Health-Related Information Seeking During COVID-19: Testing the Comprehensive Model of Information Seeking on University Students of Pakistan

Hamza Shaheen [a], Farahat Ali [a], Muhammad Awais [a, *], Muzammil Saeed [b]

[a] University of Central Punjab, Lahore, Pakistan
[b] University of Management and Technology, Lahore, Pakistan

Abstract

The study revolves around online health related information seeking. Hypothetically, the use of social media and other internet-based platforms is becoming common. This information seeking behavior further leads to self-medication which can be dangerous, so it requires theoretical attention. While many studies have been conducted to cover this behavior, there was a need to explore this area in the context of Pakistan. Internet is the focus of this study which is further sub-categorized into other media forms like Social Media, Google Search, Online Web T.V./Radio and E-Magazines/Papers. Data was gathered using purposive sampling technique from the intended population (N = 300) and to examine the data. Findings of this study indicated that the relationship of information-carrier characteristics and online health information seeking was significantly mediated by utility of information channel. On the other hand, utility was significantly predicted by beliefs, interest, and information-carrier characteristics. Furthermore, direct experience and salience are not significant predictors of utility of online health information seeking. The study also helped elaborating the extensions of comprehensive model of information seeking, which are helpful in applying this model in context of the latest digital media.

Keywords: comprehensive model of information seeking, internet, online health information Seeking, direct experience, information channel.

1. Introduction

Health being an important and sensitive issue for all, requires a lot of care and negligence, in such issues, can be fatal. The information available on the internet can be questionable specifically when it comes to validity and authenticity. Issues like health, demand great care and internet users need to be more concerned about the validity of such information on the internet. In this time of severe pandemic situation all around the globe, people prefer seeking information by using online platforms rather than physically visiting a medical institute or meeting a medical consultant. The COVID-19 induced lockdowns in different countries around the globe has encouraged people to avoid physical interactions and the information seeking behavior of people has increased as people have been home-locked and are endangered by the outbreak.

The initial reports about the coronavirus prompted people to seek more information on the internet and news of first COVID-19 cases had a significantly great effect on people's information seeking behavior. The initial news about the outbreak led people to search on the internet about the coronavirus, its symptoms, and precautions. As such, it can be concluded that the COVID-19 news made people to attempt to educate themselves about the disease (Bento et al., 2020).

---

* Corresponding author
E-mail addresses: muhammad.awais@skt.umt.edu.pk (M. Awais)

A study examining exposure of misinformation about COVID-19 in the US, South Korea, and Singapore, suggests that the internet users has been demotivated due to exposure to misinformation. But this study also argued that in early stages of COVID-19 pandemic, exposure to general information regarding the lesser-known hazard might have made people feel less-informed, as to prompt them to seek more information (Kim et al., 2020). A similar study based in China advised that people significantly use internet-based sources for seeking information regarding health and specifically about COVID-19. Therefore, internet is seen as an important tool for searching such information in China (Zhao et al., 2020).

The internet being the only global-level platform of multi-type communication has become the need of everyone and its biggest product, the social media, has become the world's most agile form of communication. Therefore, it can be said that inventing the internet is breakthrough, especially in field of communications. Individual-level usage of the internet and the social media is increasing day-by-day, and there can also be seen a factor of dependency in this common behavior, as social media has become a major part of today's everyday life (Dutta-Bergman, 2005). Internet is a platform of communication where people can connect and discuss anything from any part of the world, that too with such ease of access. With all these features, social media has also become a major source of health of health communication (Zhou et al., 2018). Studies suggest that the internet and social media are a potential cause of the increase in support groups, and support groups are responsible for connection between a wide range of people from far distances and diverse cultures (Houston et al., 2002).

Contemporary studies also acknowledge the involvement of patient or medicine consumer in the search of health-related information that goes beyond doctor's consultancy (Dutta-Bergman, 2005). Studies that revolve around the OHISB (Online Health Information Seeking Behavior), considered demographic factors like age, gender, and education (Hartoonian et al., 2014; Johnson, Meischke, 1993; Robinson et al., 2006; Ruppel, 2016). Some studies concluded that the demographical factors do not share a significant relationship with utility of health-related information (Brodie et al., 2000; Tustin, 2010). In this digital where people are connected, they are supposed to make smart and wise decisions specifically when it comes to medical or health related problems. The sensitivity of such problems requires carefully acquired and reliable information (Dutta-Bergman, 2005).

The latest interactive form of communication, social media is a user-centered, user-friendly medium of communication. This unique aspect of social media proved to be the most essential one. The popularity of this interaction providing platform has led "social media" become a part of the dictionaries around the globe. Socialization has also changed its form to a much vibrant and dynamic one, all this due to social media (Murray, 2014). Along with the many opportunities it offers, social media has its own limitations. For instance, one of the essential features that it is a platform for everyone to share and receive information, which can be questionable, as everyone is free to share thus, authenticity of the information cannot be guaranteed. The validity of the content available on the social media requires attention, specifically when it comes to health. Past studies also show that validity of information sources can affect the behavior of seeking information online (Houston, Cooper, 2002). Such studies have addressed major topics of heath communication, decision making in the context of medication and general information seeking regarding health (DeLorme et al., 2011).

A study conducted on female individuals suggest that the information seeking pattern of medical help seeking individuals depend on their characteristics (Han et al., 2010). This study also revealed that female individuals who have low-income rates and are less tech-friendly or do not have much exposure to technology and internet, are more likely to use internet-based platforms in order to seek information if provided with internet-connected system.

Literature suggests that large-scale consumption of internet-based information by individuals suffering from depression are more likely to go towards self-medication when offered such information (Houston et al., 2002). A review of a previous study showed that studies examining the information seeking behaviors reflect some unexplained variation. Furthermore, such studies also helped establishing that the activity level of individuals regarding their participation in the use of internet for information seeking purposes had insignificant variance in the results. Along with the lack of variance in these results, the urge for seeking information online caused by efficacy was also indicated as insignificant. The study also revealed that people who lack the interest in seeking information online, are not necessarily uninformed. As such, it can be

established that individuals who do not seek health-related information online, are possibly the ones who are already aware of the medical problem they are encountering. This further creates the possibility of relationship between non-seekers of information and aware or informed individuals (Grasso, Bell, 2015).

The comprehensive model of information seeking (CMIS) is a model that covers many factors that are likely to predict the online information seeking behavior in context of health. The model provides a framework which helps understand the trends of online information seeking behavior (OHISB) (Johnson, Meischke, 1993). Among these possible factors lies, demographical factors, direct experience, salience, and beliefs, and along with these factors there are attributes of information source/channel and its utility. Direct experience, salience and beliefs are considered as health-related factors while information carrier characteristics (ICC), interest in exchanging health information online and utility of information channel (UIC) are the information-carrier factors (ICF).

The model was first conceptualized by J.D. Johnson and H. Meischke (Johnson, Meischke, 1993), with a perspective of the usage in context of conventional media forms. However, in a previous study, it has also been applied in context of online/digital media and this study showed that the OHISB is more of a complex model as compared to the original CMIS (DeLorme et al., 2011). As suggested by an existing study (Hartoonian et al., 2014), in its original form, CMIS is not an effective model. As such, there was a need for an additional variable in order to enhance the fitness of this model in context of OHISB. On the other hand, in specific type of studies where explanation of information seeking behavior is required, CMIS proved to be an effective model (Han et al., 2010). In a study by J.D. Johnson and H. Meischke (Johnson, Meischke, 1993), it was explored that the CMIS is a fit model when health-related information seeking behavior is to be tested.

Past studies suggest that the CMIS has helped in indication of factors that would possibly influence the information seeking behavior in individuals belonging to various backgrounds (DeLorme et al., 2011). In another study, it was argued that the CMIS is a utile framework for studies discussing or examining the health-related information seeking behaviors (Han et al., 2010). These studies also suggested that the CMIS has been applied in numerous research-based studies. For hypothetical model (Comprehensive Model of Information Seeking) see Figure 1.
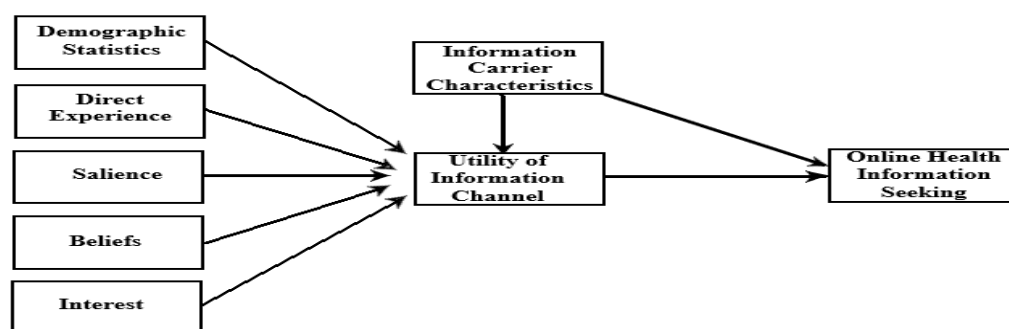

Fig. 1. Illustration of the hypothesized Comprehensive Model
of Online Health-Related Information Seeking
Note. Interest = Interest in exchanging health information online. Demographical factors such as age, gender and qualification are control variables, which is not reflected in this figure.

Demographics. Many past OHISB-centered studies have considered the demographical factors of individuals, for instance gender, education, economic status are most common factors considered (Hartoonian et al., 2014; Johnson, Meischke, 1993; Robinson et al., 2006; Ruppel, 2016). Although some studies did not suggest any direct influence of demographics on the utility of information channel (Johnson, Meischke, 1993).

Direct experience. J.D. Johnson and H. Meischke (Johnson, Meischke, 1993) defined direct experience as the suffering of a disease or an encounter with a medical or health problem by an individual directly or by someone from their social circle i.e., family, friends etc. In some studies, health has been considered as a measure for direct experience (Hartoonian et al., 2014; Oh, 2015). J.D. Johnson and H. Meischke (Johnson, Meischke, 1993) suggested that like the influence of

demographical factors, direct experience also reflected trivial effects in CMIS, specifically when testing its effect on the utility of information channel.

Salience. J.D. Johnson and H. Meischke defined this health-related factor as "the significance of health-related information to an individual, which is associated to the degree of perceived medical threats that an individual may feel" (Johnson, Meischke, 1993: 347). As such, the subjective probability and fear regarding any medical threat can be regarded as salience. Hence, salience is one possible factor of motivation that might encourage an individual to seek medical and health-related information online.

Beliefs. Any individual's health-related beliefs are referred as beliefs in studies like J.D. Johnson and H. Meischke (Johnson, Meischke, 1993). This behavior is directly related to HISB (Health Information Seeking Behavior), individuals who believe that they can help their medical condition by seeking such information online are more likely to use such platforms for information seeking purposes as compared to those who do not believe so. Some studies have suggested differently, arguing that the CMIS is neither predicted nor influenced by an individual's personal beliefs (Hantoonian et al., 2014; Robinson et al., 2006).

Information-carrier characteristics. A past study argued that the information-carrier characteristics influence the HISB in two ways, directly and indirectly through the utility of information channel (Johnson, Meischke, 1993). Various tests focusing the CMIS model showed that the strongest effect was found between the information-carrier characteristics and utility (Johnson, Meischke, 1993). Information-carrier characteristics in the CMIS was taken in the context of online information seeking behavior. In a study focusing OCIS (Online Cancer Information Seeking), an indirect influence of information-carrier characteristics via utility was found, although there was no insignificance or direct relationship (Hartoonian et al., 2014).

Utility of information channel. Some studies also oppose the findings of previous studies and argue that the utility of information channel has influence on the use of such sources (Hartoonian et al., 2014). It is advocated that the utility plays a significant role in the context of CMIS because it induces the effects of health-related factors and information-carrier characteristics on the HISB (Johnson, Meischke, 1993). Utility, as conceptualized by J.D. Johnson and H. Meischke (Johnson, Meischke, 1993), is the degree to which information in a channel or source satisfies the need of information seeking individual. On the other hand, in a previous study, it has been operationalized as belief in an information channel and the perceived capacity to approach or access the information (Hartoonian et al., 2014).

Interest in health information exchange online. With the use of CMIS framework, some past studies have focused the prediction of OHISB. Along with the process of information seeking, studies added another additional variable of satisfaction, and this framework has also been used in the context of online health-related information scanning (Robinson et al., 2006; Ruppel, 2016). Following hypotheses are constructed with the help of above literature.

H1: (a)Demographics, (b) direct experience, (c) salience, (d) beliefs, and (e) interest are significant predictor of utility of online health information.

H2: Characteristics of Information-carrier are significant predictor of utility of online health information.

H3: (a) Characteristics of Information-carrier and (b) utility are significant predictor online health information seeking (OHIS).

H4: Utility is a mediator between the relationship of all independent variable (demographics, direct experience, salience, beliefs, and interest) and one dependent variable.

H5: Utility is a mediator between the relationship characteristics of information-carrier and online health information seeking (OHIS).

2. Materials and methods

Study Design and Participants. Correlational research design was used to measure the health information seeking behavior among university students of Lahore. Correlational research design is a useful technique to measure the opinion of the respondents on a topic. Moreover, this technique provides the data which can be empirically analyzed by a software in a quantitative manner. In the questionnaire, it was inquired whether the respondents use internet and social media or not. The purpose of this question is to ensure that the respondents are internet users and do access social media every now and then. Purposive sampling technique was used to select the sample. This helped the study to be conducted involving the intended population.

Different Lahore based universities, including University of the Punjab, University of Central Punjab, and Lahore Leads University, and University of management and technology students were approached through online google survey. A total number of three hundred survey questionnaires were distributed among the respondents with the help of their respective teachers. After final distribution of the questionnaires, the data was downloaded and was then entered into the software of use i.e., SPSS and then relevant tests were run in order to analyze the collected data statistically. The demographical factors like gender, age and education were included to this research, as these factors have been considered as a part of studies in previous research (Hartoonian et al., 2014). Adapting the instrument from previous study (Hartoonian et al., 2014) age, gender and education were inquired using general and categorized questions. The first demographic factor here, age, was inquired with simple and open-ended question and the respondents were to mention their age in years.

Descriptive analysis was applied for analyzing the demographics of the respondents with other variables and that ages of respondents were found to be M = 21.87 and SD = 2.951. The gender of respondents was, Males = 57.7 % and Females = 42.3 %. More than half of the respondents were undergraduate, 182 (60.7 %), while the remaining respondents 75 (25.0 %) were graduates and postgraduates were 43 (14.3 %).

Online health information seeking (OHIS) during COVID-19. To collect data related to online health information seeking behavior during COVID-19, a measure was adapted from a previous study (Stee, Yang, 2017). The question was asked for 5 different information sources, and for each of them they had to select one of the 5 points of the Likert-type scale. The sources for health information were internet/google search, social media, online web TV, E-Magazine/E-Paper and online radio.

Direct experience. The measure of direct experience was adapted from a previous study (Hartoonian et al., 2014) and included (1) "In general, would you say your health is?" where a 5-point Likert-type scale was used which had responses from 1 (*poor*) to 5 (*excellent*). The direct experience was also inquired by asking "Have you ever been diagnosed as having major or minor flu/cough?" and "Have any of your family members ever had major or minor flu/cough?", here option ranged from 1 (*yes*) to 2 (*no*).

Salience. The scale of salience was adapted from a previous study (van Stee, Yang, 2018). For inquiring about the salience questions related to worry about health and chances of getting a disease were included, with a 5-point Likert-type scale.

Beliefs. Belief's scale was also adopted from a previous study (van Stee, Yang, 2018). For this part of the research, to inquire agreement or disagreement, on a Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Interest, Utility, and Information-carrier characteristics Scale. Respondents' interest was inquired in different types of health-related information providing platforms. Three constructed questions were used for inquiring the utility. Three questions with a 5-point Likert-type scale was used to inquire the information-carrier characteristics. All these scales were adopted from the previous two studies (Basnyat et al., 2018; van Stee, Yang, 2018).

Data Analysis. The Pearson correlation coefficient was used to analyze the correlation between the variables. Smart PLS 3.2.9 was used to analyze the direct and indirect effects.

3. Discussion

This study investigated the hypotheses and proposed relationships between the variables in which few were rejected. The utility of information seeking was the first dependent variable, and it was measured with salience and direct experience which showed an insignificant and negative relationship. May be, salience is not directly associated with the utility of information seeking because generally people who are highly concerned with their health are over-cautious and do not prefer the use of internet and other such sources for seeking information and advisably tend to consult a general physician. In COVID-19 exposure to misinformation led people towards avoiding the available information. These findings are similar to a recent study (Hameleers et al., 2020; Hossain et al., 2020; Islam et al., 2020; Kim et al., 2020; Roy et al., 2020; Soroya et al., 2021). However, this indicates that the significance of health information in individuals was not found to be a potential reason for utility of information seeking. The utility of information seeking was also analyzed it with all other variables i.e. beliefs, interest and it showed a positive and significant

relationship while it showed negative relationship with demographic variables and information-carrier characteristics.

These results imply that seeking information from online sources can occur due to a personal experience or a medical problem experienced by anyone from an individual's peer group or family member involving a disease or a medical problem. These findings are supported by a recent study conducted in Wuhan, China (Zhao et al., 2020) and with some other studies (Ali et al., 2020; Capone etl., 2020; Avery, Park, 2021). The study found that most people turned to internet to know about virus, medication, online support and managing self-quarantine. Beliefs about the information seeking from internet sources and health can be another possible factor which might develop tendency of such information seeking behavior. Similarly, interest for sharing or exchanging information from/on such sources can serve as such another factor. Analyzing direct experience with the other variables showed certain results, for example, with salience, it has shown a positive but insignificant relationship. This suggests that the direct experience of an individual may not serve as a potential or significant role-player in having an importance of health and medical issues. Possibly, this is because an individual who had an experience with a certain disease would be careful about practices that cause that specific medical problem and do not tend to learn or realize the importance of health in general.

Running the tests helped measuring variables and their relationships were analyzed which have been mentioned in the above discussion. However, results also suggested statuses of the proposed hypotheses of the study, most of them were qualified to be referred as accepted, after the analysis. While, against a few, evidence showed that some of the hypotheses did not qualify for the acceptance and were thereby rejected or nullified. As per the H1, the demographics would serve as a significant predictor of utility of information channel. However, this did not get justified as the results suggested the otherwise i.e., demographics did not predict the utility of information channel. These findings are supported by previous studies which argued that people consider television, health ministry, United nation organization (UNO) and newspaper as authentic source during pandemic (Islam et al., 2020; Mohamad et al., 2020; Reintjes et al., 2020; Tangcharoensathien et al., 2020). The hypothesis —suggesting that salience would be a significant predictor of utility of information channel (H3) — was also nullified, as salience did not predict the utility of information channel.

Beliefs were also proposed to be a predictor of the utility of information channel, and the tests concluded that it did serve as a predictor of the utility of information channel. In a recent study, health beliefs are found to be a significant predictor of willingness to receive vaccines (Wong et al., 2020) adherence to guidelines (Clark et al., 2020; Nowak et al., 2020; Tong et al., 2020). Similarly, interest was, hypothetically, said to be a predictor of utility of information channel. After the results were drawn from the analyses, it showed interest also acted as a significant predictor of the utility of information channel (Ali et al., 2020, Chan et al., 2020).

Hypothetically, information-carrier characteristics would predict the utility of information channel and viewing the results from the tests, it showed that information-carrier characteristics functioned as a significant predictor of the utility of information channel. This predicting role of information-carrier characteristics with the utility of information channel have also been supported by a previous study (van Stee, Yang, 2017). It was also proposed that the direct experience would be a significant predictor of the online health information seeking. It was proposed that the direct experience did not serve as a significant predictor of the online health information seeking in the condition.

Utility of information channel, on the other hand, was also confirmed by the tests to be a significant predictor of the online health information seeking i.e., this hypothesis was accepted. Moving on to information-carrier characteristics, which according to tests and as stated in the hypotheses significantly predicted online health information seeking. The prediction of information-carrier characteristics to the information seeking has been found in a previous study (i.e., van Stee, Yang, 2017) as well. Lastly, it was also proposed that the utility of information channel would serve as a mediator of the relationship between information-carrier characteristics and online health information seeking. The tests suggested that utility mediated the relationship between information-carrier characteristics and online health information seeking.

Limitations. This study considered population of general internet-using individuals. However, a research on this area can also be conducted using different methods and for obvious reasons, with different theoretical directions. For example, this area can be studied by using

stratified sampling, which will be required if the population has criteria to qualify for being respondents of the study i.e., ascribing certain attributes/characteristics to the supposed respondents. Such type of a research can be conducted if a researcher intends to test the CMIS on a different type of population i.e., other than just internet users or students.

Future Research. In the future, studies should explore this area further by examining the validity of the health-related information that can be found on the internet. With this being studied, researchers shall be able to understand whether the health-related content on the internet is valid or not. Also, studies to be conducted in the future, should investigate the online health information seeking behavior with a different population older aged people. And their behavior and tendency towards self-medication should be examined. With such theoretical direction, a study can help develop further understanding of the behavior and factors that predict such behavior in the older-aged people will also be testified.

Since the information seeking behavior can lead to self-medications, future studies should revolve around the self-medication behavior which can be considered as an extension of the CMIS, as it precedes online health-related information seeking. Researchers should analyze the extensions of CMIS while adding up more variables to the study, which can help investigate the usefulness of this model. Also, studying the self-medication behavior would help understand the complications of this issue at a greater level and would play a vital role in practices of health organizations that provide remedies for certain health issues and spread awareness about health in general.

4. Results

Preliminary tests were run to avoid any possible violation in the assumptions of analysis. Smart PLS 3.2.9 was applied to test the hypotheses. The results of direct effect show that he demographic variables (β = -.30, $p<.05$) and information carrier characteristics (β = -.54, $p<.01$) have negative and significant effect on utility. On the other hand, the direct effect of beliefs (β = .22, $p<.05$) and interest (β = .18, $p<.05$) on utility was positive and statistically significant. The remaining two independent variables (direct experience and salience) was not statistically significantly related to utility. In addition to this, information carrier characteristics (β = .46, $p<.05$) and utility of information seeking (β = .23, $p<.05$) was positively and significantly related to online health information seeking. These results are supporting the hypotheses H1a, H1d, H1e, H2, H3a, and H3b while H1b and H1c are not supported by data.

Mediation Analysis. Bootstrap approach was used to find the significance of indirect effect and 95 % bias-corrected confidence interval was used. This approach is most useful and superior from other approaches (MacKinnon et al., 2004). The indirect effect result indicates that utility only played mediating role between interest and online health information seeking (β=.18, 95 % CI = .026 to .18). Thus, hypothesis H4a, H4b, H4c, H4d were not supported by data and only H4(e) was accepted. In addition to this, the relationship between information carrier characteristics and online health information seeking was mediated by online health information utility (β=.45, 95 % CI = 1.93 to .124). So, H5 is accepted.
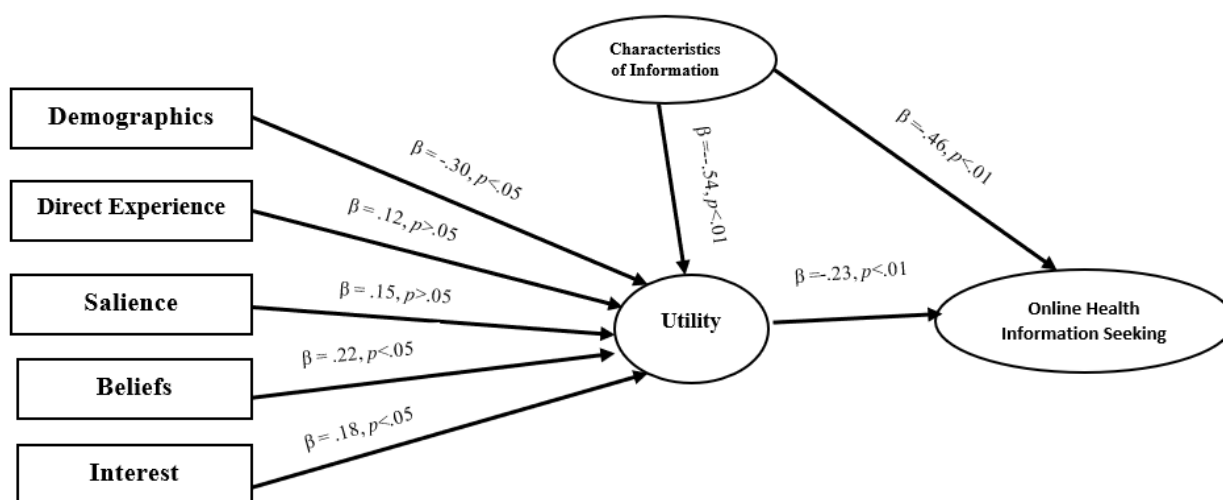

Fig. 2. Structural Model

5. Conclusion

This study has helped to develop a better understanding of the online health information seeking behaviour during COVID-19 pandemic. People with access to the internet and those who are tech-friendly can be bearers of this behaviour which leads to self-medication. However, when a layman is on the receiving end of the health-related information, self-medication can prove to be dangerous. With this level of understanding about this matter, healthcare providers and health organizations can work in a much better way to let people avoid this behaviour. It is because now, it is known what type of sources are used for health-related information seeking and why is this behaviour becoming a common thing in the technological era.

With all the factors that has been explored in this study, it is now known which of the factors play a significant role in exciting the aforementioned behavior, government-level measures can also be taken to run awareness campaigns. Such campaigns would spread awareness among people and would influence them to consult a doctor instead of seeking information over the internet or mobile applications regarding corona virus or other diseases. This study and its results related to the information-carrier characteristics offers implications for medical and health-care practices. The patients and affected individuals of any medical problem can be encouraged to receive health-related information provided by government or health organizations approved systems or health-related information-carrying platforms or portals. These platforms should be with the ease of access to general public and should carry authentic and relevant information only. This could help patients to find and understand the relevant information only. Health literacy should also be considered here, and the awareness campaigns should attempt to make people aware about the health and medical issues.

References

Ali et al., 2020 – *Ali, S.H., Foreman, J., Tozan, Y., Capasso, A., Jones, A.M., DiClemente, R.J.* (2020). Trends and predictors of COVID-19 information sources and their relationship with knowledge and beliefs related to the pandemic: nationwide cross-sectional study. *JMIR public health and surveillance*. 6(4): e21071.

Avery, Park, 2021 – *Avery, E.J., Park, S.* (2021). Perceived Knowledge as [Protective] Power: Parents' Protective Efficacy, Information-Seeking, and Scrutiny during COVID-19. *Health Communication*. 36(1): 81-88.

Basnyat et al., 2018 – *Basnyat, I., Nekmat, E., Jiang, S., Lin, J.* (2018). Applying the modified comprehensive model of information seeking to online health information seeking in the context of India. *Journal of Health Communication*. 23(6): 563-572.

Bento et al., 2020 – *Bento, A.I., Nguyen, T., Wing, C., Lozano-Rojas, F., Ahn, Y.Y., Simon, K.* (2020). Evidence from internet search data shows information-seeking responses to news of local COVID-19 cases. *Proceedings of the National Academy of Sciences*. 117(21): 11220-11222.

Brodie et al., 2000 – *Brodie, M., Flournoy, R.E., Altman, D.E., Blendon, R.J., Benson, J.M., Rosenbaum, M.D.* (2000). Health information, the internet and the digital divide. *Health Affairs*. 19(6): 255-265. doi:10.1377/hlthaff.19.6.255

Capone et al., 2020 – *Capone, V., Caso, D., Donizzetti, A.R., Procentese, F.* (2020). University student mental well-being during COVID-19 outbreak: What are the relationships between information seeking, perceived risk and personal resources related to the academic context?. *Sustainability*. 12(17): 1-17.

Chan et al., 2020 – *Chan, E.Y.Y., Huang, Z., Lo, E.S.K., Hung, K.K.C., Wong, E.L.Y., Wong, S.Y.S.* (2020). Sociodemographic predictors of health risk perception, attitude and behavior practices associated with health-emergency disaster risk management for biological hazards: the case of COVID-19 pandemic in Hong Kong, SAR China. *International journal of environmental research and public health*. 17(11): 1-18.

Clark et al., 2020 – *Clark, C., Davila, A., Regis, M., Kraus, S.* (2020). Predictors of COVID-19 voluntary compliance behaviors: An international investigation. *Global transitions*. 2(1): 76-82.

Delorme et al., 2011 – *DeLorme, D.E., Huh, J., Reid, L.N.* (2011). Source selection in prescription drug information seeking and influencing factors: applying the comprehensive model of information seeking in an American context. *Journal of health communication*. 16(7): 766-787.

Dutta-Bergman, 2005 – *Dutta-Bergman, M.J.* (2005). Theory and practice in health communication campaigns: A critical interrogation. *Health communication*. 18(2): 103-122.

Grasso, Bell, 2015 – *Grasso, K.L., Bell, R.A.* (2015). Understanding health information seeking: A test of the risk perception attitude framework. *Journal of health communication.* 20(12): 1406-1414.

Hameleers et al., 2020 – *Hameleers, M., van der Meer, T.G., Brosius, A.* (2020). Feeling "disinformed" lowers compliance with COVID-19 guidelines: Evidence from the US, UK, Netherlands and Germany. *Harvard Kennedy School Misinformation Review.* 1(3): 1-16.

Han et al., 2010 – *Han, J.Y., Wise, M., Kim, E., Pingree, R., Hawkins, R.P., Pingree, S. ... Gustafson, D.H.* (2010). Factors associated with use of interactive cancer communication system: an application of the comprehensive model of information seeking. *Journal of Computer-Mediated Communication.* 15(3): 367-388.

Hartoonian et al., 2014 – *Hartoonian, N., Ormseth, S.R., Hanson, E.R., Bantum, E.O., Owen, J.E.* (2014). Information-seeking in cancer survivors: application of the comprehensive model of information seeking to HINTS 2007 data. *Journal of health communication.* 19(11): 1308-1325.

Hossain et al., 2020 – *Hossain, M.T., Ahammed, B., Chanda, S.K., Jahan, N., Ela, M.Z., Islam, M.N.* (2020). Social and electronic media exposure and generalized anxiety disorder among people during COVID-19 outbreak in Bangladesh: A preliminary observation. *Plos one.* 15(9): e0238974.

Houston, 2002 – *Houston, T.K., Cooper, L.A., Ford, D.E.* (2002). Internet support groups for depression: a 1-year prospective cohort study. *American Journal of Psychiatry.* 159(12): 2062-2068.

Islam et al., 2020 – *Islam, M.S., Sarkar, T., Khan, S.H., Kamal, A.H.M., Hasan, S.M., Kabir, A., ... Seale, H.* (2020). COVID-19–related infodemic and its impact on public health: A global social media analysis. *The American Journal of Tropical Medicine and Hygiene.* 103(4): 1621-1629.

Johnson, 1993 – *Johnson, J.D., Meischke, H.* (1993). A comprehensive model of cancer-related information seeking applied to magazines. *Human Communication Research.* 19(3): 343-367.

Kim et al., 2020 – *Kim, H.K., Ahn, J., Atkinson, L., Kahlor, L.A.* (2020). <? covid19?> Effects of COVID-19 misinformation on information seeking, avoidance, and processing: A Multicountry comparative study. *Science Communication.* 42(5): 586-615.

Mohamad et al., 2020 – *Mohamad, E., Tham, J.S., Ayub, S.H., Hamzah, M.R., Hashim, H., Azlan, A.A.* (2020). Relationship between COVID-19 information sources and attitudes in battling the pandemic among the malaysian public: cross-sectional survey study. *Journal of medical Internet research.* 22(11): e23922.

Murray, 2014 – *Murray, T.M.* (2014). Virtual communities as a health information source: examining factors that predict individuals' use of social media for health communication. Ph.D. Dis. University of Akron, Ohio, USA.

Nowak et al., 2020 – *Nowak, B., Brzóska, P., Piotrowski, J., Sedikides, C., Żemojtel-Piotrowska, M., Jonason, P.K.* (2020). Adaptive and maladaptive behavior during the COVID-19 pandemic: The roles of Dark Triad traits, collective narcissism, and health beliefs. *Personality and Individual Differences.* 167(1): 1-6.

Oh, 2015 – *Oh, Y.S.* (2015). Predictors of self and surrogate online health information seeking in family caregivers to cancer survivors. *Social Work in Healthcare,* 54(1): 939-953. doi:10.1080/00981389.2015.1070780

Reintjes et al., 2016 – *Reintjes, R., Das, E., Klemm, C., Richardus, J.H., Keßler, V., Ahmad, A.* (2016). "Pandemic public health paradox": time series analysis of the 2009/10 influenza A/H1N1 epidemiology, media attention, risk perception and public reactions in 5 European countries. *PloS one.* 11(3): e0151258.

Robinson, 2006 – *Robinson, J., Thompson, T., Tian, Y.* (2006). *Seeking cancer information on the internet: Antecedents and satisfactions.* Paper presented at the annual conference of the International Communication Association, Dresden, Germany.

Roy et al., 2020 – *Roy, D., Tripathy, S., Kar, S.K., Sharma, N., Verma, S.K., Kaushal, V.* (2020). Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian journal of psychiatry.* 51(1): 1-7.

Ruppel, 2016 – *Ruppel, E.K.* (2016). Scanning health information sources: applying and extending the comprehensive model of information seeking. *Journal of health communication.* 21(2): 208-216.

Soroya et al., 2021 – *Soroya, S.H., Farooq, A., Mahmood, K., Isoaho, J., Zara, S.E.* (2021). From information seeking to information avoidance: Understanding the health information behavior during a global health crisis. *Information Processing & Management*. 58(2): 1-16.

Tong et al., 2020 – *Tong, K.K., Chen, J.H., Yu, E.W.Y., Wu, A.M.* (2020). Adherence to COVID-19 precautionary measures: applying the health belief model and generalised social beliefs to a probability community sample. *Applied Psychology: Health and Well-Being*. 12(4): 1205-1223.

Tustin, 2010 – *Tustin, N.* (2010). The role of patient satisfaction in online health information seeking. *Journal of Health Communication*. 15(1): 3-17. DOI: 10.1080/10810730903465491

Van Stee, Yang, 2018 – *Van Stee, S.K., Yang, Q.* (2018). Online cancer information seeking: Applying and extending the comprehensive model of information seeking. *Health communication*. 33(12): 1583-1592.

Wong et al., 2020 – *Wong, L.P., Alias, H., Wong, P.F., Lee, H.Y., AbuBakar, S.* (2020). The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. *Human vaccines & immunotherapeutics*. 16(9): 2204-2214.

Zhao et al., 2020 – *Zhao, X., Fan, J., Basnyat, I., Hu, B.* (2020). Online health information seeking using "# COVID-19 patient seeking help" on Weibo in Wuhan, China: Descriptive Study. *Journal of Medical Internet Research*. 22(10): e22910.

Zhou et al., 2018 – *Zhou, L., Zhang, D., Yang, C.C., Wang, Y.* (2018). Harnessing social media for health information management. *Electronic commerce research and applications*. 27(1): 139-151.