

# COVID-19 Related Behavioral Modification and Anxiety among Egyptian Adults: An Online Survey

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## Abstract

**Background:** COVID-19 prevention depends mainly on how people modify their behavior to comply with the appropriate precautionary measures recommended by health authorities all over the world as maintain social distance, maintain hygienic practice, wearing mask properly and follow the quarantine activities. Unfortunately, the compliance level varies widely between people within and across countries. **The Capability-Opportunity-Motivation-Behavior model (COM-B)** evidently provides a convenient theoretical framework for understanding the stimuli of any behaviors in depth. **The Aim of study:** to assess COVID-19 related behavior modification and anxiety among Egyptian adults. **Study Design:** A cross sectional exploratory survey research design was used. It was conducted between first of May till the end of June 2020. **Study Subjects:** 512 Egyptian residents with minimum age of 18 years old and had the accessibility to internet from reached Egyptian Governorates (16 governorates were reached Alexandria, Cairo, Giza, behyira, Monufia, Kafr el sheikh, Matrouh, Daqhlyia, Qalyubia, Gharbia, Fayoum, Ismailia, Asyut ,Red Sea, Minya, Damietta). **Tool:** An online questionnaire distributed through Google form portal including three sections was used to collect required data. **Results:** 69.3% of the respondents were females with mean age of 33.7±9.8, the majority of them were either university or post graduate holders. All the three COM-B components significantly predict appropriate precautionary measures among Egyptian adults with the capability having the greatest influence on their behavior followed by motivation and opportunity domains. Nearly half of the respondents had anxiety related to COVID-19. Significant relations were found between anxiety level, capabilities, motivation and opportunities with age and participant who has family member less than 18 year. **Conclusion:** the mean %of capability domains was the higher followed by motivational domain. The opportunity domain considered an important barrier for the respondents in complying preventive measures. Half of the respondents had moderate level of anxiety related to COVID 19 pandemic. **Recommendations:** Implementation of effective and tailored health education programs aimed at improving COVID-19 self-actualization and preventive and behavioral program to enhance Coping with anxiety in a healthy way available in the organizational system.

**Keywords:** COVID 19, The COM-B Model, anxiety, behavior modification, Egypt

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## Introduction

Since the began of COVID-19 global pandemic at the end of 2019 at Wuhan, and the number of cases unfortunately had increase drastically in a way make the scientists and clinician's researchers rushed to understand and mitigate the threat, sharing their view with others and try to put various solution or prediction of the best ways to prevent cross infection. **Mishra et al. (2020), Nath, and Gupta (2020)**

Globally, by the 1<sup>st</sup> of August 2020, there have been 20,439,814 confirmed case of COVID-19, including 744,385 deaths, reported by the dashboard statistics of World Health Organization (WHO). Among the African countries, the first confirmed case of COVID-19 was reported in Egypt on February 14, 2020, as by the beginning of April of 2020, there were over 800 confirmed cases, with more than 50 fatalities, and a rapid tendency towards increase. Further, the government of Egypt documented on the first of October 2020 the total number of confirmed COVID 19 cases since the beginning of the outbreak as it was 103,317 including 5,946 deaths **(WHO, Egypt, 2020)**.

While the symptoms of COVID- 19 could be the same as the conditions caused by other coronaviruses SARS m MERS (e.g., coughing, fever, and fatigue; many infected individuals can appear asymptomatic and thus can unknowingly transmit the virus to others in their surrounding Till the moment, there is no proved treatment or vaccination against COVID 19, strict preventive and control measures are the

most reliable and valid methods for controlling the spread of the disease and the primary intervention to minimize the spread of the virus in the community. **Al-Sadeq, and Nasrallah (2020), Azlan et al. (2020)**.

COVID 19 Pandemics adversely impact the whole health, wealth and economy of all affected countries especially the poor one. Similar to other coronaviruses (e.g., MERS-COV),the negative impact of virus pandemic and its consequences are vast, including negative outcomes in mental health, with increased depressive and anxiety symptoms, stress disorders, insomnia, anger, and fear all of these effect increase because of its anonymity in relation to all aspect of the disease itself as confirmed sign and symptoms, mode of transmission, treatment and prevention etc. **Shaukat et al., (2020.)** Evidence from previous publications have argued that habits and behavioral trends have impacts on control measures as regard to MERS, SARS, stressing that individual behavior is crucial to controlling the spread of COVID-19. Specifically, through public adherence to preventive measures established by the government. **Abdelghany et.al. (2020) Bavel et.al. (2020)**

Governments all over the world put certain regulations that their citizens must adopt certain behaviors (such as practicing social distance ( The CDC defines social distancing as it applies to COVID-19 as "remaining out of congregate settings, avoiding mass gatherings, and maintaining distance (approximately 6 feet or 2 meters) from others when possible."), hygienic practices and proper ways of wearing

masks regularly) at high levels of compliance that they will need to maintain for an extended period of time, probably until treatments and vaccines are widely available (CDC 2019). These measures have the objective of decreasing the “R0”, a measure of reproduction of new infections, to less than one, and thus suppressing the local spread of the virus. **Worby and Han Chang (2020).**

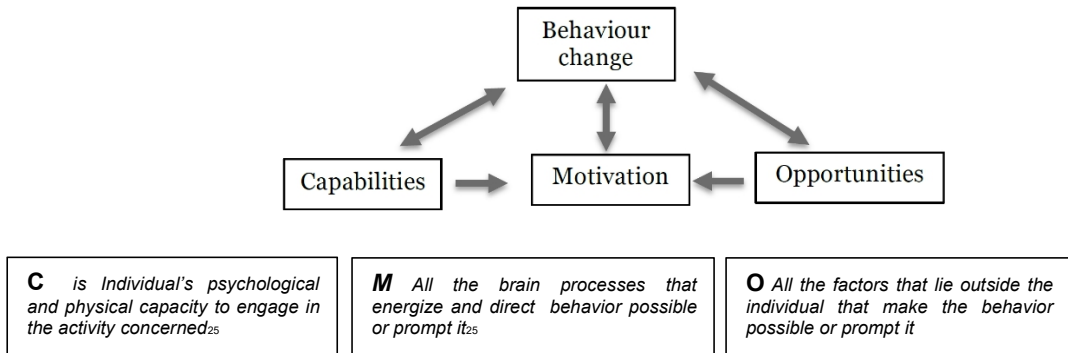
Because there is substantial variability in people’s adoption of the preventive behaviors recommended by experts and by public health organizations, it is vital to understand the factors that motivate or inhibit these adoption. One of the model that try to figure out those variables is the COM-B model as it is widely used to identify what is the requirements to change in a behavior, it forms the basis of a larger system of behaviors called the Behaviors Change Wheel (BCW). It aimed at addressing what needs to be targeted in one or more of the components of the COM-B model to achieve a change in behavior. It identifies three factors that need to be present for any behavior to occur: Capability, Opportunity and Motivation. These factors interact over time so that behavior can be seen as part of a dynamic system with positive and negative feedback loops. Motivation is a core part of the model. **Michie et al. (2011), West et al. (2020)**

Generally as we can apply the COM-B model for the COVID 19 pandemic, the Capability mean the personal has sufficient psychological and physical capabilities as required knowledge and skills to maintain protective behaviors requires to

understand what needs to be done, under what exact situations, how to do it and why it is important to be done in that way. Opportunity (physical and social opportunity) requires ensuring access to the living, working and social measures (norms and social rules), tools and resources that enable (availability of mask, sanitizer, clean water source etc.) and support (family, work, friends) the behaviors to be enacted and to maintain normal life as possible. Motivation (reflective and automatic) involves, at a minimum, people feeling or mental process or strong need or intention to do certain behaviors (wearing mask because of fear, lockdown, gathering) in all the circumstances in which they are required, or persons have the ability and will to do and this must be sufficient to overcome competing wants or needs in that instance. **Michie et al. (2011) Jatau et al. (2019) figure (1)**

## The COM-B Model (Capability-Opportunity-Motivation-Behavior)

Figure 1: The COM-B System Model



**Source:** Michie S. et al, 2011, The behavior change wheel: A new method for characterizing and designing behavior change interventions.

Behaviors change interventions involve activities, policies, products and services designed to make a difference to the way people act in this way in this context, one of the important and essential Community health nurse is health promoting the population and help in assessment of health problem affecting the community and helping the health authority in executing health policies especially in case of epidemic and pandemic disease. **Kumar and Preetha.(2012)** As in case of COVID-19 community health nurses offer education to community members about maintaining their health so that they can decrease the occurrence of diseases and deaths through increasing awareness about precautionary& preventive measures, control cross infection, help implementing the national guides.

**Significant of the study:** Public behaviors determine how quickly Covid-19 spreads and its' related mortality. Therefore, behavioral science must be at the heart of any public health national

response **Michie et al. (2020)**. WHO recommendations about the importance of encouraging adaptive and protective behaviour changes in response to public health emergencies, to encourage individuals, families, and communities to act to protect themselves (**WHO EMRO. 2017**), should be emphasized by community health nurse as there must be a complete understanding about the main factors affecting the adult behaviors in complying these measures and to be taken into consideration with the health authority in conducting proper health program in combating this disease and prevent sequel of second wave of the pandemic. Regardless of the extraordinary Egyptian national measures in combating the pandemic, the success or failure of these efforts is largely dependent on public behavior. (**WHO 2020**) So that the present study will be conducted to find out what are COVID-19 Related Behavioral Modification needed and the level of Anxiety related to it among Egyptian Adults

## **Aims of the study**

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The current study aimed:

To assess COVID-19 Related Behavioral Modification and Anxiety among Egyptian Adults through the following aims:

- 1- Assess behavior modification related to COVID 19 pandemic among Egyptian adults
- 2-Explore the extent of COVID 19 related anxiety among Egyptian adults.

### **Research questions:**

What are the behavior modification related to COVID 19 pandemic among Egyptian adults?

- What is the extent of COVID 19 related anxiety among Egyptian adults?

## **Subjects and Methods**

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### **Study Design:**

An online cross-sectional exploratory survey research design was adopted.

**Study Setting:** An online survey using google form was sent to cover almost Egyptian governorates. Only 16 governorate were reached through the online form sent (Alexandria, Cairo, Giza, behyira, Monufia, Kafr el sheikh, Matrouh, Daqhlyia, Qalyubia, Gharbia, Fayoum, Ismailia, Asyut, Red sea, Minya, Damietta,)

**Study Subjects:** The study respondents were selected according to the following Inclusion criteria: Egyptian residents, with the access to the internet, accepted to participate in the study and with minimum age of 18 years old.

**The sample size** was 512 by calculated using the Epi Info 7 software. As there were scares or no similar studies related to coronavirus disease, the calculations were based on the assumption that the probability of modification behaviors towards preventive measures against COVID 19 pandemic was 50.0% at 95% confidence interval, precision of 5%, with a design effect of 1 and then the calculated sample size was 384 respondents at least. Accordingly, the survey portal was closed, and stopped at the end of the day when the number of respondents exceeded the sample size and after a week of no response was sent or answered , i.e. at the end of June

**Sample technique:** online convenient sample was used because of the national partial lockdown and difficulty to collect the required number of the respondents due to social distance precautions during data collection duration . A Snowball sampling technique was used. A total of 512 respondents took part in the survey. Several strategies were used to reach as many participants as possible to cover most of the Egyptian governorate within decided time of data collection as **mentioned in methods part.**

**Tool of the study:** In order to collect the necessary data for the study, the following questionnaire was used it comprise from the following different three parts: the tool parts **(I-III)** was developed by the researchers after reviewing recent and available literatures **Michie et al., (2011), (CDC, WHO 2020), West et al. (2020) and part II was adopted from Roya et.al (2020).** The survey questionnaire was formulated in Arabic, the native language in Egypt

**Part 1: Participants demographic characteristics, and their daily activities modification questionnaire :** include (age, gender, education, occupation, marital status, governorate residence , place of living either rural or urban, number of living personnel in same home, and number of youngest children age if present. Moreover, 5 statements were allocated to ask participant about their **daily activities' modification** because of COVID 19 pandemic. The response options were either no, yes or not sure. Moreover, questions about frequency of hand washing or sanitizing hand for the last 24 hours as reported by the respondents were asked based on CDC guidelines (CDC) (2019). The Responses of the answers were coded as yes or no and reported number if yes answer. **Part II: Anxiety level related to COVID 19 pandemic assessment questionnaire** was sub categorized into two sections **first:** respondents self-perceived rating their Mental/Emotional health through using figure of five faces: ranged from Very Good, to very sad/ anxious. **Second: anxiety towards the COVID-19 pandemic.** It was based on **Roya et al. (2020)**. it include 17 items that were rated on a 5-point Likert scale for example (how often do you think about Novel Coronavirus Pandemic?, how often they feel of thinking of contacting the COVID19 Virus infection? , how often they avoid large gathering ,partying and meetings ? as respondents was asked to choose the best answer ranging from never, occasionally, sometimes, often and always. It used to assess the respondent's level of anxiety associated to novel coronavirus infection they felt over past 2 weeks. The percent of

responses who feel anxious ranged (often and always). Score ranged from 0-68. The total score of anxiety was divided into 0 to less 24 = low anxiety ,24 to less than 48 = moderate anxiety and 48 to 68 = high anxiety :**Part III:** this part will apply the **COM-B tool related COVID 19 preventive behaviors questionnaire** .It was guided and based on the COM-B Self-Evaluation Questionnaire, the COM-B Behavioral Diagnosis **Michie et al., (2011), West et al. (2020)** and recent and evident knowledge retrieved until time of constructing the form, from (CDC, WHO 2020) and available researches (**Barker et al., 2016), (Mayne 2017)**. The research respondents were asked to indicate the extent to which statements were accepted or agree with, during the COVID-19 pandemic on a 3–point scale labelled: agree, somewhat agree and disagree. It was constituted of main 7 items related to evident available references about preventive behaviors can be maintained according to capability, opportunity, and motivation domains. The allowed total score was measured for each domain based on number of statements and scoring points.

## Methods

1. An online semi-structured questionnaire was developed by using google forms. All response was sent to researcher Gmail and collected through google form responses. A standardized general startup note describe for each participant the title ,purpose, inclusion criteria of the research study and acceptance of completing the survey and insuring the anonymity and privacy of the data in the beginning of the online form

and also was noted with the link. The link of the questionnaire was sent through different social network, media and platform especially (e-mails, Facebook, twitter, LinkedIn, WhatsApp and Instagram) which used in disseminating the survey to for reaching out to large number of community as possible.

2. Respondents who gave consent to willingly contribute in the online survey follow the 'next' button and would then be directed to complete the self-administered questionnaire. After submission there were thanks message sent to each respondent. The study respondents were encouraged to distribute the questionnaire link to as many people as possible. Thus, the link was furthered to people away from the first respondents of contact in different Egyptian governorates and so on.
3. Before sending the online form, a **preliminary phase** was conducted to assess the validity and reliability of the tool. Five experts in the filed in community health nursing were asked to review the questionnaire regarding its relevancy and **content validation** related to aim of the study.
4. **Reliability of the tool** was asserted by using Cronbach's Alpha coefficient test as well as test-retest reliability using the intra-class correlation coefficient. The internal consistency reliability result was 0.79 and the intra-class correlation coefficient was 0.91.
5. A **pilot study** was carried out on 26 respondents to test the extent of the clarity, feasibility, applicability and

average time required needed to be completed by each respondent. The necessary modifications were done. These responses were excluded from the total study subjects.

6. Data was collected between first of May till the end of June 2020.

### Statistical Analysis

The raw data and participant responses was collected through goggle form into excel sheet and then the was coded using to SPSS sheet. All data analyses were performed using Statistical Package for the Social Sciences (SPSS) software, version 22. Descriptive statistical methods were used to summarize data on demographic characteristics and responses to questions concerning participant behavior related to COVID-19. Data were summarized as frequencies (n) and percentages (%) for categorical variables. A value of  $P < 0.05$  was considered statistically significant. Continuous variables were represented as arithmetic means  $\bar{x}$ , standard deviations  $\pm$  SD. One Way ANOVA test: Parametric statistical tests were used to compare the means for quantitative data COM-B of each study participant and their demographic variables.

### Ethical Considerations

Written online consent after complete description of the research purpose was included at the start-up statement at the beginning of the online form. Respondents who gave consent follow the 'next' button and would then be directed to complete the self-administered questionnaire. Confidentiality and anonymity of participant's response was ensured by statement in the



startup page of the online tool, and a code number was used instead of the names as well. Participation was maintained on a voluntary basis.

## Results:

**Table (1)** presents that 512 was the total number of respondents who were included in the study, of them 69.3% were females. The age of the respondents ranged from 18 to 77 years with a mean±SD of 33.7±9.8years. Nearly two thirds of them were married (57.4%). Slightly less than half of them (48.2%) had post university level of education. The majority of respondents (86.9%) were resided in urban areas. 15.4% of them worked as health care provider while, 55.1 % of them had family member working as health care provider. Further, less than of half (47.7%) of them reported that their family consists of 3-4 members with a mean of 3.6±1.8 and nearly one quarter of them (24.2%) had two members less than 18 years old. Finally,47% of respondents were from Alexandria followed by 14% from both Cairo and El- Bahira, 13% was from Giza and 12% from the rest of the Governorates(as Monufia, Kafr el sheikh ,Matrouh ,Qalyubia, gharbia, Fayoum). Regarding the study respondents' sources of information, it was clear from **figure (2)** that the majority (87.7%) of them mentioned that they obtained their knowledge from media, followed by family members and health team , and the least was from poster and flyer in the street (44.5%39.5% and 14.1%) respectively.

**Table (2)** represents the Distribution of the studied respondents according to the change in their daily activities and

their house hold members during to COVID-19 pandemic national lockdown. It was obvious from the table that the majority (86.5%) of the respondents reported generally, that their routine daily activities had been changed due the pandemic and the lockdown. Less than two thirds (62.9%) of them mentioned that they and their house hold members left home and interact with others in job, market or gathering places. Additionally, it could be observed that 60%, 62.5% of the respondents reported change in their working or studying conditions respectively. The same table also revealed that 56.3% of them reported that they work or study from home and the working hours had decreased respectively. Moreover, 36.7% of them stated that their lifestyles will change drastically after pandemic end.

**Figure (3)** shows participant self-reporting about frequency of hand washing for the last 24 hours. It was noticed that nearly half (49%) of the respondents reported that they wash their hand more than 10 times / day and less than one third (31.3%) of them wash their hands 4-6 times/ days.

**Figure (4)** represent the distribution of The Study respondents according to self-rating for their mental / emotional health through using figures of Face Reaction towards COVID-19. It was clear from the figure that less than half of the respondents consider them neither good nor sad, 30% reported that they are in good mental status.

**Figure (5)** portrays the anxiety level among respondents regarding COVID-19 pandemic. It was clear from the graph that slightly more than one quarter

(25.4%) of the respondents had high level of anxiety related to COVID-19

Distribution of the respondents according to their self-reported behaviors required to Limit COVID-19 Transmission Based on (COM-B) Model was illustrated in **table (3)** Regarding the **coughing, sneezing and safety disposal of tissue**, it was clear from the table that nearly three quarters (74%) of the respondents agreed about the proper sneezing/coughing technique and 59.6% agreed about how to dispose the tissue safely. Regarding the capability domain (C), the majority of them (82.6%) agreed that they always carry tissue all the time, 25.4% of people around them dispose tissue safely Opportunity (O) and 72.2% of them agree about their intention to do it in the proper way. Motivation (M). Moreover, slightly less than three quarters (73.6%) of the respondents agreed that they know that wearing mask is one of preventive measures of COVID 19 (C) , only 13.7% can offered to wear new mask every time they went outside home (O) and 68.2% claimed that wearing a mask all the time become as a habit (M). Also, regarding participant **maintain physical distance** it was appear from the table that 57.2% understand the importance of social distance, 29.9% of them about stop socializing and gathering(C), only 14.8% of respondents the agreed about that physical distance were maintained all the time either in work or in faculty (O) and only 26% was greeting other in different ways than normal (M). Concerning, **washing hand with soap and water or sanitizing it for 20 seconds**, 91%and 74.8% of the respondents reported their agreement about knowing hand washing or hand sanitizing and importance of

hand washing after sneezing or coughing respectively (C). 38.3% and 40.4% of them agree about carrying hand gel sanitizer or alcohol on daily basis respectively. Further, 49.8% of the respondents mentioned that soap washing facilities could be reach (O), and 78.9% of them agree and believe about importance of frequently hand washing and sanitizing it frequently as methods of prevention (M). Additionally, **disinfection of services and objects**, 76.2%of the respondents agreed that disinfecting service can prevent cross infection, less than one third of them (61.0%and 61.4%) agreed disinfecting their mobiles and avoid touching service as possible outside homes respectively (C), 37.5% agree about their ability to carry disinfectant tissue all the time (O) and 54.9% agreed about its importance (M). Concerning **avoidance of touch T zone**, it was observed from the table that 76.2% of them agree about their understanding it is important to prevent cross infection but only 7.4% was agreed about the way they can do it properly (C) , only 24.6% agreed that others enhancing them to do it(O) ,and 71.7% of research respondents were somewhat agreed about the priority of handwashing or sanitizing it before touching their face and 73.6 % agree that they are trying to make it as habit (M). Finally, regarding **social and physical isolation**, it was clear from the table that (76.4%, 76.8%) of the respondents agreed about the understanding of the importance and how 25.6% stopped using public transport. they can isolate them self in home respectively (C), 35.4%, 38.9% of respondents agree about the accessibility and affordability of investigation and knowing where to

go if they infected respectively, (O), while 48.1%, 54.1% of them somewhat agree that, they must follow the governmental lockdown all the time and people around them help in this respectively and lastly 81.4% agree that they intended to isolate them self properly for required time if they became infected (M).

**Table (4)** illustrates that the allowed total score and mean score percent of COM-B related to COVID-19 preventive measures. The table elaborates that capabilities mean %score of respondents was the dominant as it is  $77.1 \pm 11.6$  followed by  $70.0 \pm 12.4$  for motivation domains and  $64.2 \pm 11.9$  for opportunity.

**Table (5)** shows COM-B and anxiety related to COVID-19 correlation matrix. There is a statistically significant strong positive correlation observed between capability and opportunity, motivation, and anxiety level ( $r = 0.549$  (p value 0.000),  $r = 0.587$  (p value 0.000), and  $r = 0.502$  (p value 0.000) respectively). It also noticed that there is a statistically significant strong positive correlation between opportunity and motivation ( $r = 0.596$  (P value: 0.000)) and a statistical weak positive correlation between opportunity and anxiety level. Finally, there is a statistically significant moderate positive correlation noticed between motivation and anxiety level ( $r = 0.404$  (p value 0.000)).

**Table (6)** explore the influence of the COM-B model components on the enactment of COVID 19 preventive measures related to respondents' demographic variables. There is a significant association between gender and capability, motivation, and anxiety level (F:30.8, P:<0.001, F:6.552,

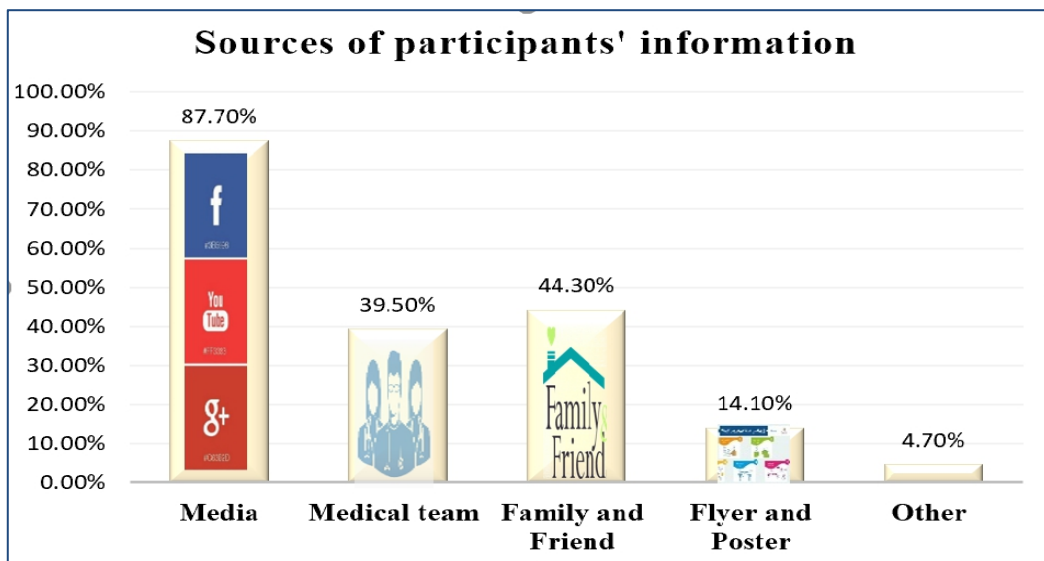
P:0.011, and F:28.637, P:<0.001 respectively). A significant association was noted between age and capability, opportunity, motivation, and anxiety level (F: 2.864, P:0.023, F:17.497, P:<0.001, 5.671, P:<0.001, F:5.742, P:<0.001 respectively). Additionally, there is a significant association noted between level of education and capability and anxiety level (F: 14.537, P:<0.001, F:18.847, P:<0.001 respectively). Furthermore, there is a significant association observed between marital status and capability, motivation and anxiety level (F:2.698, P:0.045, F: 10.402, P: <0.001, F:9.693, P: <0.001 respectively). A significant association observed between working as a health care provider and capability and anxiety level (F:4.305, P:0.039, F:4.445, P:0.035 respectively). Furthermore there are a significant association noticed between number of family members and their capability, opportunity, motivation and anxiety level (F:5.511, P:0.001, F:7.318, P:<0.001, F:3.591, P:0.014, and F:6.572, P:<0.001 respectively). Finally, there are a significant association noted between place of residence and anxiety level (F: 7321, P value: 0.007).

**Table (1):** Distribution of the Respondents according to their Socio-Demographic Data (n=512)

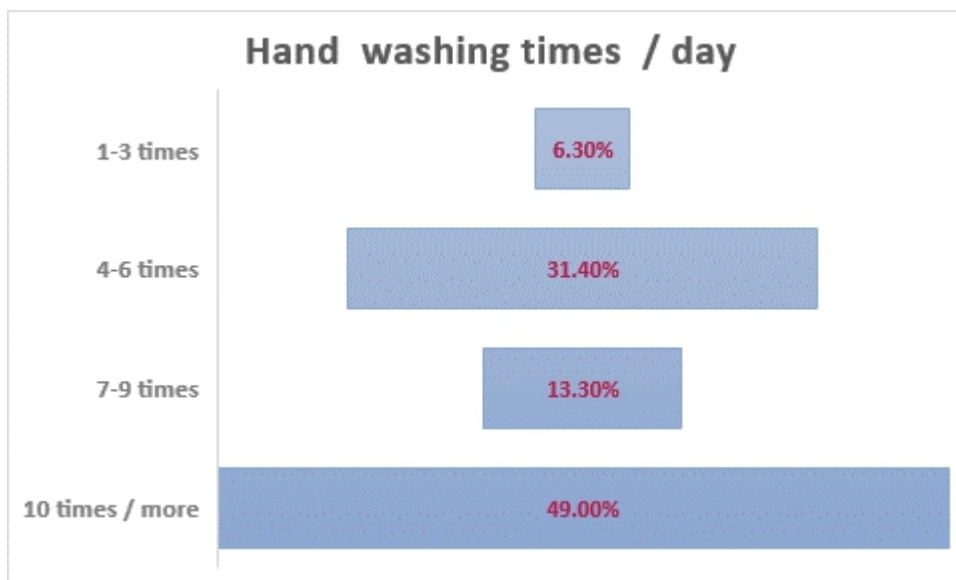
Sociodemographic Data	No. (512)	%
<b>Sex</b>		
Male	157	30.7
Female	355	69.3
<b>Age (Years)</b>		
Less than 20	23	4.5
20 to less than 30	161	31.4
30 to less than 40	197	38.5
40 to less than 50	100	19.5
50 and more	31	6.1
Min-Max	18-77	
Mean $\pm$ SD	33.7 $\pm$ 9.8	
<b>Level of education</b>		
Secondary	70	13.7
University	195	38.1
Post	247	48.2
<b>Marital status</b>		
Single	200	39.1
Married	294	57.4
Divorced	16	3.1
Widow	2	.4
<b>Working as a healthcare provider</b>		
No	433	84.6
Yes	79	15.4
<b>Family member working as a healthcare provider</b>		
No	230	44.9
Yes	282	55.1
<b>No. of family members</b>		
1-2 members	132	25.8
3-4 members	244	47.7
5 members and more	136	26.6
Min-Max	1-15	
Mean $\pm$ SD	3.6 $\pm$ 1.8	
<b>No. of family members less than 18 years</b>		
None	172	33.6
One member	147	28.7
Two members	124	24.2
Three members and more	69	13.5
Min-Max	0-7	
Mean $\pm$ SD	1.2 $\pm$ 1.2	
<b>Place of residence</b>		
Urban	445	86.9
Rural	67	13.1
<b>Outreached Resided governorates</b>		
Alexandria	241	47
Cairo	72	14
Behyira	72	14
Giza	65	13
Other(Monufia, Kafr el sheikh ,Matrouh , Qalyubia, Gharbia, Fayoum,Ismailia, Asyut ,Red sea, Minya, Damietta, Daqhlyia )	62	12

**Table (2):** Distribution of the Respondents and their household members according to their daily activities modification due to COVID19 pandemic national lockdown (n=512)

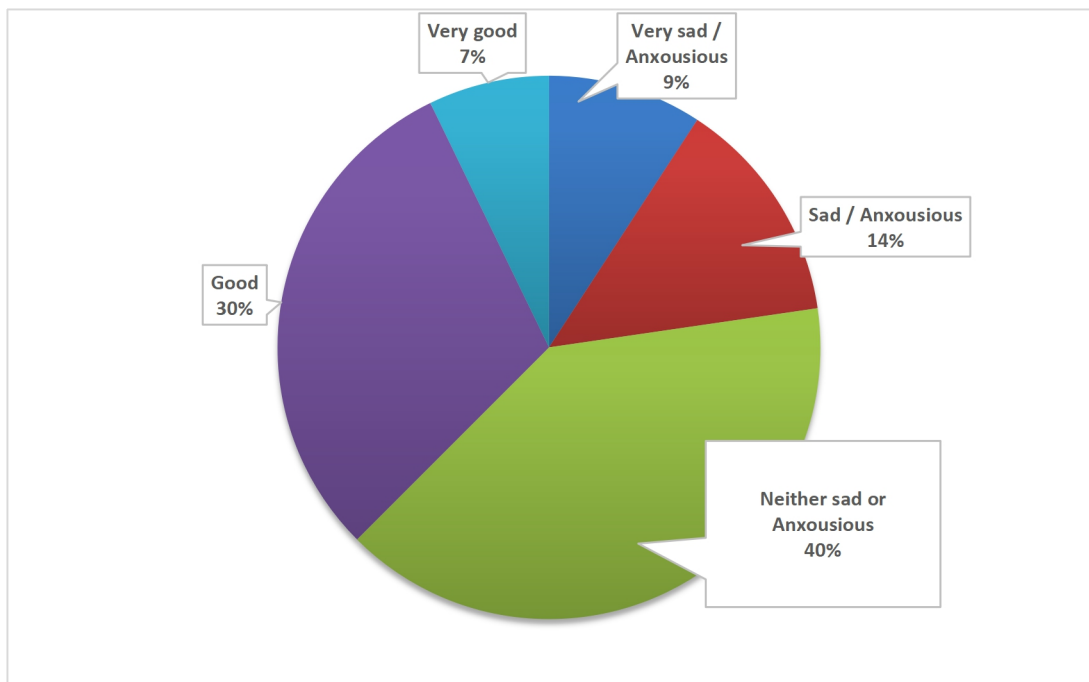
Daily activities modifications	No.	%
<b>Changes in daily activities because of COVID 19 pandemic</b>		
No	34	6.6
Yes	443	86.5
Not sure	35	6.8
<b>Participant /Household member left home and interact with others in market , job or other places</b>		
No	181	35.4
Yes	322	62.9
Not sure	9	1.8
<b>Lifestyle will be changed after the pandemic state end</b>		
No	178	34.8
Yes	188	36.7
Not sure	146	28.5
<b>Working from home in spite from work place</b>		
No	167	32.6
Yes	307	60.0
Some times	38	7.4
<b>Study from home in spite from in University</b>		
No	103	20.1
Yes	320	62.5
Some times	89	17.4
<b>Decrease the working hours or days</b>		
No	148	28.9
Yes	288	56.3
Sometimes	76	14.8



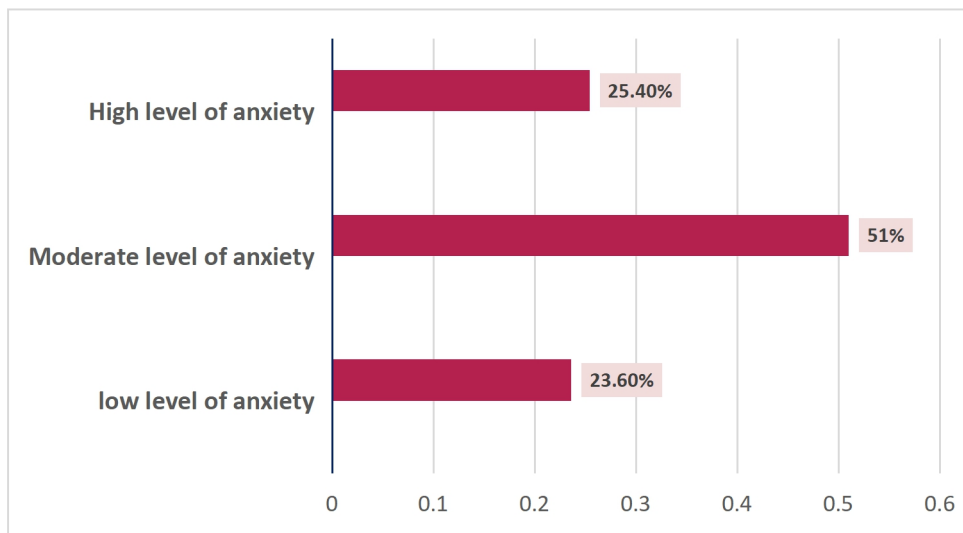
**Figure (2):** Respondents’ reported main sources of information (n=512)



**Figure (3):** Respondents self reported Hand Washing times / day (n=512)



**Figure (4):** Distribution of the Respondents According to their reporting Emotional Face Reaction Toward COVID-19 (n=512)



**Figure (5):** Respondents' COVID-19 related anxiety level (n=512)

**Table (3):** Distribution of Respondents self-reported behaviors required to Limit COVID-19 Transmission Based on COM-B model (n=512)

COM-B Model domains / items		respondents agreement					
		Disagree		Somewhat agree		Agree	
		No.	%	No.	%	No.	%
<b>Coughing or sneezing into tissues and safely dispose of these.</b>							
<b>Capability (C)</b>	I know how to cough/ sneezes properly/ sleeves	21	4.1	112	21.9	379	74.0
	I knowhow to handle tissues and dispose of them safely.	39	7.6	120	23.4	353	68.9
	I knew that sneezing/coughing is one of the virus transmitted	24	4.7	115	22.5	373	72.9
	I knew how to dispose the tissue safely	59	11.5	148	28.9	305	59.6
<b>Opportunity (O)</b>	I had tissue available all the time	40	7.8	49	9.6	423	82.6
	Available all the time disposing container/ plastic bag	45	8.8	324	63.3	143	27.9
	Availability of disposing container in street / work	52	10.2	330	64.5	130	25.4
	People around me do it frequently	46	9.0	343	67.0	123	24.0
<b>Motivation(M)</b>	I feel that I must do it in that way.	21	4.1	121	23.7	370	72.2
<b>Wear/ take off face masks as appropriate.</b>							
<b>Capability (C)</b>	I knew that wearing mask stop/ prevent cross infection	33	6.4	102	19.9	377	73.6
	Wearing mask all the time out side home	33	6.5	118	23.0	361	70.5
	Wearing / taking off mask properly	59	11.5	148	28.9	305	59.6
	Knowing difference between type of mask and benefit	24	4.7	184	35.9	304	59.4
	I know how to dispose safely dispose of them.	39	7.6	119	23.2	354	69.1
<b>Opportunity (O)</b>	I can afford wearing new mask every time I went outside home	97	18.9	345	67.4	70	13.7
	All type of mask are available.	78	15.2	71	13.9	363	70.9
	I can wear musk each time I go out side	39	7.6	120	23.4	353	68.9
<b>Motivation (M)</b>	It become as habit to wear it all the time outside home	39	7.6	124	24.2	349	68.2
	I try to not to touch the mask all the time	78	15.2	285	55.7	149	29.1
<b>Maintain physical distance.</b>							
<b>Capability (C)</b>	Understanding the importance of keeping physical distance at least 2 meter .	194	37.9	25	4.9	293	57.2
	I stop socializing or gathering/ with other all the time	19	3.7	340	66.4	153	29.9
	Avoid using public transport as possible	56	10.9	325	63.5	131	25.6
	I avoid close contact greetings (kissing , hugging )	16	3.1	307	60.0	189	36.9
<b>Opportunity (O)</b>	There is rules to follow in market / shops to maintain physical distance	194	37.9	25	4.9	293	57.2
	Availability of sign to maintain physical distance in public places.	39	7.6	120	23.4	353	68.9
	Physical distance is maintained in work, faculties	148	28.9	288	56.3	76	14.8



COM-B Model domains / items		respondents agreement					
		Disagree		Somewhat agree		Agree	
		No.	%	No.	%	No.	%
<b>Motivation (M)</b>	People around me keep distance.	64	12.5	212	41.4	236	46.1
	It become normal / habit to keep distance	146	28.5	178	34.8	188	36.7
	I greet other in different ways	40	7.8	339	66.2	133	26.0
<b>Wash (soap and water )or disinfect hands under certain conditions.</b>							
<b>Capability (C)</b>	knew hand washing prevent the transmission / cross infection 20 sec.	22	4.3	107	20.9	383	74.8
	Hand sanitizer is important for prevention for at least 20 sec.	39	7.6	120	23.4	353	68.9
	I knew the importance of hand washing after each sneezing and coughing	14	2.7	32	6.3	466	91.0
	I understand the importance of using moisturizing after hand sanitizing to protect hands.	67	13.1	202	39.5	243	47.5
<b>Opportunity (O)</b>	I carry hand gel sanitizer	62	12.1	254	49.6	196	38.3
	I carry alcohol 70%	63	12.3	242	35.3	207	40.4
	The alcohol/ hand sanitizer available and can afforded	14	2.7	209	40.8	289	56.4
	There is soap and washing facilities around me outside home	39	7.6	218	42.6	255	49.8
	I had the time / easiness to do it outside home	35	6.8	220	43.0	257	50.2
<b>Motivation (M)</b>	I believe that hand washing frequently can lower the risk of the virus	66	12.9	42	8.2	404	78.9
	The surrounding always remind me to do it	35	6.8	127	24.8	350	68.4
<b>Disinfect surfaces and contact objects.</b>							
<b>Capability (C)</b>	I know disinfecting service prevent cross infection / recontamination	20	3.9	102	19.9	390	76.2
	I disinfect my mobile /laptop/any service	123	24.0	77	15.0	312	61.0
	I avoid touching service outside home as possible	121	23.6	77	15.0	314	61.4
<b>Opportunity</b>	I had disinfectant tissue all the time.	20	3.9	300	58.6	192	37.5
<b>Motivation (M)</b>	I believe it is important to do so whenever required	150	29.3	81	15.8	281	54.9
	People accept me to do it as it should	275	53.7	87	17.0	150	29.3
<b>Do not touch the T-zone unless one has just thoroughly washed one's hands.</b>							
<b>Capability (C)</b>	Understanding the importance of doing this in prevent cross infection	23	4.5	99	19.3	390	76.2
	Know how to do it by keeping hand below shoulder as possible	341	66.6	133	26.0	38	7.4
<b>Opportunity</b>	Other keep tell me not to touch T zone	216	42.2	170	33.2	126	24.6
<b>Motivation (M)</b>	It became as a priority to hand wash or sanitize it before contact my face	18	3.5	367	71.7	127	24.8
	I try to make as habit by stopping oneself doing it	33	6.4	102	19.9	377	73.6
<b>Social/ physical isolation</b>							
<b>Capability (C)</b>	I understand the importance of social isolation to prevent cross infection	24	4.7	97	18.9	391	76.4
	I know how to isolate my self in home	20	3.9	99	19.3	393	76.8
	I know the isolated period of virus	33	6.4	102	19.9	377	73.6

COM-B Model domains / items		respondents agreement					
		Disagree		Somewhat agree		Agree	
		No.	%	No.	%	No.	%
<b>Opportunity (O)</b>	Available and affordable places of investigation	47	9.2	284	55.5	181	35.4
	I know where to go to make lab investigation	30	5.9	283	55.3	199	38.9
	home working or reduced working hours.	179	35.0	222	43.4	111	21.7
	I tailored specific home measures to maintain isolation.	273	53.3	107	20.9	132	25.8
	I planned to stock what I need if in case of lockdown	255	49.8	170	33.2	87	17.0
<b>Motivation (M)</b>	I try to follow the national lockdown to maintain social distance all the time	76	14.8	246	48.1	190	37.1
	People around me help maintain social distance	45	8.8	277	54.1	190	37.1
	I intended to isolate myself in case of being infected for required period.	47	9.2	48	9.4	417	81.4

**Table (4):** Mean and Mean Percent Scores of The Capability–Opportunity–Motivation–Behavior (COM-B) Model(n=512)

COM-B Model	Maximum allowed scores	Min-Max	Mean± SD	Mean%±SD
<b>Capability</b>	48	17-47	37.0±5.5	77.1±11.6
<b>Opportunity</b>	42	13-38	26.9±5.0	64.2±11.9
<b>Motivation</b>	28	10-28	19.6±3.4	70.0±12.4

**Table (5):** COM-B Model and Anxiety related to COVID-19 Correlation Matrix (n=512)

	Capability		Opportunity		Motivation		Anxiety	
	R	P	R	P	r	P	R	P
<b>Capability</b>			.549**	.000	.587**	.000	.502**	.000
<b>Opportunity</b>	.549**	.000			.596**	.000	.294**	.000
<b>Motivation</b>	.587**	.000	.596**	.000			.404**	.000
<b>Anxiety</b>	.502**	.000	.294**	.000	.404**	.000		

r: Pearson Correlation P: P value of Pearson Correlation \*\*: Correlation is significant at the 0.01 level

**Relation** : r<0.2: no correlation. r: 0.2-0.4: weak correlation. r: 0.4-0.6: A moderate correlation r: 0.6-0.8: A strong correlation. r> 0.8: A perfect correlation

**Table (6):** Association between socio demographic variables related to COM-B domains and anxiety related to COVID 19 (n=512)

Sociodemographic Data	COM-B Model						Anxiety	
	Capability		Opportunity		Motivation		Mean%±SD	Test of sign.
	Mean%±SD	Test of sign.	Mean%±SD	Test of sign.	Mean%±SD	Test of sign.		
<b>Sex</b>								
Male	72.9±14.1	F:30.8 P:<0.001*	64.5±12.0	F:0.096 P:0.757	67.9±13.2	F:6.552 P:0.011*	76.5±16.1	F:28.637 P:<0.001*
Female	78.9±9.7		64.1±11.8		71.0±12.1		84.0±13.8	
<b>Age (Years)</b>								
Less than 20	70.1±9.1	F: 2.864 P:0.023*	50.3±12.7	F:17.497 P:<0.001*	60.2±10.0	F:5.671 P:<0.001*	69.5±17.9	F:5.742 P:<0.001*
20 to less than 30	76.5±9.4		68.6±9.4		72.0±11.5		80.4±15.0	
30 to less than 40	77.7±11.7		62.9±12.2		69.4±12.7		83.9±14.3	
40 to less than 50	77.5±14.9		61.8±12.1		69.2±13.0		81.4±15.1	
50 and more	79.9±8.1		67.9±7.6		73.8±12.5		85.0±10.7	
<b>Level of education</b>								
Secondary	75.1±11.2	F: 14.537 P:<0.001*	63.6±13.1	F:1.073 P:0.0343	69.5±12.6	F:1.691 P:0.185	74.3±16.5	F:18.847 P:<0.001*
University	74.3±12.5		63.4±11.6		68.9±13.4		79.8±15.1	
Post	79.9±10.2		65.0±11.8		71.1±11.7		85.4±13.3	
<b>Marital status</b>								
Single	75.9±10.3	F:2.698 P:0.045*	64.9±12.6	F:1.988 P:0.115	68.3±12.5	F:10.402 P:<0.001*	77.7±15.9	F:9.693 P:<0.001*
Married	78.1±12.2		64.1±11.2		71.9±12.1		84.5±13.7	
Divorced	71.8±13.3		57.4±13.9		56.9±9.7		80.0±13.3	
Widow	83.3±2.9		63.0±1.6		82.1±5.0		100.0±0.0	
<b>Working as a healthcare provider</b>								
No	76.6±12.1	F:4.305	64.3±11.9	F:0.024	70.0±12.7	F:0.030	81.1±15.0	F:4.445
Yes	79.6±8.0	P:0.039*	64.0±11.8	P:0.876	70.3±11.7	P:0.862	85.0±14.3	P:0.035*
<b>Family member less than 18 years</b>								
None	77.6±10.1	F:5.511 P:0.001*	67.4±9.5	F:7.318 P:<0.001*	69.7±11.9	F:3.591 P:0.014*	52.8±18.8	F:6.572 P:<0.001*
One member	75.4±11.1		62.0±12.8		71.8±12.3		56.2±20.1	
Two members	80.0±12.5		64.1±12.1		70.8±12.9		59.9±19.7	
Three members and more	74.0±13.3		61.2±13.2		66.0±12.9		47.5±21.4	

F: ANOVA test P: P value of ANOVA test

\*Significance at p value ≤0.05

## Discussion

This study tried to answer a critical question in relation to the behavior modification related to COVID-19 pandemic especially complying related preventive measures. The study assessed the extent to which people has already complied with the preventive behaviors and tried to apply COM-B model which investigate the interactive relation between each domain in relation preventive behaviors. COM-B is the core of the behavior change wheel social science which have shaped the person compliance. The results of this study can be a key and a road map for any policy maker in deciding the extent to which they can achieve the desired change in population behaviors, consequently can decrease the spread of the COVID 19 virus and motivate their compliance easily. **Atkins et al. (2017)**.

The commitment and adherence to the precautionary measures will positively minimize the risk of getting infection as well as its live threatening consequences of COVID 19 (WHO 2020). As one of preventive pillar relay on the individual abilities and extents that enable protecting themselves and others by adopting behaviors such as washing hands, avoiding touching their face, practicing good respiratory etiquette, individual level distancing, isolating in a community facility or at home if they are sick, identifying themselves as a contact of a confirmed case when appropriate, and cooperating with physical distancing measures and movement restrictions when called and so on (**Ecdc 2020**). The present results portray one of this measures which considered one of the key important

measures for all personnel as it is not considered one of the financial burden on persons, as nearly half of studied participant reported that they wash their hand thoroughly for 20 second ten times /day. this result was in-congruence with **Głabska, et al.(2020)**, **Sahiledengle. et al. (2020)** who mentioned both that more than half and nearly half of their respondents practiced hand washing 6–15 times a day and).

It was obvious from the study results that the majority of the respondents mentioned that their daily activities had been changed related to COVID-19 pandemic, this was in agreement with **Martínez. et al. (2020)** who mentioned that the most of their subject changed their lifestyle and daily activities. Furthers, nearly two third of them reported that they start working or studying from home after the initiative of the lockdown while, more than half of them the working hours had reduced. This result was in agreement of **Kalenkoski and Pabilonia (2020)** who mentioned that more than half of his respondents had decreased their working hours /week . Only more than one third of the respondents reported that their lifestyle will return as before COVID 19 pandemic. This may be rely on the nature of Egyptian residence that they don't like to be restricted or follow any rules affect on their life freedom and being locked out in homes.

To develop effective interventions to combat any health problem confronting any population it require full understanding of human behavior, ways of reacting, interacting and what motivate or enhance their capabilities or opportunities required to comply to the

national regulations as in case of COVID 19 precautionary measures guidelines declared by the Egyptian government. In the present study, it was observed that all three COM-B component significantly predict appropriate preventive measures among Egyptian studied sample with the capability having the greatest influence on behavior. In the subscale study, It was obvious from the result that the higher score representing the higher level in each domains. The mean %of capability domains was the higher which indicate to undertake any preventive measures as respondents understanding, modalities ,ability to do it and in the appropriate way in the needed time was observed as the dominant factor this may be attribute to the massive information available in all media either governmental on non emphasizing people to do and aim to increase their awareness regarding to minimum requirements of preventive measures. Followed by the motivational domains as it was described the intention feeling and value of the behaviors it self and opportunity domains was the least agreement among respondents which consider the barrier to achieve desired activities. This was in agreement with (Miller et al., 2020) who find that capabilities and motivation manly driven positively the behavior for hand washing for an example among his research respondents . This may be attributed to the fact that Egypt is considered as one of the developing countries and also the Egyptian economic status was severely interrupted which affect inversely on the socioeconomic status leading to limitation of ensuring the minimum requirements for an example payment over costing of disinfectant solution,

mask and working arrangement, resources either social or financial to meet required essentials for maintain preventive measures among the studied participant all of these considered as barriers for complying with preventive measures. Also, the research result configure that there was statistically significant relation between COM-B several exogenous socio-demographic variables. Especially, age and with those who have family members less 18 years (P:0. 023, P:<0.001and p<0.001),and (p<0.001, p<0.001) p<0.001, p<0.001) respectively. Also it was noted from the results that the least behavior changed generally according to COM -B regarding maintain physical distance and avoidance of touching T zone this may be attributed to culture of the Egyptian which is socialization and gathering is one of the important traits in the Egyptian culture. It was clear from the results that majority of the respondents sources of information was related to the new information channels including, internet connected social media platforms namely face book, YouTube, twitter, blogs as it is consider the only available and most important sources of information nowadays especially in lockdown situation. Irrespective to the validity and correctness of these information, at the expense of the other reliable sources from the medical team as only more than one third mentioned as their main sources. This result was in agreement with Abdelhafiz.et al. Egypt (2020) and Ferdous (2020), who reported that the main information source for the majority of their respondents was the different social media, this may attributed to the fact that during lockdown there was vast and changeable

information and all the data obtained from online platform of WHO and CDC with daily report. Also may be attributed to that most of respondents were urban residents with good internet environment and high smartphone user rate and may be that they are connected due to either for work or study online. Further, as it was the mean age of the study participant were  $33.7 \pm 9.8$  as it consider which represent more than 75% of Facebook users in Egypt according to **Abdelhafiz et al. Egypt (2020)**.

While the physical health burden of COVID 19 is important clearly understood more and more every day, mental health and anxiety, stress level still not clear comprehend conversely may be unpredictable it was clearly was Preventive measures. **Abdel-Fattah et al. (2020)**. The present study elaborate the studied respondents point of view regarding their reported emotional mental health, related to face reactions, as less than half of them were either anxious and or sad related to the pandemic state, while less than one third of them reported that happy face represent their mental health at time of study. This result was congruent with their assessing the level of anxiety related to COVID 19 as half of them had moderate level of anxiety. This is emphasizing the true feeling they expressing through the pandemic state. this result was in agreement of **Zhao et al. (2020) and Magdy et al. (2020)**. Who mentioned that In total, 80% of respondents rated the psychological impact; (48%) with moderate anxiety symptoms. This may be due to pressures of anonymity and novelty of the virus, and fatality rate in the begging of the lockdown and unavailability of effective

and apparent management protocol which is affect strongly on adults emotional status and social distancing, can make people feel isolated and lonely and can increase stress and anxiety however, these actions are necessary to reduce the spread of COVID-19. Moreover, there was significant relation with anxiety and all demographic characteristic as gender, age, level of education , marital status, has family member with less than 18 and being working as health care worker was confirmed from research results. This may be attributed to that people be more older as well , women and more educated were most likely to take comprehensive precautionary measures against the infection and try to search more about every single new information and be worry about other family members. Whereas, those risk taking individuals e.g. young males with low level in education may fell that they will not catching the virus and need adjustment of their attitude in order to optimize their self-protection measures against (COVID 19) infection and prevent cross infection to other in their community.

## Conclusion

Findings of the present study concluded that, studied Egyptian respondents modified preventive behaviors, related to the three COM-B components were significantly predicted the positive level of changed behavior related to COVID-19 with the capabilities having the greatest influence on behaviors as when knowledge and skills are enhanced and the least of agreement was related to opportunity domains, as it relay on availability of

social and physical resources. Which is considering barriers in achieving preventive measures. There are a statistically significant association noted between. COM-B and especially the capability, and motivation behavior domains were significant with all the demographic variables. The model can serve as a comprehensive guide for the selection and design of interventions for improving population preventive measures. Main sources were social media in different categories, more than half of respondents had moderate level of anxiety related to COVID-19 pandemic and anxiety were significant of all demographic variables

### Recommendations

- 1- Further in-depth qualitative work would be conducted addressing barriers and enablers to behavior, related to intervention design and content of preventive program.
- 2- Encourage intervention policy maker to plan their strategies on ways to enhance self regulations related to COVID-19 preventive measures.
- 3- Implementation of effective and tailored health education programs aimed at improving COVID-19 self-actualization.
- 4- Consideration must be emphasized in maintaining gained changed behavior over time especially after pandemic end -up
- 5- Preventive and behavioral program to enhance Coping with anxiety in a healthy way available in the organizational system.

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### Conflict of Interest

The authors declared that they have no conflict of interest.

### Author Contribution

All research authors were part of the initial design of the research. They shared in collected and analyzed the data, wrote and edited the final version of the text of the manuscript and formatted it and submitted it for publication.

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