Applying the Four Models of Science Journalism to the Publics' Interaction with Coronavirus News

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Abstract

Since the outbreak of coronavirus, also known as COVID-19, the news has been covering its rapid developments by the minute, while feeding the eager publics the information they seek regarding its origin, health-threats, symptoms, preventative measures, and global impact. It is thus of pressing importance, to track the Egyptian publics' interactions with Coronavirus news and to test the four science journalism models by applying them to the publics' consumption of, and reaction to, Coronavirus news. Coronavirus is a global health concern, and although the research sample tests the local Egyptian publics' interactions with Coronavirus news, the findings of this research can be of global relevance and interest. The study's results are derived from a survey circulated electronically over the course of two weeks, yielding 437 responses. The findings conclude that the publics' interacted the most with the Contextual Model, which ultimately relies on providing audience-relevant information. The second most popular model was the Public Participation Model, which serves as an interactive model intended to engage publics. Following those two models, is the Science Literacy model, which builds on translating complex scientific information to aid in educating the audience; the least popular model amongst publics was the Lay Expertise Model, which offers publics, as well as scientists, diverse sources for news.

Introduction

On December 31, 2019, the first case of the Coronavirus, also known as COVID-19, was reported from the city of Wuhan in China (WHO 2020), releasing the first warning sign of what would soon after be labeled a pandemic (Hickok 2020). According to Worldometers, at the time of writing this paper, the virus had affected more than 71,000 people worldwide—the highest numbers being reported in China—with 11,000 recovered, and a death toll of over 1,500. The news outbreak caused a stir, and created a media frenzy around the world, forcing a wave of science communication to the masses with the aim of educating and engaging

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them in safe practices. It is, therefore, an interesting time to investigate how publics interact with this trending news, given the fact that science journalism has an expansive reach and a powerful impact on adding knowledge that consequently alters behaviors and attitudes towards a health-related concern (Barel-Ben David et al. 2020). Hence, it is of great importance to question the kind of communication model that appeals to digital audiences, who consume and are significantly affected by digital media; media that is restricted by virtual borders.

The debate over the "most fit" science communication model that serves the audience best has been discussed, almost indefinitely in literature (Gerhards and Schäfer 2009; Brossard and Lewenstein 2010; Tlili and Dawson 2010; Secko et al. 2013; Knaapen and Lehoux 2016). This has resulted in the formation of many proposed models to enhance the communication of science and health-related news in journalism practices. And such diversified findings stand against a "one model fits all" approach, or at least a unanimously agreed upon model that is guaranteed to translate science and communicate it with ease to publics. This dichotomy has resulted in more research-based attempts at deciphering the audience, and the construction of case-specific models. This paper presents another attempt at looking into science journalism models through the lens of a very current and unique case study that has proven of great concern to publics, and questions whether these models are still eligible to operate in the ever-evolving digital era.

Literature Review

In a time when a health crisis needs to be communicated to the publics, journalism plays a key role in informing and educating the 7.53 billion people populating this earth. This heavy responsibility places journalism as a profession in a continuous shifting momentum, to cater to the rapid changes accompanying COVID-19. Today, the majority of the publics rely on different media platforms and formats to consume news, yet, journalism, in its professional communication sense, remains their primary source for science information (Su et al. 2015). The fast-paced development of information communication technologies, and rising internet access, have caused radical shifts in the publics' consumption patterns that are equally worthy of study as the content of disseminated news.

First, it has to be noted that this study utilizes the word "publics" as it gives the greatest attention to audiences who seek news relating to the current Coronavirus. The term "publics" had been recurrently used in science and health communication studies (Bucchi and Trench 2016; Amend et al. 2014; Miller 2001) as a generalized term to include all different groups of audiences receiving and engaging in science communication. The term was originally associated with the Contextual Model of science journalism, to alleviate the restrictions of audience demographics on mass communication research, and to widen the scope to include attitudes, effects, and interest of a desired sample of population focusing on scientific matters (Miller 2001). In other words, the introduction of the term "publics" served the research

by eliminating the limiting traits which would otherwise confine the population being studied to a country or a region; instead, the term "publics" focuses on human interest in a scientific-related issue or event.

Furthermore, this paper complements the efforts of David Secko, Elyse Amend, and Terrine Friday's research, titled "Four Models of Science Journalism; A synthesis and Practical Assessment" (2013). The scholars tested varying communication models and emerged with four theoretically-supported models of science journalism. The derived results were drafted on the basis of five criteria, mimicking the five elements of newsworthiness; Who, what, where, when, why, how (Morton and Warren 1992). The results elaborated that the purpose of a news story serves as the *why*; the focus of the news story offers the *what* element; the style of the news story is determined by *how* the story is formatted; the sources cited in the news story reflect *what* voices are included; the audience are *who* the news story is directed at, and what the expected reactions of these audiences are expected to be; and the scientific content defines *how* science is covered in the story. With all these factors were taken into account, four models of science journalism were derived: The Science Literacy Model, the Contextual Model, the Lay Expertise Model, and the Public Participation Model.

The first model, known as the Science Literacy Model, aims to merely inform the publics of recent discoveries or the status quo of events by presenting only the necessary scientific information, with the intention to motivate them to either support or reject the proposed topic. With this information, the publics can then formulate informed opinions. This model, while not novel (Davies 2008; Gerhards and Schafer 2009; Tlili and Dawson 2010; Curnock et al. 2012), builds on the credibility of evidence-based scientific facts, while employing simplified language to complex terminologies (Grand et al. 2015). However, as a basic journalistic format, the Science Literacy Model completely disregards the contextual background through which the publics can relate to the plausible effects of such scientific breakthroughs or diseases on a daily basis. In other words, the Science Literacy Model regards the publics as passive recipients of information provided by experts and official reports; it adopts the traditional delivery frame, focusing on the '5W's and H' components of newsworthiness: 'Who, what, when, where, why, and how' (Morton and Warren 1992). The sole purpose here is to translate science and health information into an understandable format that the publics can easily comprehend.

The second model, known as the Contextual Model, fills the gap that the Science Literacy Model overlooks, by providing the necessary context that makes the provided information relevant to the publics. This means that the news coverage for a topic or issue is not unified across the globe, but is rather reformulated and packaged to be more audience-specific or 'user-friendly'; it is tailored to the receiving publics' needs, interests, demographics, and intellectual differences (Hofman and Curie 2016). The Contextual Model recognizes that the impact of science news is not unanimous as well, and places emphasis on the context through which the publics

receive such information, as this will inevitably affect the publics' stance on the information presented. Therefore, news is presented by a combination of experts communicating pure science, and community opinion leaders communicating the relevant cultural and intellectual context of science (Brossard and Lewenstein 2010). This more dynamic approach to communicating health and science suggests a more cooperative dynamic to the top-down information delivery mechanism employed by the Science Literacy Model (Mulvale et al. 2017), where the publics are not regarded as an ignorant, passive audience. Instead they are regarded as critical thinkers who, when provided the necessary information, can be motivated to question and engage in the consequences of the presented news.

However, across the literature, both the Science Literacy Model and the Contextual Model, have been labelled as "deficit" traditional journalism models focusing mainly on what Ahteensuu (2012) described as the "'old' public understanding of science." The models assume that publics have a very limited understanding of the science being communicated, and that they lack the necessary information to formulate an opinion; the models were originally constructed on the basis that the audience are passive receivers of information. Even though the Contextual Model is regarded as an improved version that aims to shape and influence the attitudes of publics, both models still present a unidirectional communication strategy (Renedo et al. 2018).

The third model, known as the Lay Expertise Model, builds on the Contextual Model but with an additional two variations; (1) Scientific information is not presented in a top-down delivery format. Brossard and Lewenstein (2010) argue that the voice of science societies, and the concerns of the potentially affected publics, are combined to formulate more meaningful and impactful science and health news; (2) Other disciplines and social systems are included in the news coverage to further explain the scientific data and/or provide additional validation to the information communicated (Knaapen and Lehoux 2016). Accordingly, publics (as audience and practitioners), who are affected by the news, are encouraged to participate either by sharing their expertise on the subject matter, or by voicing their questions and concerns. In the Lay Expertise Model, science is not treated as an abstract matter, as presented by the Science Literacy Model and the Contextual Model, but is rather communicated as limited and in need of additional supporting resources outside the science community to further investigate the issue and give a more well-rounded perspective (Brossard and Lewenstein 2010; Gerhards and Schafer 2009). Therefore, empowering publics to engage and participate in the scientific process is the focal point of this model. According to Nisbet (2009), this dynamic shift from merely informing to actively engaging encourages the participation of local communities (lay people, community members, and opinion leaders) in shaping public and health policies towards the practical needs of the publics. Since the Lay Expertise Model allows room for publics to share their views and concerns, many critics (Renedo et al. 2018; Varcoe et al. 2012) question the subjectivity of this model, which results from the unfeasibility of correctly balancing the information provided by

scientists, experts, and the "lay experts" (lay audience) in science journalism. Consequently, this imbalance of verified facts affects the "seriousness", or as some literature refers to it, the "validation" of the scientific issues under discussion (Füchslin et al. 2019; Hansen 2016; Simon et al. 2016; Knobloch-Westerwick et al. 2015).

The fourth model is the Public Participation Model, which pays more attention to engaging the public—who are referred to in this model as "potential stakeholders"—throughout the different phases of the scientific process, and embracing varying points of views in an attempt to present scientific information and progressions in an interactive format. By doing so, the model encourages public debate regarding the issue under discussion, especially when that issue evokes the creation or upgrade of public or health policies (Secko et. al. 2013). The Public Participation Model, unlike the aforementioned three, breaks the traditional mold of the top-down information delivery mechanism, and the equilibrium format that combines experts and lay experts into a nonlinear delivery mechanism, which gives priority to the democratization of scientific communication over serving the science literacy function of science journalism (Brossard and Lewenstein 2010; Secko et. al. 2013). The pluralistic debate encouraged by this model has been applauded by many scholars and rejected by some (Barel-Ben David et al. 2020; Füchslin et al. 2019; Swart et al. 2017; Ashwell 2016). On the positive side, the Public Participation Model stimulates public engagement through its creative and attractive news coverage, reports that employ infographics, and polls that successfully embed science into culture and daily lives. However, the criticism directed towards this model concerns the favoring of public debate and engagement over science literacy, which is an essential element to shaping decisions and reaching an informed stance (Brossard and Lewenstein 2010).

By reviewing the aforementioned literature, the gradient scale that the four models of science journalism slide across becomes more evident, measuring the criteria of informing publics, to engaging them as active and fundamental partners in the science issue's outcome and its consequent course of action. This falls perfectly in line with the Health Communication Model for Social Change, studied in the literature (Shepherd et al. 2016; Gebbers et al. 2017; Mulvale et al. 2017; Werder 2019). These traditional models of science journalism focus mainly on filling the non-existent or pre-existent knowledge gaps of the audience regarding a topic, as opposed to the more "interactive models" that regard publics as active audiences, and focus on engaging rather than just educating them on a specific issue.

Therefore, five research questions and four variables (shown in Table (1)) were extracted to apply the four models of science journalism on the publics' understanding of Coronavirus news:

Table (1)
Variables used to assess the four science journalism models

Model	Variable
Science Literacy Model	Comprehension
Contextual Model	Relevance
Lay Expertise Model	Sources
Public Participation	Interactions

RQ1: *Do the publics find Coronavirus news easy to understand?*

RQ2: *Do the publics choose to follow news that is contextually relevant to them?*

RQ3: *What sources do the publics prefer to see cited in the news?*

RQ4: *Do the publics engage with Coronavirus news?*

RQ5: *Which of the four science communication models applies to the current publics' interaction with Coronavirus news?*

H1: *The public tend to interact the most with Coronavirus news that allows for their participation in dissemination and application.*

Methodology

To grasp the publics' interest in Coronavirus news and their interactions with the heap of updates provided daily by the media, the research utilized a quantitative survey method for data collection. The survey technique was selected as it stands as one of the main research tools to gather information regarding individuals' attitudes, and asses their knowledge of health-related concerns (Jones et al. 2013). Surveys serve as the most practical method in terms of efficiency and reach to gather the maximum number of responses possible. The study employed the Simple Random Sample technique through which each individual in the publics has an equal chance of being included in the research sample. This sampling method was employed to avoid bias and minimize analysis inaccuracies (Levy and Lemeshow 2013). Initially, a total of 441 responses were collected, but four responses were disregarded as a result of them providing a negative answer to the two screening questions: 'Do you know what Coronavirus is?" and whether the respondents seek news covering coronavirus updates, resulting in a final total of 437 responses yielded, eligible for further analysis.

Survey Design

A survey of 24 questions, translated into simple Arabic language, was distributed electronically across social media platforms, emails, and WhatsApp over a span of two weeks from January 20, 2020, to February 3, 2020, and responses were gathered for analysis. The survey encompassed limited closed-ended and five-point Likert-scale questions, which contains five response options, ranging from

"Strongly Agree" to "Strongly Disagree". This survey structure gives a holistic view of the publics' opinion and their level of interaction with Coronavirus news, by measuring the main variables that assess each of the four science journalism models.

Measurements

Screening: Two closed-ended screening questions were administered at the beginning of the survey to limit the responses according to: (1) the publics' awareness of the existence of Coronavirus, and (2) the publics' search for news covering Coronavirus.

Interest: To grasp the publics' interest in science journalism, two questions were added to evaluate the respondents' (1) care to follow science and health-related news; and (2) whether they recognize news covering Coronavirus as science journalism, or as current affairs.

News Media Platform and Format: (1) Via a closed-ended question, respondents were asked to select the media platform through which they prefer to follow Coronavirus news. (2) Respondents were asked to assess six statements using a five-point Likert scale from "Strongly Disagree" to "Strongly Agree", justifying their preferred media platform. (3) A closed-ended question was included to identify the news format the publics preferred to follow, from short news to lengthy specialized articles. (4) A final close-ended question was included to identify the news presentation format the respondents were interested in, ranging from videos, images, infographics, and text.

Motivation: The motive behind the publics' search for Coronavirus news was assessed on multiple levels and via many of the survey questions. Respondents were asked to assess nine statements on the five-point scale, indicating whether they "Strongly Disagree", "Disagree", "Remain Neutral", "Agree", or "Strongly Agree", indicating the varying reasons why they seek out Coronavirus news. (Refer to Table (2))

Comprehension: To assess the first variable for the Science Literacy Model, respondents were asked four questions. (1) Respondents were asked to indicate their level of agreement (using the five-point scale, from "Strongly Disagree", to "Strongly Agree") on the statement that their go-to media platform for news is governed by ease of comprehension of information and its presentation. (2) Respondents were asked to assess the simplicity, or ease of understanding of the information provided by the news covering Coronavirus on a five-point scale, from "Very Difficult to Understand", to "Very Easy to Understand". (3) Respondents were asked whether they found the scientific terminology, provided in the news, complex or simple. (4) Respondents were asked if they were able to learn about the nature of the Coronavirus from the news.

Relevance: Three questions were given to respondents to indicate the publics' preference for receiving Coronavirus news, on the basis of social and cultural relevance, as directed by the Contextual Science Journalism Model. Respondents were asked the following: (1) Whether they seek local Coronavirus news coverage (covering Egypt), or global Coronavirus news coverage (covering worldwide), or both local and global coverage; (2) Their interest in the news discussing the impact of Coronavirus on their daily lives (through a five-point Likert scale); and (3) assessing respondent's media platform choice justification based on relevance on a five-point scale.

Lay Expertise: Respondents were asked to (1) select their preferred sources of news, from the following list: scientists, officials, experts, celebrities, influencers, or others, and (2) accordingly, select the focal point of the news they seek from the following list: general news, scientific discoveries, scientific background story, number of infected people, preventative measures, and global impact.

Participation: To have a better understanding of how the publics interact with Coronavirus news, respondents were provided closed questions regarding (1) the actions they take after they are exposed to news (action options include reading, engaging via sharing, commenting, and suggesting solutions); (2) their feeling of responsibility to educate others about Coronavirus; (3) whether they believe they can contribute to limiting the spread of the Coronavirus; (4) the application of the preventative measures announced in the news, in their daily lives; and lastly (5) whether they have taken the extra step of visiting and consulting a physician during the Coronavirus period.

Demographics: Respondents were asked to indicate their gender, age, education level, and average monthly income through answering four closed-ended questions.

Findings

Sample Demographics:

Of the 437 responses (excluding four responses from the total of 441 gathered surveys), 57 percent were female and 43 percent were male. Two percent of the respondents were under the age of 18, 13 percent were between 18 and 25, 34 percent were between the age of 26 and 35 (males and females equally), 17 percent were between the age of 36 and 45, and 34 percent were over the age of 45. In terms of education, 55 percent of the survey sample held a masters or doctoral degree, 43 percent have a bachelor's degree, one percent secondary education, and one percent selected "other" assuming a lesser educational level. Coinciding with level of education and age, the majority of the respondents (55 percent) indicated that they earn over 8000 EGP average monthly income, in the economic status question. Ten percent of the responses indicated an income of less than 2000 EGP per month.

Interest in Science and Health News, and News Classification Perception:

64 percent of the results revealed that the publics are interested in science and health-related news, with 25 percent expressing their occasional interest, and only 11 percent gave negative responses indicating disinterest in the topic of science and health-related news. However, the same percentage who positively expressed their interest in science and health news, 64 percent, classified Coronavirus news as "current affairs", and only 31 percent identified its coverage as "science journalism".

Preferred News Media Platform:

66 percent of the responses pointed to social media as the preferred platform for accessing Coronavirus-related news, followed by 18 percent preferring television, 10 percent preferring online news websites, four percent preferring print news, and 0.6 percent of the sample seeking news via the radio.

Justifications for Media Platform Choice:

To assess the reasons behind the publics' preferred choice of media platform, and in order to obtain the average mean score for each statement, the five-point scale responses were assigned ordinal values between "Strongly Agree" =5 and "Strongly Disagree" = 1; the results were accordingly arranged in ascending order.

The results in (Table 2) show that the publics preferred acquiring news from a media platform on the basis of (1) engagement, (2) relevance, (3) comprehension, (4) updated news, (5) credibility of news, and lastly, (6) ease of access.

Table (2)
Publics justifications for media platform choice

	Justifications for Media Platform Choice	Mean
1	I choose this platform because I can share the news on my social media	0.92
2	I choose this platform because it provides news that is relevant to me	0.91
3	I choose this platform because news presentation is easy to comprehend	0.90
4	I choose this platform because the news is frequently updated	0.84
5	I choose this platform because it is credible	0.82
6	I choose this platform because it is easier to access	0.81

Preferred News Media Format

In terms of hard news (critical news that have a significant impact on society and require urgent reporting), the majority of the sample (76 percent) preferred short news articles covering Coronavirus-related news, while only eight percent showed interest in reading detailed reports. Only nine percent of the sample reported that they favored interviews, and six percent of the sample reported they prefer opinion columns.

Preferred News Media Information Presentation:

65 percent of the surveyed sample preferred consuming information in text format (within the text preference, 50 percent favored short text, and 15 percent favored long articles). 35 percent of the sample preferred consuming information through visuals (within the visuals preference, 15 percent favor videos, 12 percent favor infographics, and eight percent favor images).

Coronavirus News Sources:

When asked to select the news source that the publics followed, or referred to for information and updates on Coronavirus, 45 percent of the sample chose officials, 20 percent of the sample chose Coronavirus patients, 17 percent chose scientists, and 10 percent chose experts as their preferred source of news. Six percent of the respondents followed celebrities as their source of information, and two percent followed social media influencers as their source of information.

Coronavirus News Focus:

The publics' focus on geographic location of news stories, and topics covered in the news, were also explored in the survey. In terms of geographic location, 73 percent of the respondents selected Egypt as their Coronavirus news focus, 20 percent follow news covering both national and international updates, and seven percent follow an international source only for Coronavirus updates. With regards to the focal topic, 30 percent of the respondents seek news covering the general status of the Coronavirus, 28 percent followed news reporting for the statistics on Coronavirus confirmed and recorded cases, 18 percent followed the latest updates on Coronavirus treatment research, 15 percent followed news which provided preventative measures, seven percent followed news explaining the nature of the Coronavirus, and two percent were interested in the global impact of the Coronavirus spread.

The Publics' Comprehension of Coronavirus-Related News:

94 percent of the respondents confirmed that they found the scientific information provided in the news to be simplified, and six percent found that news coverage of the Coronavirus included complicated scientific terminology. Such findings were confirmed by the yielded 61 percent of respondents who agreed to have acquired knowledge about the nature of the Coronavirus from the news, with only 5 percent rebuffing the news as their source of information. 80 percent of the responses stated that Coronavirus news was easy to understand (60 percent of which, regarded the scientific nature of the news as "very easy to understand" and 20% of which, regarded it as "easy to understand", 19% regarded news comprehension difficulty as "neutral", and only one percent referred to the Coronavirus news as "difficult to understand").

The Publics' Motivation for Seeking Coronavirus News:

The same approach employed when assessing the publics' reasoning for preferred media platforms was applied to obtain the mean score for the responses given to each statement and accordingly, arrange the nine statements provided in the survey in an ascending order. The results (shown in Table (3)) places "fear" as the number one motive for following Coronavirus news, followed by the publics' desire to learn about the symptoms of Coronavirus infection, followed by its consequent preventative measures. "Spreading awareness" about the Coronavirus was the fourth most common motive for following Coronavirus news, and "curiosity" was the fifth most common motive. The fact that it is a global issue that is currently being publicly debated is the sixth most common motive, followed by the motive of "gaining general knowledge". The "science literacy" factor fell late in the order of motives, coming second to last, followed by the respondents' general interest in health and science news as the least-chosen motive for following Coronavirus news.

Table (3)
Publics motivation for seeking coronavirus ews

	Publics' Motivation for Seeking Coronavirus News:	Mean
1	I follow Coronavirus news out of fear of being infected	0.94
2	I follow Coronavirus news to learn about the symptoms	0.92
3	I follow Coronavirus news to aid in the prevention of the disease	0.90
4	I follow Coronavirus news to spread awareness	0.84
5	I follow Coronavirus news out of curiosity	0.81
6	I follow Coronavirus news because it's a Global Issue	0.78
7	I follow Coronavirus news to gain General Knowledge	0.65
8	I follow Coronavirus news to learn about the nature of the disease	0.58
9	I follow Coronavirus news out of fear of being infected	0.49

Publics' Interaction with Coronavirus News:

50 percent of the respondents chose "reading only" as their means of interacting with Coronavirus news, while 20 percent engaged with the news through sharing (10 percent shared among family and friends and 10 percent shared the news publicly). Three percent of respondents interacted with the content either by commenting, or posting suggestions reflecting their opinions, experiences, and suggested solutions. From a non-virtual perspective, 82 percent of the respondents feel that they are responsible for educating others about Coronavirus health threats, and 74 percent believe they have an active role to play in order to prevent the further spread of the virus.

The Publics' Utilization of Coronavirus News:

The vast majority of the respondents (94 percent) asserted applying the news announced on Coronavirus preventative measures in their daily lives, while only 28 percent took matters further by checking with a physician regarding their health status after receiving Coronavirus news.

Discussion

Each science journalism model was tested equally (three times) across the circulated survey to allow for the comparable application of the models on the publics' interaction with disseminated news on the Coronavirus. The aforementioned results can be categorized or grouped according to; (1) the tested variables, (2) the original four models concluded by Secko et. al. in (2013); and (3) in comparison to this study's findings, to yield the answers for the research questions proposed as follows:

RQ1: *Do the publics find Coronavirus news easy to understand?*

Science Literacy Model application: Since 43 percent of the respondents held a postgraduate degree, 55 percent fell in the highest income category, and 68 percent are over the age of 26; this profile explains why the publics' search for information regarding the nature of the Coronavirus came in last on the list of priorities as to why they follow the news (only 7 percent of the respondents followed Coronavirus news for this particular purpose), and in the lowest ranks (8th place on the motivation scale). The same remark can be pointed out with the results yielding the Coronavirus-related information as "easy to understand" by 80 percent, where 94 percent of the publics decided that the scientific terms used in the news was simplified. Another aspect that needs to be put in consideration is the timing of the survey distribution; it was circulated almost three weeks after the global announcement of the Coronavirus outbreak, posing the possibility that respondents might have already gained the fundamental information needed about the origins and nature of the virus by the time they were filling in their responses. Their collected responses indicate that two factors contribute to the 94 percent of the respondents finding Coronavirus-related news easy to understand; the first is the high education level, and the second is the timing of the survey dissemination, where most of the respondents have already acquired the basic scientific information about what Coronavirus is.

RQ2: *Does the publics choose to follow news that is contextually relevant to them?*

Contextual Model application: The *relevance* variable used to test for the Contextual Science Journalism Model was very evident in the findings, where 73 percent of respondents stated that they follow Coronavirus news that focuses on Egypt, compared to seven percent who follow international Coronavirus news. Also, 88 percent of the respondents preferred to follow coronavirus news that relatively impacted their daily lives. The same finding was confirmed by the respondents' choice (2nd place in the justification for media platform choice scale) for following news that is relevant to their lives. Perhaps the most prevalent finding can be concluded from the motivation for seeking Coronavirus news scale where the top 3 motivators are the publics' fear of being infected; to learn about the symptoms; and to learn about preventative measures. All three findings reaffirm

that the publics' prioritization of news is directly related to the Contextual Model's main focus, where their personal wellbeing, and area/country of residency, Egypt, were deemed of high interest by the respondents.

RQ3: *What are the sources publics prefer to be cited in the news?*

Lay Expertise Model application: The variable used to asses this model's application to the public's interaction with the Coronavirus news is prevalent through the public's preference of *sources* cited in the news. The fact that Coronavirus is a health-related concern assumes that scientists and health experts would be the primary source of news for the public. However, the results indicate otherwise: 45 percent of the responses favored government officials as their source of news. Again, this can be attributed to the timing of the survey's circulation (three weeks post-outbreak), so the publics might have initially pursued news citing scientists, but reverted to news from officials once the matter became a public-policy matter, requiring intervention from government officials. This would explain the shift from a Science-Literacy Model, to a Lay Expertise Model. However, the fact that 20 percent of the respondents choose to read news citing current or recovered patients of the disease, provides a stronger case for the Lay Expertise Model, that the publics seek to acquire news from diverse sources of information. However, the wide spectrum of 66 percent of the publics acquiring Coronavirus-related news from social media does not allow for specifying "news" whether it being professional news offered by news organizations or user-generated content in the form of shared information posted by other users. Along the same lines, no confirmed correlation can be drawn up from whether the utilization of Coronavirus news, in terms of gaining the knowledge of and applying preventative measures, are a result of the small percentage (ten percent) of the publics who seek experts-cited news, or from the 15 percent who seek information about preventative measures through social media.

RQ4: *Do the publics engage with Coronavirus news?*

Public Participation Model application: This is the most evident model in terms of variable abundance in the survey and this can be attributed to multiple findings. Firstly, 66 percent of respondents chose social media as their source of news and information about Coronavirus and the fact that the publics can share the acquired news came in first as a justification for the 66 percent selecting such a platform. This mirrors the interest of the publics in being "active" when engaging with the news. Secondly, 26 percent of the responses confirmed the publics' interaction with Coronavirus news whether through sharing, commenting or providing suggestions. Thirdly, the fact that 82 percent and 74 percent, respectively, of the sample surveyed, believe that they have an active role in educating and preventing the further spread of the disease, signifies the "active publics" dimension of this model which relies heavily on engaging the publics in the communication process and giving room for information dissemination to follow the two-way communication model.

Conclusion

There is a 66 percent evident interest in health and science-related news as established by the survey responses, but this cannot be used in correlation with Coronavirus specific news, since the majority of respondents (64 percent) did not regard Coronavirus news under the 'science journalism' category, but instead as "current affairs", which indicated that the publics perceive specific matters—whether due to scale, or timeliness—as events of political or social interest. This finding is not indicative of science journalism's wealth, health, and status in Egyptian media, since no content analysis for the type of news disseminated has been conducted as of this writing. The fact that Coronavirus news is on every media platform, in its professional and citizen journalism/User-Generated Content form, sparks the interest to further analyze the findings of this survey to establish which science journalism model is most utilized by the publics.

Therefore, to draw a final conclusion and answer **RQ5** on distinguishing which of the four models of science journalism the publics interacts with the most, variables abundance had to be tested. The number of positive responses for each of the assigned model-specific variable is added and divided by the total number of responses gathered for each question.

The results, as shown in Figure (1), indicate that the Contextual Science Journalism

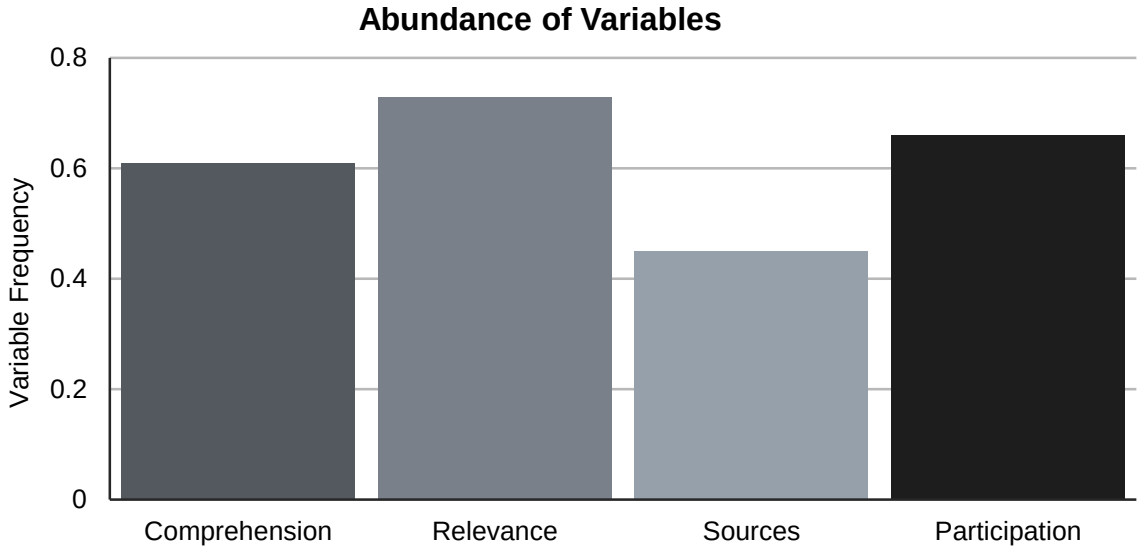

Figure (1)
Abundance of variables as per publics responses

Model's variable ("relevance") delivered the highest frequency, followed by the Publics Participation Model's variable (administered in the survey as "interactions"), followed by the Science-Literacy Model's variable (referred to in the survey as "understanding of information and scientific terminology"), and the Lay-Expertise Model variable (tested via sources cited in news) came last.

As a result, **H1** suggesting that the publics tend to interact the most with Coronavirus news that allow them to participate in its dissemination and application is rejected. Many reasons can be attributed to such a conclusion, including the ongoing status of Coronavirus' spread and the heightened fear of infection. Therefore, it is expected for the publics to seek news which concerns them whether as per area of residency or effect. Moreover, the reliance of the vast majority on social media for coronavirus news and the features offered by such platforms, give room for the publics' interactions with news and expressing their stances and ideas through shares, posting, commenting, and suggesting. Therefore, the publics are no longer passive or mere recipients of information, annulling the assumptions made by the Science-Literacy and Contextual Models. The third place acquired by the Science Literacy Model can be linked to the demographics of the sample surveyed, in terms of their educational and socioeconomic status, and the fact that they no longer seek news identifying the nature of Coronavirus and are more concerned with the health and financial implications of the virus. The final place attained by the Lay Expertise Model can be, again, due to the ongoing status of coronavirus panic and the time of conducting this research. The global impact, in terms of political, economic, and social dimensions, is not the focal point of most news which remains, to this moment, concerned with micro-level effects. Additionally, the fact that reporting the numbers of infected people is very different to covering their stories and documenting their recovery journey, limits the Lay Expertise Model to all sources except for Coronavirus patients' accounts.

The Coronavirus case presents itself as a newly acquainted health-related crisis that is heavily reflected in the news sphere. This study aimed to analyze the interactions of the Egyptian publics with Coronavirus news, three weeks post the initial Coronavirus outbreak. The case of Egypt, therefore, definitely uses further investigations as the Coronavirus status proliferates and can be applied to global publics as well. While health-related crises are not novel to the human race, it is the communication means in an advanced Digital Age that has imposed different dynamics to human interactions during this time. Considering the fact that COVID-19 is only four months old in its pandemic status, it is only inevitable that social-responsibility motivational messages forefront the news. As the world is currently getting ready for a fight against a virus that is no longer unknown, through preventative measures and multiple international clinical trials to hopefully present an antidote, it is rather the social and economic impact of such a viral disease that many countries are trying to manage and contain. Accordingly, there is no room for vertical communication as suggested by the Science Literacy Model, because since this particular case of the Coronavirus is affecting everyone, if not health-wise, then it will be on the economic or social level. The concern is now to cater for the needs of those who are, or will be, trying to survive during the unknown time frame of this pandemic. As suggested by the Contextual Model and the Public Participation Model, relevance and interaction are key components of any news production today. It is mandatory for stakeholders to participate in the discussions about an occurrence of such magnitude making the

best use of the interactive media platforms, connecting the publics with scientists, organizations, policy makers and governments.

Limitations

This study is constrained by the fact that it tackles in its core the Coronavirus disease that is currently affecting and impacting the world. The freshness of the topic is, without a doubt, a double-edged sword, when it comes to assessment and analysis. It results in slight ambiguities when responding to the survey. It results in slight ambiguities when responding to the survey as respondents may have answered on their immediate knowledge and understanding of the Coronavirus which they had already gained knowledge about 3 weeks ago. Therefore, this study assesses the immediate responses and ideally such a study would provide better results if it were to be conducted as longitudinal assessments of the publics' interaction with Coronavirus news along the course of its spread and post its control. Furthermore, due to the primary screening question limiting the respondents to those who are aware of the Coronavirus spread, the Science Literacy Model application is narrowed down to two variables; the use of simplified scientific terminology and the publics' comprehension, disregarding the educative purpose of this model, especially when 55 percent of the respondents hold post-graduate studies degrees. This fact also presents another limitation to the representativeness of the sample compared to Egyptian publics as a whole indicating that further analysis should be conducted through including a wider demographic scope. However, this study did not aim to access publics' reception of the news, but rather asses the four different science journalism models and their application/utilization by those who are already aware of a health/science issue. Moreover, although survey methodology was employed as a quantitative tool to gather as many responses as possible, the number of yielded results is considered low and insufficient compared to the 40.9 million Egyptians who have access to the internet (Ministry of Communications and Information Technology 2019), which is the platform the survey was distributed across. It would have also served the study more if a content analysis of the Coronavirus news was administered and its concluded results were compared to the publics' interactions in order to determine the science journalism model applied in the coverage.

Recommendations

Once the spread of the Coronavirus is controlled and the infection number curve is flattened, this study should be repeated in a retrospective manner where news coverage is to be analyzed and compared to the publics' interactions accordingly. The intention is to develop an updated science communication model for journalism to employ during similar situations where, due to the continuous advancement of ICT, the publics would be regarded as active audiences instead of passive recipients.

References

Ahteensuu, M. (2012). Assumptions of the deficit model type of thinking: Ignorance, attitudes, and science communication in the debate on genetic engineering in agriculture. *Journal of Agricultural and Environmental Ethics, 25*(3), 295-313. doi:10.1007/s10806-011-9311-9

Amend, E., Capurro, G., & Secko, D. M. (2014). Grasping scientific news: The use of science journalism models to clarify the impacts of alternative forms of production. *Journalism Practice, 8*(6), 789-808. doi:10.1080/17512786.2013.868146

Asamoah, C. K., Asamoah, B. O., & Agardh, A. (2017). A generation at risk: A cross-sectional study on HIV/AIDS knowledge, exposure to mass media, and stigmatizing behaviors among young women aged 15-24 years in ghana. *Global Health Action, 10*(1), 1331538. doi:10.1080/16549716.2017.1331538

Ashwell, D. J. (2016). The challenges of science journalism: The perspectives of scientists, science communication advisors and journalists from new zealand. *Public Understanding of Science, 25*(3), 379-393. doi:10.1177/0963662514556144

Barel-Ben David, Y., Garty, E. S., & Baram-Tsabari, A. (2020). Can scientists fill the science journalism void? online public engagement with science stories authored by scientists. *PloS One, 15*(1), e0222250.

Brossard, D., & Lewenstein, B. V. (2010). A critical appraisal of models of public understanding of science: Using practice to inform theory. In *Communicating science* (pp. 25-53). Routledge.

Bucchi, M., & Trench, B. (2016). Science communication and science in society: A conceptual review in ten keywords. *Tecnoscienza (Italian Journal of Science & Technology Studies)*, *7*(2), 151-168.

Curnock, E., Bowie, P., Pope, L., & McKay, J. (2012). Barriers and attitudes influencing non-engagement in a peer feedback model to inform evidence for GP appraisal. *BMC Medical Education, 12*(1), 15-15. doi:10.1186/1472-6920-12-15

Davies, S. R. (2008). Constructing communication: Talking to scientists about talking to the public. *Science Communication, 29*(4), 413-434. doi:10.1177/1075547008316222

Füchslin, T., Schäfer, M. S., & Metag, J. (2019). Who wants to be a citizen scientist? identifying the potential of citizen science and target segments in switzerland. *Public Understanding of Science, 28*(6), 652-668. doi:10.1177/0963662519852020

Gebbers, T., De Wit, J. B., & Appel, M. (2017). Health Communication| Transportation Into Narrative Worlds and the Motivation to Change Health-Related Behavior. *International Journal of Communication*, *11*, 21.

Gerhards, J., & Schäfer, M. S. (2009). Two normative models of science in the public sphere: Human genome sequencing in german and US mass media. *Public Understanding of Science, 18*(4), 437-451. doi:10.1177/0963662507082891

Grand, A., Davies, G., Holliman, R., & Adams, A. (2015). Mapping public engagement with research in a UK university. *PloS One, 10*(4), e0121874. doi:10.1371/journal.pone.0121874

Hansen, A. (2016). The changing uses of accuracy in science communication. *Public Understanding of Science, 25*(7), 760-774. doi:10.1177/0963662516636303

Hickok,K. (2020, March 13). What is a pandemic? Retrieved March 16, 2020, from https://www.livescience.com/pandemic.html

Hofman, I., & Maria Curie–Skłodowska University in Lublin (Poland). (2016). The new journalism: An attempt at the model reconstruction. *Polish Political Science Yearbook, 45*(1), 391-398. doi:10.15804/ppsy2016029

Jones, T. L., Baxter, M. A., & Khanduja, V. (2013). A quick guide to survey research. *Annals of the Royal College of Surgeons of England*, *95*(1), 5–7. https://doi.org/10.1308/003588413X13511609956372

Knaapen, L., & Lehoux, P. (2016). Three conceptual models of patient and public involvement in standard-setting: From abstract principles to complex practice. *Science as Culture, 25*(2), 239-263. doi:10.1080/09505431.2015.1125875

Knobloch-Westerwick, S., Johnson, B. K., Silver, N. A., & Westerwick, A. (2015). Science exemplars in the eye of the beholder: How exposure to online science information affects attitudes. *Science Communication, 37*(5), 575-601. doi:10.1177/1075547015596367

Levy, P. S., & Lemeshow, S. (2013). *Sampling of populations: methods and applications*. John Wiley & Sons.

Miller, S. (2001) Public Understanding of Science at the Crossroads, in "*Public Understanding of Science*", 10 (1), pp. 115-120.

Ministry of Communications and Information Technology. (2019). *ICT Indicators Bulletin* . Retrieved from: http://www.mcit.gov.eg/Upcont/Documents/Publications_1822020000_EN_Quarterly_Bulletin_September_2019_2020.pdf

Morton, L. P., & Warren, J. (1992). News elements and editors' choices. *Public Relations Review*, *18*(1), 47-52.

Mulvale, G., McRae, S. A., & Milicic, S. (2017). Teasing apart "the tangled web" of influence of policy dialogues: Lessons from a case study of dialogues about healthcare reform options for canada. *Implementation Science : IS, 12*(1), 96-16. doi:10.1186/s13012-017-0627-3

Nisbet, M. C. (2009). The ethics of framing science. (1st ed., pp. 51-74) Taylor & Francis. doi:10.4324/9781315572888-4

Pauly, B. M., Varcoe, C., & Storch, J. (2012). Framing the issues: Moral distress in health care. *HEC Forum, 24*(1), 1-11. doi:10.1007/s10730-012-9176-y

Renedo, A., Komporozos-Athanasiou, A., & Marston, C. (2018). Experience as evidence: The dialogic construction of health professional knowledge through patient involvement. *Sociology, 52*(4), 778-795. doi:10.1177/0038038516682457

Secko, D. M., Amend, E., & Friday, T. (2013). Four models of science journalism: A synthesis and practical assessment. *Journalism Practice*, *7*(1), 62-80.

Shepherd, H. L., Barratt, A., Jones, A., Bateson, D., Carey, K., Trevena, L. J., ... & Entwistle, V. (2016). Can consumers learn to ask three questions to improve shared decision making? A feasibility study of the ASK (AskShareKnow) Patient–Clinician Communication Model® intervention in a primary health-care setting. *Health Expectations*, *19*(5), 1160-1168.

Simon, U. K., Steindl, H., Larcher, N., Kulac, H., & Hotter, A. (2016). Young science journalism: Writing popular scientific articles may contribute to an increase of high-school students' interest in the natural sciences. *International Journal of Science Education, 38*(5), 814-841. doi:10.1080/09500693.2016.1173260

Su, L. Y., Akin, H., Brossard, D., Scheufele, D. A., & Xenos, M. A. (2015). Science news consumption patterns and their implications for public understanding of science. *Journalism & Mass Communication Quarterly*, 92(3), 597-616. doi:10.1177/1077699015586415

Swart, J., Peters, C., & Broersma, M. (2017). Repositioning news and public connection in everyday life: A user-oriented perspective on inclusiveness, engagement, relevance, and constructiveness. *Media, Culture & Society, 39*(6), 902-918. doi:10.1177/0163443716679034

Tlili, A., & Dawson, E. (2010). Mediating science and society in the EU and UK: From information-transmission to deliberative democracy? *Minerva, 48*(4), 429-461. doi:10.1007/s11024-010-9160-0

Werder, O. (2019). Toward a humanistic model in health communication. *Global health promotion*, *26*(1), 33-40.

WHO. (n.d.). World Health Organization. Retrieved February 12, 2020, from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019

Worldometer. (2020, February 24). Covid-19, Coronavirus Pandemic. Retrieved February 26, 2020, from: http://worldometers.info/coronavirus/