



## Exposure to Multiple Communication Channels and Preventive Behaviors during COVID-19 in Pakistan: An Application of Extended Parallel Process Model

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### Abstract

COVID-19 has been declared as a pandemic in March 2020. Pakistan became the 20th most-affected country as of June, the same year. This study attempts to explore the relationship between exposure to different communication channels and preventive behaviors during COVID-19. The study finds its conceptual roots in the Extended Parallel Process Model (EPPM) which described the two components (i.e. threat, efficacy) through which communication could influence the adoption of preventive behaviors during a health crisis. A Survey of 620 students was collected in the month of May and June from different Pakistani universities. The study extended the EPPM model to be used on measuring the behavioral effect of the exposure to multiple communication channels along with suggesting the health professional and government officials take into account the four components of threat and efficacy during COVID-19 to effectively implement the strategies about preventive behaviors. Findings show a positive association between exposure to different communication channels and preventive behaviors. Moreover, the components of the theoretical underpinning positively mediated the relationship.

**Keyword:** *COVID-19, Communication, EPPM, Preventive Behaviors, Mediation Analysis*

### Introduction

COVID-19 is the largest pandemic event in the age of information. It is triggered by the “severe acute respiratory syndrome coronavirus 2” (Ren, Gao & Chen. 2020). It is thought to have started spreading from China and reached 213 countries including Pakistan as of July 07, 2020 (worldometer, 2020). Out of

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over 11 million COVID-19 positive cases all around the world (as of the same date), 245k cases were reported in Pakistan (WHO, 2020a; 2020b). This virus does not account for any perfect cure or vaccine yet. Being quarantined is a cure and taking preventive measures has become a vaccine. Information is a significant contributor to letting people know how to adopt preventive behaviors during a pandemic (La Torre et al. 2009).

Nowadays, there are many communication channels available where people can get and share information. A public health crisis (like COVID-19) promotes an information-rich environment. It is due to the uncertainty during a crisis that demands information (Reynolds & Seeger, 2005). Through news media, social media, and interpersonal communication channels, individuals encounter related information repetitively in a crisis (Avery, 2010). Communicating information through multiple channels repeatedly is also crucial to inform people about the severity of the problem, and to keep them calm (Covello, Von Winterfeldt, & Slovic, 1987).

Despite the increase in exposure to multiple communication channels (hereafter EMCC) during a crisis, the effects of that exposure on behaviors have yet to be fully explored. To address the following gap by considering “The Extended Parallel Process Model” (hereafter EPPM) as a conceptual foundation, the present study intends to investigate, the effect of exposure through multiple communication channels on behavioral outcomes and the underlying mechanisms of the effects.

## **Literature Review**

People use to expose themselves repetitively to different communication channels in an intended (hereafter seeking) or unintended (hereafter scanning) way during a health crisis (Jang & Park, 2018). What impression does the exposure to multiple communication channels leave on masses? Do the people who expose repeatedly to different communication channels likely to adopt more preventive behaviors than those who expose to just one channel? Integrated marketing communication offers a perspective that explains that repetitive exposure to multiple communication channels about the same messages produces complementarily outcomes as a synergy construct (Madhavaram, Badrinarayanan, & McDonald, 2005). The dissemination of information from different entities (government officials, journalists, doctors, lay individuals) makes crisis communication different from marketing communications (Liu et al. 2008). The latter is more controlled because of the endorsements (Jang & Park, 2018). That makes a need for other relevant theoretical foundations to understand the phenomenon.

As described earlier, people search actively for health-related communication in a health-related crisis as well as are exposed to health-related information incidentally during routine use of different communication channels like mass media, internet, interpersonal communication, etc. (Kelly et al. 2010). Both exposures cultivate engagement in behaviors related to health. Shim et al. (2006) explored that both types of exposure related to cancer-related information were associated with fruit consumption, exercising, and doing screening tests. Other researchers also endorsed the same facts (Hornik et al., 2013).

Knowing a health crisis is a precondition for a behavioral effect (Bandura, 2004). Those people who have more knowledge tend to bring change in their behavior more than those who know less because knowing would enable them to measure the expected outcomes of a certain behavior (Bandura, 2004). Referring to our previous cancer-related information example, those who know the healthy routine and routine screening decrease the likelihood of cancer is more expected to engage themselves in those healthy routines. Hence one of the possible underlying processes of effecting behavioral change through seeking and scanning exposure is knowledge (Jang & Park, 2018). It is also evidenced that seeking and scanning multiple media exposure to health-related crises increases knowledge (Jang & Park, 2018).

Furthermore, EPPM offers another perspective to understand the mechanisms of the effect of multiple communication channels' exposure on behavioral change (Jang & Park, 2018). This model has been effective in understanding adaptive behaviors in wake of a crisis (Barnett et al. 2009) The EPPM has two components that explain processes of behavioral effect which include threat and efficacy (Witte, 1992, 1994).

Witte (1994) argued that threat is the feeling of risk or harm in the environment which has further two subcomponents which are severity and susceptibility. Severity is the degree of believability about the seriousness of the threat (Witte, 1994). In our case, COVID-19 is spread all over the country and the world which refers to the seriousness of the threat. Susceptibility is the degree of belief that one is likely to get affected. If someone thinks

of himself or herself at the risk of getting affected by the virus, he or she is likely to have a susceptibility to the virus.

Efficacy, the second component of EPPM, is the perceived feasibility and effectiveness of the behaviors recommended to mitigate (prevent or avoid) the consequences of the crises (Witte, 1992, 1994). It also has two subcomponents. First, Response efficacy is the belief that the recommended action is useful in curtailing the threat. For example, they believe in washing hands as an effective technique in preventing COVID-19. Whereas the second component of efficacy is named self-efficacy which is the degree to the belief that one can perform a recommended (preventive) behavior (Witte, 1994). For example, in the process of preventing COVID-19, self-efficacy refers to the degree of belief if one could perform those actions to prevent from getting affected by the virus. In the present case, the degree to which a person believes that he or she can perform actions (like washing hands, wearing masks, etc.) to seek prevention from COVID-19.

The EPPM has been used to evaluate health awareness campaigns (Jang & Park, 2018). By applying the following model, many researchers have documented those messages were designed to clarify the threat of the messages and such kinds of words that heightened efficacy. Witte (1994) found those messages and words effectively facilitate the intention to perform preventive behaviors regarding AIDS. As a result, those words and messages also developed a positive attitude towards the safety of workplace (Basil et al. 2013); enhanced the intention to receive a vaccine of a disease (Carcioppolo et al., 2013); increased the intention to use on-the-job hearing safety from farmers (Smith

et al., 2008). EPPM was used to measure the effectiveness of an anti-smoking communication campaign (LaVoie & Quick, 2013); and a childhood obesity prevention campaign (Batchelder & Matusitz, 2014). It may also be used to measure the impact of television news on health-related problems (see Hong, 2011). One of the previous studies has used the following model to explore the relationship of repetitive exposure to information and communication channels and the adoption of prevention during the H1N1 pandemic (Jang & Park, 2020). Since it has been applied to evaluate different health-related communication campaigns, it is a good proxy to find out the effects of the seeking and scanning communication messages during COVID-19 on the adoption of preventive behaviors of the people.

Based on the above discussion, exposure to multiple communication channels (EMCC) can have a profound effect on the adoption of preventive behaviors. Knowledge about the disease along with the identified components of the EPPM model can interplay between the relationship of EMCC and preventive behavior. In this regard, the following hypotheses are proposed.

H1. Exposure to multiple communication channels is positively associated with a) knowledge b) perceived severity c) susceptibility d) response-efficacy and e) self-efficacy and f) preventive behaviors during the COVID-19 outbreak.

H2. a) Knowledge b) perceived severity c) susceptibility d) response-efficacy and e) self-efficacy is positively associated with preventive behaviors during COVID-19.

H3. The relationship between exposure to multiple communication channels and preventive behavior during

COVID-19 is mediated by a) knowledge b) perceived severity c) susceptibility d) response-efficacy and e) self-efficacy.

**Method**

The data of this study was collected through an online survey from 20th May to 15th June of 2020. The purposive sampling technique was used to select a sample of 620 university students who were selected from different private and public universities of Lahore. Only those students were selected who regularly watch TV news and use social networking sites frequently. Those participants were not included in the study who did not use traditional or new media regularly during the COVID-19 pandemic. A question was inserted in the survey screening and a link was sent to students of different universities. Initially, the link was sent to 700 students in different online classes conducted through Zoom, Microsoft Team, and WhatsApp. Of all the 700 students, only 620 students completed the questionnaire and submitted it properly. No compensation was provided in monetary terms. The mean age of the participants was  $M=22.4$ ,  $SD=1.72$ . Moreover, most of the participants were females 54.7% while males were only 45.3%. The monthly family income of the family of respondents was between 40,000 to 80,000. Most of the respondents were undergraduate students of mass communication departments (80.4%) while the remaining respondents have a graduate degree (19.6%). All the respondents were briefed about the objective of the study and consent was taken before collecting the data.

### Exposure to Multiple Communication Channels

Previous studies have used the frequency of exposure (Kelly et al., 2010; Nelissen et al. 2015) and scope of information channel (Kim, Lim, & Park, 2015) to measure the health information-seeking behavior in respondents. We adapted this scale from a previous study (Jang & Park, 2018). The respondents were asked to indicate which among the following communication channels they encountered the information often related to COVID-19: (a) friends and family, (b) television news, (c) print and online newspapers, (d) Twitter, (e) Facebook, (f) TikTok, (i) Instagram and (j) WhatsApp. Responses were taken on 7-point scale (1= "never", 2= "1-4 times", 3= "5-8 times", 4= "9-12 times", 5= "13-16 times", 6= "17-20 times", 7= "more than 21 times"). The adapted scale is named as 'exposure to multiple communication channels (EMCC)'. The overall mean of this scale was 4.52 (SD= 1.65).

### Knowledge about COVID-19:

This scale deals with information about causes, transmission, treatment, and consequences of COVID-19 on individual health. Such a variable needs to cover all the content related to a specific disease (Ownby et al., 2014; Waller et al. 2013). The questionnaire about knowledge of COVID-19 was developed by the authors with the help of the government of Pakistan guidelines on the pandemic. Moreover, some of the items were adapted from the study of Huynh et al. (2020) and Zhong et al. (2020). The knowledge scale consists of 12 items and responses were taken in true or false form. A true answer assigned 1 point and the wrong answer assigned 0 points. Kuder-Richardson coefficient of



reliability (KR-20) was used to measure the reliability of the knowledge scale (KR-20 = .71).

#### Severity

Perceived severity was measured with the adapted scale from a previous study (Witte, 1994) study. Questions related to the perceived severity of COVID-19 were asked from respondents. It was measured on a Likert scale (5-point) which contained four items. The scale has a reliability of  $\alpha=0.86$ .

#### Susceptibility

Perceived susceptibility was also assessed with the adapted scale of Witte's (1994) study. Questions related to risk and possibility of getting COVID-19 virus were asked from respondents. It was measured on a Likert scale (5-point) and contains three items. The scale has a reliability of  $\alpha=0.81$ .

#### Response Efficacy

Response efficacy was assessed with the adapted scale of Witte's (1994) study. Questions related to the face mask and hand wash were asked to respondents. It was measured on a Likert scale (5-point) and contains three items. The scale has a reliability of  $\alpha=0.76$ .

#### Self-Efficacy

Self-efficacy was measured with the adapted scale of Jang and Park's (2018) study. It was measured on a 5-point Likert scale and contains two items. The scale has a reliability of  $\alpha=0.72$ .

#### Preventive Behaviour

Preventive behavior was measured with an adapted scale of Taghrir, Borazjani, and Shiraly's (2020) study. Nine items were

asked in account to the following scale. It was measured on a Likert scale (5-point) and the scale has a reliability of  $\alpha=0.87$ .

#### Control Variable

Age, gender, education, and family income were included as a control variable because these variables can affect the relationship between independent and dependent variables. Moreover, respondents were asked about their subjective health (1 = “very poor” to 5 = “very good”) and the status of their area (either their area is affected by COVID-19 or not).

The study used the PROCESS macro to test the direct and indirect effect hypotheses. A bootstrap of 5000 was used to test the mediation analysis. In the first step, frequent exposure of multiple channels was entered as the independent variable and preventive behavior was entered as the dependent variable. EPPM variables which include perceived severity, self-efficacy, knowledge, response efficacy, and susceptibility were entered as mediating variables. Age, gender, family income, education, health status, and status of the area were entered as a control variable.

#### **Results**

The study used model 4 of PROCESS macro to test all the hypotheses. Table 1 shows the results of direct and indirect effects. In terms of the direct effect of independent variables on dependent variables, exposure to multiple communication channels (EMCC) is positively associated with knowledge about COVID-19 ( $\beta=0.35$ ,  $p<.01$ ). These results support H1(a). These results explicate that higher exposure to multiple channels for information leads to higher knowledge about COVID-19. EMCC is also positively associated with perceived severity ( $\beta=0.25$ ,

$p < .001$ ). These results support H1(b). These results indicate that higher exposure to multiple channels for information leads to a higher level of perceived severity of COVID-19. EMCC is also positively associated with susceptibility ( $\beta = 0.30$ ,  $p < .001$ ). These results support H1(c). These results indicate that higher exposure to multiple channels for information leads to a higher level of susceptibility about COVID-19. EMCC is also positively associated with response-efficacy ( $\beta = 0.15$ ,  $p < .01$ ). These results support H1(d). These results indicate that higher exposure to multiple channels for information leads to a higher level of response-efficacy about COVID-19. EMCC is also positively associated with self-efficacy ( $\beta = 0.22$ ,  $p < .01$ ). These results support H1(e). These results indicate that higher exposure to multiple channels for information leads to a higher level of self-efficacy about COVID-19. EMCC is also positively associated with preventive behaviors ( $\beta = 0.11$ ,  $p < .001$ ). These results support H1(f). These results indicate that higher exposure to multiple channels for information leads to a higher level of preventive behaviors about COVID-19.

The direct effect of mediators on preventive behaviors show that knowledge ( $\beta = 0.41$ ,  $p < .01$ ), perceived severity ( $\beta = 0.19$ ,  $p < .01$ ), susceptibility ( $\beta = 0.23$ ,  $p < .01$ ), response-efficacy ( $\beta = 0.25$ ,  $p < .01$ ) and self-efficacy ( $\beta = 0.46$ ,  $p < .001$ ) are significantly and positively associated with preventive behavior about COVID-19. Thus, these results support H2(a), H2 (b), H2(c), H2(d), and H2(e).

The results of indirect effect show that knowledge ( $\beta = 0.11$ , 95% CI [.03, .06]), perceived severity ( $\beta = 0.05$ , 95% CI [.02, .05]), susceptibility ( $\beta = 0.08$ , 95% CI [.02, .06]), and self-efficacy

( $\beta=0.13$ , 95% CI [.03, .06]) are mediating between the relationship of EMICC and preventive behaviour. The results show that response efficacy was also a significant mediator ( $\beta=0.09$ , 95% CI [.03, .07]) between the relationship of exposure through EMCC and preventive behavior. Overall, independent variables have explained 48.2% variance in preventive behavior.

**Table 1:** *Direct and Indirect effect of COVID-19 Exposure to Multiple Communication Channels*

	Path coefficient	SE	BC bootstrap 95% Confidence Interval
<b>Control Variables</b>			
Gender (1 = female, 2=Male)	.20**	.06	
Age	.05**	.03	
Subjective health	.04	.02	
Education	.03	.01	
Household income	.02	.03	
COVID-19 affected area (1 = affected)	.26**	.08	
<b>Independent variable direct effect on mediators</b>			
Susceptibility	.30***	.04	
Severity	.25***	.04	
Response efficacy	.15**	.03	
Self-efficacy	.22**	.03	
Knowledge	.35**	.04	
<b>Mediators' direct effects on Dependent Variable</b>			
Susceptibility	.23**	0.03	
Severity	.19**	0.03	
Response efficacy	.25**	0.03	
Self-efficacy	.46***	0.04	
Knowledge	.41**	0.04	
<b>Independent Variables direct effect on Dependent Variables</b>			
<b>Indirect effect (Mediating effect)</b>			
Susceptibility	.08	.03	[.02, .06]
Severity	.05	.04	[.02, .05]
Response efficacy	.09	.01	[.03, .07]
Self-efficacy	.12	.03	[.09, .18]
Knowledge	.11	.03	[.03, .06]

**Discussion**

One of the major findings of the current study is that multiple media exposure is positively related to preventive behavior

during the COVID-19 pandemic. This relationship indicates that when an individual is exposed to multiple media channels, the individual considers it important to take necessary preventive action. The results of this study also show that multiple media exposure is positively associated with susceptibility, severity, response efficacy, self-efficacy, and knowledge. In addition to this, it was also expected that these variables would act as a mediator between the relationship of EMCC and preventive behavior. We found that all these variables play a mediating role in the relationship between EMCC and preventive behavior.

The data of this study were collected during May and June when corona cases were increasing daily. The positive relationship between independent and dependent variables might be due to a daily increase in the number of cases. According to the Government of Pakistan COVID-19 website statistics, Pakistan had 148,921 confirmed cases till 15th July 2020 and 2839 people were reported dead. Exposure to multiple communication channels during the following time might have created a sense of susceptibility and severity among the respondents. Moreover, EMCC has created a higher knowledge related to COVID-19 disease which ultimately leading them to preventive behavior. This finding is aligned with the previous studies which showed that those people who have a greater knowledge of disease are more likely to perform preventive behavior toward disease (Dinesh, Kulkarni, & Gangadhar, 2016; Sharoni & Wu, 2012; Beckerle & Lavin, 2013; Li et al., 2014). The present study also found that self-efficacy and response efficacy was positively associated with preventive behavior. Previous studies have also

shown identical results (Sarkar, Fisher, & Schillinger, 2006; Masoompour, Targari, & Ghazanfari, 2017). Moreover, severity and susceptibility have a positive association with preventive behavior, and it is also aligned with previous studies (Dehghani-Tafti et al., 2015; Larki, Tahmasebi, & Reisi, 2018).

Interestingly, the information provided through multiple communication channels is not identical because every channel is focusing on a specific part of the pandemic. Some channels are focusing on economic issues due to coronavirus while others are covering mental well-being. This diversified exposure has a complementary effect on individuals' severity, susceptibility, response-efficacy, self-efficacy, and knowledge. Consequently, EMCC can have a positive effect on society during an epidemic or public health crisis. The direct and indirect effects of the study imply that EMCC can activate the danger control mechanism in an individual during an epidemic which eventually could elicit preventive behaviors.

### **Practical Implications**

In terms of practical implications, this study has three fresh insights. First, this study extends the concept of EMCC in times of public health crisis. Though several studies have discussed the role of communication channels in changing behavior during a health crisis, the least attention has been paid to the effect of multiple communication channels on preventive behavior (Abroms & Maibach, 2008; Seeger et al., 2018; Thackeray et al. 2012). In the recent past, some studies have explored the use of social media during a public health crisis (Liu, Fraustino, & Jin, 2016). The findings of this study can help government health

officials to focus on the message disseminated through different channels to create awareness among the public about the epidemic. Second, multiple motivating factors like susceptibility, severity, self-efficacy, and response efficacy can be an important area for health officials. They can use these factors to engage the people in preventive during an epidemic.

### **Theoretical Implications**

This study has re-examined and extended the EPPM in the context of the COVID-19 epidemic. Previously, several studies have used the EPPM to study health and crisis communication and these studies were more concerned about message design (Basil et al., 2013; Carcioppolo et al., 2013). The focus of the studies was to examine how the presence or absence of different components of EPPM can play their role in predicting behavioral changes. Moreover, some of the studies have examined the behavioral outcomes in terms of intentions, behavior preparedness, or message acceptance (Hong, 2011; Kim & Hawkins, 2020; Lael-Monfared et al., 2019; Weber, Schulenberg, & Lair, 2018; Salita, Tiongco, & Kawano, 2020) but fewer studies have used the EPPM theory components in predicting the actual behavioral engagement during an epidemic (Jang & Park, 2018).

However, this study provides a stronger theoretical foundation to understand the observed social phenomenon and has studied the effect of EPPM subcomponents on actual preventive behaviors. Unlike previous researches which used the theory in the cancer context, this study has applied the theory in the public health crisis context (Birmingham et al., 2015; Evans, Beeken, Steptoe, & Wardle, 2012; Zonouzy, Niknami,



Ghofranipour, & Montazeri, 2019) It can be useful in devising a policy on preventive health care. The application of the theory in public health crises can help in a better understanding of scanning and seeking health information behavior during epidemics.

### **Limitations and Suggestions**

The study used cross-sectional data to infer the results. To analyze the rigorous effect of communication on health issues, we recommend using longitudinal data. The correlation of the variables was measured through the survey, but it is recommended to use experimental design to get valid causal evidence. As is also discussed earlier, the different communication channels may differ in messages regarding health issues. Future researchers may also consider the uniqueness of the messages of every medium to measure the effects on behaviors during health crises.

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