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Worry and Media Use Behavior during COVID-19 Pandemic

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ABSTRACT

Background: Information seeking occurs to reinforce existing information, to solve problems, construct meaning, and as a response to alienation. The continual information uncertainty related to COVID-19 pandemic impacted life, livelihood and triggered worry. Information seeking from multiple sources became necessary to allay anxiety and verify authenticity. This research investigated the various sources of information, and its influence on their level of worry.

Methods: An online survey required respondents to indicate their sociodemographic details, different information sources used, awareness of rumors, the ability to check the authenticity of the information, sources, and COVID-19 related experiences. The lowest and highest for worry scale was 1—10.

Results: The median worry during the period was seven, and the number of media accessed was five. Overall worry correlated significantly with other worries (personal and family health, income, job, and lack of growth). Worry differed significantly among age groups, education, occupation, and marital status but not across gender and economic status. Individuals, who self-isolated, experienced issues with rumors, feared infection and death reported significantly more worry. Awareness, fear of infection, and rumors influenced significantly more number of media use.

Conclusions: The extent of worry and the number of information sources showed complex and non-linear 'U' shaped relationship with the lowest at six sources. The article extends the information-seeking behavior literature by indicating that the use of a higher number of media sources is counterproductive. Understanding information exchange and information sources can help address public worry.

Keywords: Anxiety, Behavior, Coronavirus, COVID-19, Information-Seeking, Pandemics

Introduction

Information seeking has a utilitarian perspective and helps reinforce existing information (Atkin, 1973). It is also conceived as a series of events with a constructive effort to derive meaning from information to increase the knowledge on a specific issue (Kuhlthau, 1991). Information alienation theory proposed that the higher degree of alienated feeling (powerlessness, meaninglessness, normlessness, isolation, and self-estrangement) pushes an individual to mass media to escape the reality of everyday life (Chatman, 1990).

Everyday life information seeking theory distinguishes between work and non-work related information seeking, which is directed toward problem-solving. It can have cognitive vs affective and optimism vs pessimism dimensions, resulting in four quadrants for information seeking (Savolainen, 1995). Information seeking and processes has also been investigated in different contexts. Using the Internet for information seeking, requires the right skills, effort, and time where experienced users were more successful in finding the right information (Korobili et al., 2011). Cost, time, and effort are required in seeking the right information. Health-related information can be considered from the utilitarian, reinforcement, increase in knowledge, as well as from the problem-solving perspectives.

The advent of social media has changed the dynamics of production, sharing, and searching for information in general, and health information in particular. Researchers have used social support theory and e-adoption paradigms to develop a net valence model to explain an individual's intention to seek and share information related to health in social media (Li et al., 2018). Perceived benefit (perceived usefulness, the credibility of health information, emotional support, and informational support), perceived risk (mental intangibility, privacy risk, time risk, social risk, and psychological risk) determines the intention to seek or share health information (Li et al., 2018). However, they found that the mental intangibility and social risk do not fit in the healthcare and social media context. Another model based on social cognitive theory and perceived interactivity proposed a model to investigate the antecedents of health information exchange in social media. The research demonstrated that human-to-human interaction, human-to-information interaction, outcome expectation of health self-management competence, and outcome expectation of social relationships have a significant impact on health-information-exchange behavior (H. C. Lin & Chang, 2018).

A model considered perceived health risk, health self-efficacy, tangible support, emotional support, esteem support, appraisal support, and practical resources to consider information exchange behavior in social media. The study reported perceived health risk and health self-efficacy to significantly affect health information-seeking intention and health self-efficacy was the moderator. Tangible support and appraisal support influenced perceived health risk whereas emotional support and esteem support, influenced health self-efficacy (Deng & Liu, 2017). The complementarity hypothesis proposed that an addition of media displaces or replaces the use of another within the media repertoire of an individual because of limited resource availability. Though research reported strong support of the hypothesis, it also found that the interpersonal channel and mass media channels do not compete with each other to provide health information (Tian & Robinson, 2008). Individuals prefer various sources for health information.

Literature Review

During the COVID-19 pandemic, sharing appropriate scientific information with the public has been a key element in controlling the spread of the virus. A study on H1N1 flu reported more frequent use of radio, television, and newspaper compared to the internet (Walter et al., 2012). In the case of a new viral illness, many facts continue to evolve. Misinformation and rumors complicated the scenario. Literature suggests that in past pandemics, misleading information was broadcast, e.g. in the 2009 H1N1 pandemic, 23% of the videos were misleading (Pandey et al., 2010). Cynicism and low trust in media information compared to trust in health professionals was reported in flu situation (King et al., 2018). Most of the individuals with chronic diseases were not satisfied with Covid-19 information available online (Kor et al., 2020). Rumors and misinformation shape the behavior of the public during a pandemic. The panic buying of goods, chaos in the travel, and transportation of migrant labors, a drastic reduction of poultry prices, and the rise of the price of fish products, are some examples of public behavior due to rumor during COVID-19 (Bose, 2020; Chattopadhayay, 2020; Cutinho, 2020; Dabhi, 2020; Krar, 2020; G. Pandey, 2020; Pawar, 2020; Shekhar, 2020; Vijayan, 2020).

Information from various social media platforms has a greater reach to the public than the professional scientific channels. Accurate and reliable information is the key as that may change the behavior of people that can help in the management of the pandemic.

Understandably, anxieties may be high for a new illness when there are no known effective treatments or a preventive vaccine. Studies have indicated that the pandemic increased public attention and anxiety though, it was short-lived (Bento et al., 2020; Tausczik et al., 2012). The issues related to information, especially the rumors and misinformation, can affect people, prompting them to search for various sources resulting in possible information overload and inaccurate information. In a pandemic situation, authorities take some control of the information spread to the public and try to improve the information sharing process. However, concerns remain in the acute phase of this pandemic about the

information that reaches people and how they search and use these. Information seeking during pandemic indicated gender differences. Women perceived a higher likelihood of infection, willingness to take preventive medications, and engagement in information exchange behavior (Ibuka et al., 2010).

Information seeking has a problem-solving approach and can allay anxiety; however, it should be appropriate, reiterative, holistic, and context-bound (Foster, 2004). Health information-seeking behavior is indicated to be one of the key coping strategies for psychosocial adjustments (Lambert & Loiselle, 2007), and it is relevant in a pandemic situation where anxieties are understandably high. Trust in the source of information, levels of knowledge about the disease, anxiety, repetitive media exposure as well as information-seeking behaviors have been suggested to lead an individual to have an increased chance of using recommended infection prevention measures that may improve the response to pandemics (L. Lin et al., 2014).

Beyond the health concern of an individual for oneself and family members, the COVID-19 posed challenges arising from the loss of income due to job loss or reduced business income, anticipated loss in future income due to lack of economic growth (Sands, 2019). The economic impacts, and effects on daily life are associated with anxiety (Cao et al., 2020; Kar et al., 2021). The negative impact on firm performance in general and small firms in particular has also been documented (Shen et al., 2020). The higher incidence of COVID-19 with lower mean income implied a loss of current income (Baena-Díez et al., 2020). It is also anticipated that people will be pushed back to poverty because of the pandemic (Suryahadi et al., 2020). Given the persistence of the COVID-19 pandemic, the concerns of income, employment, economy are expected to persist as well. The worry about life and livelihood may push individuals to seek more information.

Cockerham (2005) underlined the need and proposed a health lifestyle theory, which included the role of social structure and agency because daily lifestyle practices consider health outcomes (Cockerham, 2005). The need for further research was also emphasized to understand the relative value individuals place on different sources of information (Tian & Robinson, 2008).

Objective

In the above background, we wanted to understand how uncertainty and related worry due to a pandemic relate to information exchange behavior from different media sources. The number of media sources was considered the proxy for the increased information need. The utilitarian perspective of Atkin's information-seeking theory, Kuhlthau's proposition about the construction of meaning from information, information alienation theory, and everyday life information seeking theory for problem-solving provided the basis for this research. Worry was considered the affective dimension proposed in the everyday life information seeking theory.

Based on the review, we considered the broad objective to understand to what extent people used different sources of information and how the use of such information sources along with other demographic and COVID-19 related factors influenced the level of worry. We hypothesized that the level of worry and the number of information sources used, to have significant differences among demographic variables such as gender, age group, education, marital status, occupation, and economic status. We also hypothesized that the level of worry and the number of sources used to access information to have significant differences with awareness, self-isolation, knowing somebody infected, the worry of death, knowledge about rumor, ability to check authenticity, and those who experienced some issues due to rumor. Lastly, we wanted to understand the behavior of worry with respect to the number of sources used in an uncertain environment.

Methodology

The study was conducted as a questionnaire survey method. A questionnaire was developed to evaluate information seeking such as sources of information accessed, awareness of the presence of rumors, the method for verifying the information for its authenticity. As an individual can use different media to gather information, the survey included 11 media choices (such as word of mouth, social media, emails, news, TV, and websites of Government, World Health Organization, and health-related professional bodies) for information. The respondents indicated if they used a particular medium or not, awareness of presence of rumors, and if they faced any issue due to the rumors.

The form captured demographic variables (age, gender, education, occupation, marital status, and economic status). Worry was assessed on a scale of 1 to 10, to questions such as, 'how worried are you regarding personal health, family health, loss of present income, future income, loss of a job, and lack of economic

growth'. We also asked about the overall level of worry regarding the COVID-19 situation.

Data collection

The data collection was done through a google survey from the period 29-March to 27-April 2020 within which 758 responses could be collected, three responses were rejected due to incomplete information. Researchers sent the request to fill up the survey to the primary contacts with a request to forward to others. The survey form was shared on various platforms as well requesting responses. Respondents from 22 countries participated in this survey. Seventy six percent were from India, twelve percent were from Nepal, three percent each from UK and USA. More than one respondents were from countries like Australia, Canada, New Zealand, Ethiopia, Japan, Bangladesh, Tanzania, and the United Arab Emirates.

The project was considered a public health survey. Ethical principles were adhered to during the online data collection, no identifying data were collected; respondents were free to withdraw or not submit their responses. Information about the survey was given to the respondents and there was an option to contact researchers for more information if required.

Analysis

It was anticipated that the data distribution in a pandemic situation is not normal. The normality distribution was checked by Kolmogorov-Smirnov and Shapiro-Wilk tests. For non-normal distribution, non-parametric tests such as Kruskal-Wallis test for more than 2 groups, and both Mann-Whitney U and Kolmogorov-Smirnov (KS) Z were used to understand the difference between the two groups. The KS test being more sensitive to shape, spread, or median (Mdn) in the distribution was used for the confirmatory purposes. The statistically significant level was considered at $p<0.05$. The reported level of worry (scale: 1- least and 10- highest) was considered the outcome variable and other variables were considered independent variables. Data were analyzed in SPSS version 25.

Result

There were 755 respondents with 41.2% female and 58.8% male, mean age 34.7 (SD:13.2) years; 47.8% unmarried, 47.4% married, and 4.8% others (widowed, separated, and in-relationship. A detailed grouping of age indicated 1.2% of the respondents were within 19 years, 65.6% were from 20 to 39 years of age, 31.5% from 40 to 64 years, and 1.7 were over 64 years. There were 1.3% respondents in lower economic status, 26.0% in the lower middle class, 66.0% in the upper middle class, and 6.8% in upper economic status.

Mean ± SD number of information sources used was 4.96 ± 2.55 [95% Confidence Interval (CI) = 4.78 to 5.14, Median= 5.0, Skewness = 0.47]. Responses about various types of worries were taken from the respondents (N = 755): personal health (Mean ± SD: 6.70±2.73), family health (8.00 ± 2.28), loss of present income (6.21 ± 3.16), future income (6.80 ± 3.06), loss of job (5.04 ± 3.52), and lack of economic growth (7.69 ± 2.55). The respondents were asked to indicate an overall perceived worry as well (6.98±2.54). A correlation test among worries about specific factors and overall reported worry indicated that these were highly correlated (Table 1). The six-item reliability statistics (Cronbach's Alpha = 0.874) indicated acceptable internal reliability of different aspects of worry. Since various factors of worry have significant and high correlations; the subsequent analysis was based on the total worry responses.

The test for normality of the distribution for worry (Kolmogorov-Smirnov statistics = .156, df = 755, p = .000; Shapiro-Wilk statistic = .909, df = 755, p = .000) indicated that the distribution is not normal. Similarly, the test for normality for number of information sources (Kolmogorov-Smirnov statistics = .119, df = 755, p = .000, Shapiro-Wilk statistic = .955, df = 755, p = .000) indicate it as a non-normal distribution. Because both worry and the number of sources have a non-normal distribution, we used the non-parametric tests.

Specific medium of information and worry

There was a lack of a significant difference between the user and non-user of a particular medium except Instagram users who reported a higher level of worry than non-users (Non-Users N = 615, Worry Mdn = 7.27; Users N =140, Worry Mdn = 8.14; Kolmogorov-Smirnov Z = 1.882, p = .002). This indicated that there was no exclusivity in the usage of a particular medium or application. Secondly, an individual user is more likely to use a set of applications rather than a specific one or not. In this sense, the user is more likely to be focused on getting more information from a set of applications rather than one additional medium. To factor in this understanding, the number of sources of information was emphasized rather than a specific medium.

Table 1. Correlation between total worry and other factors (N = 755)

Variable	Worry	Personal Health	Family Health	Present Income	Future Income	Job Loss	Lack of Economic growth
Worry	1						
Personal Health	.752**	1					
Family Health	.682**	.760**	1				
Present Income	.413**	.483**	.400**	1			
Future Income	.482**	.499**	.489**	.807**	1		
Job Loss	.424**	.428**	.408**	.627**	.670**	1	
Lack of Economic growth	.450**	.454**	.455**	.523**	.632**	.517**	1

** p<.01

Worry and information use in different demographic and COVID-related categories

The following section reports the level of worry reported by respondents, and the number of information sources used by them, for different demographic variables used in the survey (Table 2). The result indicated that the level of worry and the number of information sources vary with various demographic factors. Twenty to thirty-nine age group was most worried and used the highest number of information sources. Worry did not differ by gender, but females were found to use a greater number of information sources. Professionally educated were less worried; the university-educated were significantly more worried and used a greater number of information sources. Employers were the least worried and students were found to be most worried. Health professionals used more information sources compared to salaried individuals. We found a degree of correspondence between worry and information sources by occupation. Unmarried were significantly more worried, but there was no difference in the number of information sources used. The differences in economic status did not influence the information-seeking behaviors in terms of the number of sources used and the level of worry.

Worry versus the number of sources

The demographic and pandemic related variables were found to be associated with the level of worry and the number of information sources used. Such an association and significant differences prompted an investigation of a direct relationship between worry and the number of media used, for comprehensive understanding.

To understand the distribution of the number of information sources by each level of worry, a graph (Figure 1) was plotted between the count of respondents versus the level of worry, and the number of sources of information. It was necessary to check the distribution pattern indicated in the graph. The test for normality (number of information sources) at each level of worry indicated that the distribution was not normal. The test of homogeneity of variances based on the mean (Levene Statistic= 1.920, df1=10, df2= 744, p=.039) indicated a lack of homogeneity. The test based on median (Levene Statistic=1.390, df1=10, df2=744, p=0.180) indicated homogeneity. Therefore, the distribution of the number of information sources at each level of worry was not normal.

The distribution of the worry and number of media used were non-normal. At each level of worry, the distribution of the number of media used was also non-normal. Therefore, a graphical representation of the relationship was attempted after re-grouping of information sources. Generally, an individual seeking information in a pandemic situation would not stop after exactly one increment in the information sources. The data indicated that the respondents used 4.96±2.6 (Mean and SD) number of sources (five was the median). Thirdly, the triangulation of data, information, method, and theory is a research practice; the design theory also considers information triangulation.(Wijnhoven & Brinkhuis, 2015; Wilson, 2014)

Therefore, the twelve information sources were grouped into triads. Both the mean and median level of the worry level was plotted (x-axis: triad of number of information sources and the y-axis: level of worry) against the triad of information sources (Figure 2). The figure indicates that both the mean and median level of worry decreases until the number of information sources (2nd triad) is six. Beyond which the level of worry increases when the number of sources increases. The median worry remains the same for the number of information sources 9 and 12 whereas, the mean level

Table 2 Median values of worry and number of info-sources used in different sociodemographic and COVID-19 related groups

Variables	Categories	n	Worry	p	No of Info-sources	p
Gender	Female	311	7.51	0.208	5.01	0.008
	Male	444	7.41		4.47	
Age group	⇐19	9	7.6	0.000	4.20	0.012
	20.39	495	7.9		4.96	
	40.64	238	6.5		4.31	
	64+	13	4.67		4.57	
Education	School	5	7.33	0.000	4.00	0 .043
	College	84	7.5		4.43	
	University	390	7.91		4.97	
	Professional	276	6.71		4.48	
Marital Status	Unmarried	361	8.15	0.000	4.73	0.505
	Married	358	6.7		4.62	
Economic Status	Lower	10	8.5	0.112	3.50	0.247
	Lower middle	196	7.52		4.35	
	Upper middle	498	7.5		4.80	
	Upper	51	6.5		5.11	
Occupation	Student	284	8.42	0.000	4.93	0.053
	Not working	32	6.75		4.18	
	Self Employed	34	7.00		4.33	
	Salaried	139	7.54		4.14	
	Professional	85	6.70		4.79	
	Health Professional	142	5.91		5.02	
	Employer	39	7.36		4.17	
Awareness	No	21	7.17	0.380	3.00	0.033
	Yes	734	7.47		4.73	
Self-Isolation	No	654	7.39	0.004	4.80	0.010
	Yes	101	8.00		4.06	
Knowing somebody positive	No	717	7.47	0.719	4.68	0.656
	Yes	38	7.29		4.91	
Worry of Infection	No	290	5.98	0.000	4.38	0.009
	Yes	465	8.01		4.90	
Worry of Death	No	557	6.92	0.000	4.73	0.904
	Yes	198	8.87		4.59	
Rumour	No	153	7.26	0.353	4.17	0.003
	Yes	602	7.50		4.81	
Check Authenticity	No	135	7.40	0.804	4.43	0.244
	Yes	620	7.48		4.77	
Issue due to Rumour	No	478	7.12	0.000	4.41	0.000
	Yes	277	8.02		5.21	

Tests used Mann-Whitney U / Kruskal-Wallis

of worry shows an increase. The higher median values at any given information source also confirm the non-normal distribution. A possible explanation is that additional information sources in a pandemic situation reduces the worry to a limited extent, beyond which the worry increases.

Discussion

We studied information exchange behavior during a pandemic, and its relationship with the level of worry, demography, and pandemic related factors associated with it. To our knowledge, it is the first study linking the

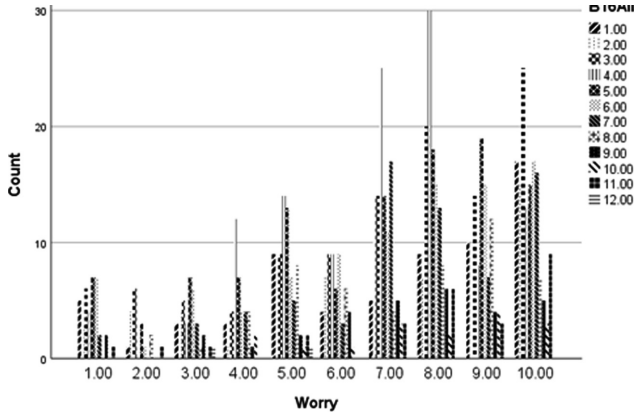

Figure 1: Level of worry and count of number of sources used by respondents.

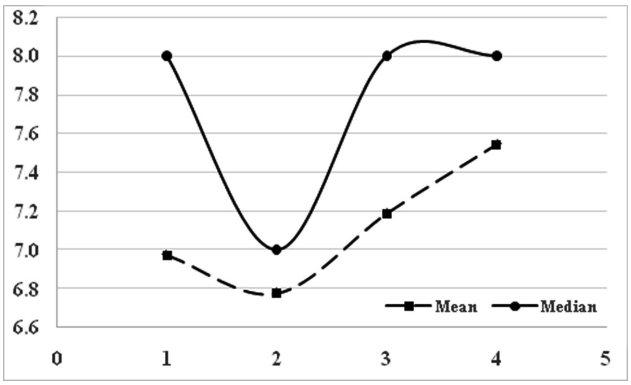

Figure 2: Mean of level of worry and set of three number of information source.

degree of worry and the number of media sources in a pandemic situation. Information seeking in a health care situation is important as it may influence subsequent behavior essential for managing the situation. The study results suggested that there are significant differences in level of worry and information seeking related to various demographic and pandemic variables; and validates the existence of communication inequalities (L. Lin et al., 2014). The findings may be useful for public health education and information dissemination process during public health crises such as epidemics and pandemics.

Given that the level of information exchange is likely to increase on various media, there is likelihood of misinformation and rumors, which has been observed during COVID-19. However, the importance of a specific medium reduces, as individuals are using multiple sources of information, which is around 5 as observed in this study. However, there is a possibility of overload of information from multiple sources causing worry to increase. As observed in this study, worry is comparatively lower while using up to six sources of information and beyond which worry increases. The risk of multiple sources also increases the chance of receiving misinformation, and it may be a concern as only a proportion can evaluate the authenticity of the information and source.

The study reported a higher level of worry to be associated with the use of a greater number of information sources; it could also mean that the use of more information sources is linked to greater levels of worry. It was seen that females were not significantly more worried than men, but examined more information sources. Health professionals accessed a higher number of information sources. Married respondents reported significantly less worry compared to unmarried, probably suggesting the supportive role of companionship, but the number of information sources did not vary. The economic status of the individuals did not matter for worry or the number of information sources, possibly indicating that the worry in a pandemic was evenly distributed in all economic strata.

Worry may trigger information searches from additional sources; or, the overload of information from additional sources without corresponding benefit may increase worry. It has been reported that, for the public, receiving information from medical staff and the internet was associated with, respectively, better and poorer psychological well-being.(Ko et al., 2020)

The relation between pandemic-associated variables and worry indicated that worry did not differ just by the awareness alone, but the number of sources used differentiated those who were aware and those who were not. People who had self-isolated compared with those who had not, showed a difference in their level of worry as well as the number of information sources used. It can be argued that self-isolation by the respondents was prompted by higher worry, and after, thought of having undertaken sufficient action to protect oneself from the pandemic may have subsequently prompted them to search for sources of information less than before.

However, personally knowing or not-knowing someone positive for COVID-19 did not significantly differentiate worry and the number of information sources. A possible explanation is that the information that someone else has been found positive reflects that one is comparatively safe and may use the information to avoid risk behaviors to prevent getting infected. Those who were worried about getting infected used a significantly higher number of information sources than those who were not worried of getting infected.

The awareness of rumors did not differentiate worry levels, but the number of information sources used was

significantly different, indicating that individuals using higher numbers of information sources distinguish rumors from fact. Interestingly, the ability to distinguish authentic information did not have any difference concerning worry or the number of sources of information. This could be because most of the respondents used the same set of information sources, or after using different number of sources, there is no significant difference in the ability to check the authenticity further.

As observed in this study, rumor increased the worry of individuals; the number of sources of information used increased in response to issue due to rumor. Rumors have an impact on the public behavior.

Interestingly, worry did not differ by the use or not-use by any specific media (except in the case of Instagram). There could be several reasons for this observation. First, the information sources now have multiple formats e.g., newspapers and TV have web editions; professional and government sites have a presence in social media (e.g. WHO is on Facebook, Instagram, etc.). Second, the information is not exclusive to any specific media, social media applications are interconnected, and information passes from one to the other medium almost without any lag. Even, different media do not have many constraints on the format (text, picture, audio, and video) of the information. Thus, credible information also has a similar chance to percolate and propagate to individuals. This study does not report any significant difference between the users and non-users of a specific medium.

Limitations and Scope for Further Research

Being an online survey, the generalizability of the survey to people not online may be restricted. However, most people are now using the Internet on their mobile and it is expected that the results will be appropriate for them. Many sociodemographic categories were not well represented in the online survey such as those without formal education, laborers, and older adults who could be more vulnerable in a pandemic situation.

This research indicates that worry reduces up to the use of a specific number of media sources and then increases, the role of search engines to push specific information based on search strings are not taken into account. The information exchange has pull or push factor, which is not separated in this research. Individuals also push information in forwarding specific content to their contacts without the information being sought. Thus, there is a possibility of redundancy, information overload, and unspecific content. The possibility of such information increasing worry is not established in this research and calls for a further research study. Similarly, the content generated may have different objectives, targets, and formats. Which specific type of content, format, induce worry among individuals of different personality types needs further investigation beyond the demographic variables. Unsuspecting, gullible individuals may demonstrate more worry due to information in a pandemic situation. Personality type and worry due to different information content may shed deeper insight. This research has indicated an association but the causality remains to be worked upon.

Conclusions

During the COVID-19 pandemic, when information was available from various sources and kept changing or being updated, as would be expected, it was observed that the general worries of people remained at higher levels. People searched multiple information resources and although people were aware of the presence of misinformation and rumors, a proportion of them knew about checking the authenticity. Information seeking and sources may have contributed to the worry in a complex, non-linear way. Public education about searching appropriate sources, identifying misinformation and rumors, and improving the reliability of resources, by the media and authorities, may be suggested. Future studies should investigate whether these measures can decrease the level of worry in the population and increase appropriate health-related behaviors to tackle public health crises such as epidemics and pandemics.

This research contributes to the information exchange theory by establishing the emotion ‘worry’ to be associated with the number of media access. Secondly, we indicated that the number of media accessed has a limit up to which worry reduces, any further increase in the number of media is associated with a higher level of worry.

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