability to diagnose disease problems, experiential learning of individuals when faced with clinical conditions and situations [22, 38]. However, research has shown that a lack of quality information shared via online resources is a potential risk to self-care activities and it is necessary to control shared information [11, 39].

One of the limitations of the present study was the possibility of filling out the questionnaire several times by users. The researchers tried to manage this by using software solutions so that each user was eligible to participate in the survey only once.

Conclusion

Due to the positive impact of virtual social networks in increasing the self-care knowledge of users towards COVID 19, the use of network potential is fully felt. It is recommended that health care

providers, the National Corona Headquarters, and the COVID-19 Control and Prevention Centers use the capacity of social networks to share health and care information question and answer, and counseling services to users.

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