Behavioural Changes and Impact on Mental Health during a Global Pandemic

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Abstract

The paper aims to analyse the behavioural changes and predict the impact on mental health during a global pandemic (here, COVID-19). The study considers various factors that ameliorate mental health or deteriorate it further. It further studies the change in attitude towards work due to a changed setup of working from home.

§1 Introduction

"A pneumonia of unknown cause was first reported to the World Health Organisation (WHO) on December 31, 2019".[2] The novel coronavirus (COVID-19), which originated in Wuhan, China, has infected more than 1.2 million people and has spread globally with confirmed cases in at least 180 countries by April 3, 2020. A number of countries have imposed a complete lockdown on all services except health care and essentials. With closing borders worldwide, the pandemic has caused a major economic impact globally and experts claim that we are headed for a recession worse than the financial crisis of 2008.

As the world fights a global crisis, and researchers strive to find a vaccine against the newly discovered coronavirus, one cannot help but wonder about its psychological impact on those infected, those who closely know someone who has been affected or any global citizen of today who is at risk of infection. The volatile, uncertain, complex and ambiguous (VUCA) world that we live in has come to a standstill and we have been asked to step away from our routine lives and stay at home in order to practice 'social distancing'. As more information flows in, such circumstances often trigger a panic amongst the public. An unfamiliar threat often causes increased anxiety in

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[2] Coronavirus (COVID-19) events as they happen

those who are already vulnerable.[1] However, mental health issues that coincide with the times of such uncertainty are often neglected and rarely examined.

The present study examines the impact on mental health by analysing various behavioural changes observed in the respondents as a result of this lockdown. Factors such as support from family and friends and attention to self care which lead to betterment of mental health whereas factors such as disturbance in sleeping cycles and increase in stress towards financial insecurity which worsen mental health, were considered. The study will predict the overall impact and also bring out the statistics for the sample population as per the varied demographics. It will also aim to establish how these circumstances will influence the work environment and an individual's attitude towards work.

§2 Methodology

Sample Population and Data Collection

An online survey of 165 respondents was conducted asking them to compare their behaviour before the lockdown vs their behaviour during the lockdown. 82 respondents were female, 82 were male and 1 respondent belonged to the non-binary category. The age group of the sample varied between 18 to 50 and above. The demographic distributions are shown in Fig. 1 and Fig. 2. The form was allowed to be anonymously answered in case the respondent is not comfortable in sharing personal details.

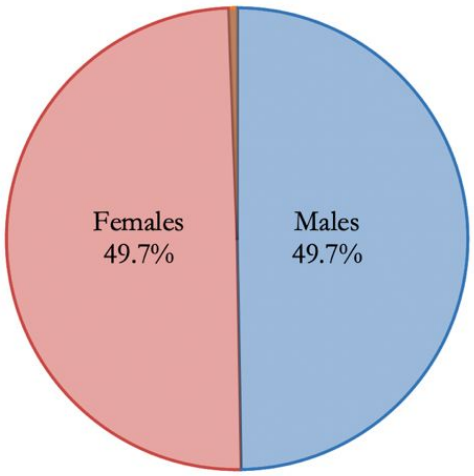

Fig. 1: Gender wise distribution of respondents

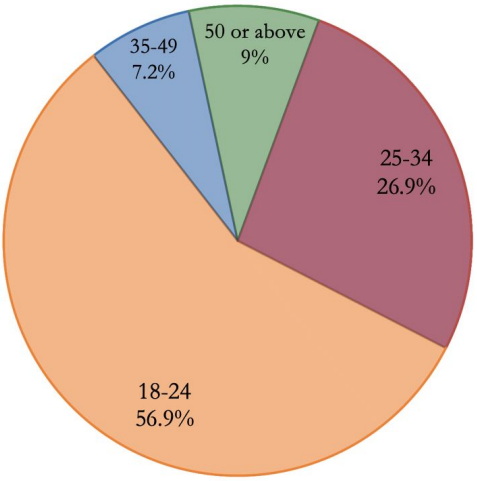

Fig. 2: Age-wise distribution of respondents

Evaluation factors

Positive Lifestyle Factors

The respondents were asked to compare the changes in focus and productivity levels, exercise routines and their attention towards self care and mental health since these are some of the factors that are indicative of good mental health. The respondent could say if she was experiencing an improvement, a fall or the factor remained the same during the lockdown.

Social and family support

In a similar way, the respondents were asked to compare if they felt any change in their family support during the lockdown, their concern towards their families' feelings and if they found it easier to interact and seek support from their friends during the lockdown as positive external support in times of crisis often leads to a betterment of mental health[2]

Disturbances in Routine/ Behaviour

The respondents were asked if they were facing a disturbance in their sleeping cycles and a change in their eating habits. They were also asked if they found themselves getting frequently more angry than they usually do in their normal routines. These factors indicate a disturbed mental health.

Negative External Stimuli

As discussed before, the falling economy, extensive news coverage and changed work environment often causes increased stress and anxiety. Thus,the respondent was asked to compare their stress levels due to financial insecurity, their stress levels towards work and if they found themselves increasingly anxious due to news coverage. These factors would further cause a negative impact on mental health.

Scale of Impact

All the above factors were taken into consideration and an impact score was calculated. An increase in negative factors increased the negative score while a decrease in the same led to an addition in the positive score and vice-versa. Besides the above factors, the respondents were also asked if they felt an increasing anxiety due to fear of infection, health,inadequate supplies,etc. These factors were accordingly adjusted in the scale of impact score. Cumulatively, the impact score was calculated. An

overall negative score implied that the lockdown had a negative impact on mental health, positive score implied a positive impact while a score of zero implied no impact on mental health as the positive and negative factors nullified each other.

Statistical Methods

Logistic regression was used to predict whether the overall impact on the mental health of a person will be negative or positive or no impact. $p < 0.05$ was considered to be statistically significant. R Studio and Microsoft Excel were used for the data analysis.

§3 Observations and Results

Socio Demographic Results

- The summarised results as per demographic divisions have been summarised in Table 1. It is observed that a majority of the respondents (66%) have a negative impact on their mental health during the lockdown.
- Gender does not play a huge impact and we see that almost the same proportions of males and females suffered a negative or positive impact. However,it is noted that more females had a positive impact than men.
- About 72% of the respondents within the age group of 18-24 experienced a negative impact on their mental health, 64% of the respondents within the age group of 25-34 experienced a negative impact on their mental health while the impact was close to 50-50 for the respondents above age 35.

	Gender			**Age**				
Impact	Male (82)	Female (82)	Non-Binary (1)	18-24 (94)	25-34 (45)	35-49 (12)	50 or above (14)	Overall (165)l
Positive or No Impact	25	31	0	26	16	6	8	56
Negative	57	51	1	68	29	6	6	109

Table 1 : Impact on mental health as per survey results

Factor Analysis Results

Positive Factors

- Table 2 gives a summary for the positive lifestyle factors discussed earlier.
- It is observed that the majority of the respondents had decreased levels of focus and productivity. This has a direct impact on the work life of an individual.
- It is observed that majority of the respondents have an increased attention towards self care and mental health (across all categories).

Table 2: Positive Lifestyle Factors		Gender		Age				
		Males (82)	Females (82)	18-24 (94)	25-34 (45)	35-49 (12)	50 or above (14)	Overall (165)
Focus & Productivity	Increased	17%	21%	18%	24%	17%	7%	19%
	Same	34%	34%	32%	29%	42%	64%	35%
	Decreased	49%	45%	50%	47%	42%	29%	47%
Self-care & attention towards mental health	Increased	62%	67%	65%	69%	58%	57%	65%
	Same	26%	23%	22%	20%	33%	43%	24%
	Decreased	12%	10%	13%	11%	8%	0	11%
Exercise	Increased	24%	30%	28%	27%	33%	21%	27%
	Same	37%	41%	35%	42%	33%	64%	39%
	Decreased	39%	28%	37%	31%	33%	14%	33%

- Table 3 summarises social and family support.Majority of the respondents experienced an increased support from family.
- Over 67% of the respondents also showed an increased concern towards family members' feelings which shows that

Table 3: Social and family support		Gender		Age				
		Males (82)	Females (82)	18-24 (94)	25-34 (45)	35-49 (12)	50 or above (14)	Overall (165)
Getting support from family	Increased	60%	54%	59%	51%	67%	50%	56%
	Same	38%	41%	36%	47%	33%	50%	40%
	Decreased	2%	5%	5%	2%	0%	0%	4%
Concern towards family members' feelings	Increased	63%	71%	65%	71%	58%	79%	67%
	Same	37%	29%	35%	29%	42%	21%	33%
	Decreased	0	0	0	0	0	0	0
Seeking support from friends	Increased	28%	41%	34%	36%	33%	43%	35%
	Same	59%	49%	53%	58%	42%	50%	53%
	Decreased	13%	10%	13%	7%	25%	7%	12%

- Table 4 summarises all the negative factors influencing the mental health of the individual.
- It is observed that the majority of the respondents experienced a disturbance in their sleeping and eating habits which is an important indicator of mental health. It is majorly seen in the age group of 18-24.
- Stress from work has had uniform results across categories and levels. While an increased stress from work may serve as a discouraging factor towards work, it also poorly reflects on mental health.
- Anxiety due to news coverage and information flow has increased more in females than in men.

Table 4 (a) Disturbances in Routine/ Behaviour		Gender		Age				
		Males (82)	Females (82)	18-24 (94)	25-34 (45)	35-49 (12)	50 or above (14)	Overall (165)
Anger Episodes	Increased	12%	26%	28%	7%	8%	7%	19%
	Same	62%	40%	49%	62%	25%	57%	52%
	Decreased	26%	34%	23%	31%	67%	36%	30%
Disturbance in Sleep Cycles	Yes	54%	51%	62%	47%	42%	14%	52%
	Somewhat	17%	26%	22%	27%	0	21%	22%
	No	29%	23%	16%	27%	58%	64%	26%
Change in Eating Habits	Yes	41%	50%	53%	42%	33%	14%	45%
	Somewhat	30%	27%	27%	33%	25%	36%	29%
	No	28%	23%	20%	24%	42%	50%	25%

Table 4 (b) Negative External Stimuli		Gender		Age				
		Males (82)	Females (82)	18-24 (94)	25-34 (45)	35-49 (12)	50 or above (14)	Overall (165)
Stress from Work	Increased	26%	28%	27%	36%	17%	7%	27%
	Same	39%	39%	44%	31%	17%	57%	39%
	Decreased	35%	33%	30%	33%	67%	36%	34%
Stress towards financial security	Increased	32%	39%	33%	44%	42%	14%	35%
	Same	66%	60%	64%	56%	58%	86%	63%
	Decreased	2%	1%	3%	0	0	0	2%

Anxiety due to news coverage	Yes	46%	66%	14%	16%	8%	7%	13%
	Indifferent	15%	12%	27%	33%	42%	36%	30%
	No	39%	22%	27%	36%	17%	7%	]

Logistic Regression

Logistic Regression is a tool used to predict the probability of an outcome when it is a categorical variable. In the given case,the dependent variable (impact) can take two categories, namely "Positive or No Impact" or "Negative". R studio automatically dummy codes the two categories using the contrast matrix

```
> contrasts(impact)
                      Negative
Positive or No Impact        0
Negative                     1
```

I ran the following logistic regression to check the statistical significance of the variable and see the probability of the "negative" impact.

```
# FINAL MODEL
model6<-bayesglm(impact~eating.c+sleep.c+anger.c+finsec.c+st_work.c+focus.c+fam.c+
                   concern.c+exer.c+selfcare.c+news.c+friends.c+imp$Anxiety,
                 family=binomial(link='logit'),data =imp,maxit=50)
summary(model6)
```

The results were as follows:

```
> summary(model6)

Call:
bayesglm(formula = impact ~ eating.c + sleep.c + anger.c + finsec.c +
    st_work.c + focus.c + fam.c + concern.c + exer.c + selfcare.c +
    news.c + friends.c + imp$Anxiety, family = binomial(link = "logit"),
    data = imp, maxit = 100)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-1.26234  -0.04778   0.03236   0.18747   1.07414

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) 11.183081   3.034845   3.685 0.000229 ***
eating.c1   -0.757947   0.903753  -0.839 0.401657
eating.c2   -3.460560   1.125175  -3.076 0.002101 **
sleep.c1    -1.626028   0.938954  -1.732 0.083319 .
sleep.c2    -2.687521   1.005950  -2.672 0.007548 **
anger.c1    -0.791486   1.218721  -0.649 0.516054
anger.c2    -3.097679   1.274493  -2.431 0.015077 *
finsec.c1   -2.206341   0.970225  -2.274 0.022963 *
finsec.c2    0.007583   2.476329   0.003 0.997557
st_work.c1  -0.365965   0.973104  -0.376 0.706857
st_work.c2  -1.912524   1.157934  -1.652 0.098602 .
focus.c1    -0.889749   0.880942  -1.010 0.312497
focus.c2    -2.787783   1.135635  -2.455 0.014095 *
fam.c1       0.447320   1.531816   0.292 0.770272
fam.c2      -0.556837   1.530999  -0.364 0.716076
concern.c2  -1.914200   1.027230  -1.863 0.062398 .
exer.c1     -2.563914   1.065872  -2.405 0.016152 *
exer.c2     -3.827613   1.197553  -3.196 0.001393 **
selfcare.c1 -0.292215   1.352096  -0.216 0.828894
selfcare.c2 -1.584007   1.266573  -1.251 0.211071
news.c1     -1.910683   1.152734  -1.658 0.097414 .
news.c2     -3.186289   0.981016  -3.248 0.001162 **
friends.c1  -0.457081   1.064090  -0.430 0.667522
friends.c2  -1.236563   1.208391  -1.023 0.306159
imp$Anxiety -1.444018   0.374552  -3.855 0.000116 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)
```

The variables support from family and friends come out to be statistically insignificant. Also, decreased stress towards financial security also comes out to be statistically insignificant.

Now, using our model, we can finally predict the average impact on mental health of an individual during a lockdown situation:

```
> pred = predict(model6, imp, type="response")
> mean(pred )
[1] 0.6604953
> contrasts(impact)
                      Negative
Positive or No Impact        0
Negative                     1
```

The 'pred' function in R studio gives the average probability of the variable which has been dummy coded as 1. In our case, this variable is 'negative impact on mental health'. **Thus, our model predicts that on an average there is a 66% probability of an individual having a negative impact on his/her mental health.**

Other Results

Impact vs Gender

```
> # Regressing Gender on Impact
> Gender.c<-factor(imp$Gender,levels = c("Male","Female","Non-Binary"))
> model7<-glm(impact~Gender.c, family=binomial(link='logit'),data =imp)
> summary(model7)

Call:
glm(formula = impact ~ Gender.c, family = binomial(link = "logit"),
    data = imp)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.5413  -1.3948   0.8528   0.9746   0.9746

Coefficients:
                  Estimate Std. Error z value Pr(>|z|)
(Intercept)         0.8242     0.2399   3.436 0.000591 ***
Gender.cFemale     -0.3263     0.3308  -0.987 0.323842
Gender.cNon-Binary 13.7419   882.7434   0.016 0.987580
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 211.41  on 164  degrees of freedom
Residual deviance: 209.60  on 162  degrees of freedom
AIC: 215.6

Number of Fisher Scoring iterations: 13
```

Impact vs Age

```
> # Regressing Age on Impact
> Age.c<-factor(imp$Age)
> model9<-glm(impact~Age.c, family=binomial(link='logit'),data =imp)
> summary(model9)

Call:
glm(formula = impact ~ Age.c, family = binomial(link = "logit"),
    data = imp)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.6033  -1.4381   0.8047   0.8047   1.3018

Coefficients:
                 Estimate Std. Error z value Pr(>|z|)
(Intercept)        0.9614     0.2306   4.170 3.05e-05 ***
Age.c25-34        -0.3667     0.3875  -0.946   0.3440
Age.c35-49        -0.9614     0.6217  -1.546   0.1220
Age.c50 or above  -1.2491     0.5872  -2.127   0.0334 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 211.41  on 164  degrees of freedom
Residual deviance: 205.20  on 161  degrees of freedom
AIC: 213.2

Number of Fisher Scoring iterations: 4
```

Impact vs Personality Type

```
> # Regressing Personality Type on Impact
> Ptype.c<-factor(imp$`Which of the following personality types do you associate yourself with?`,levels = c("Introvert","Ambivert","Extrovert"))
> model8<-glm(impact~Ptype.c, family=binomial(link='logit'),data =imp)
> summary(model8)

Call:
glm(formula = impact ~ Ptype.c, family = binomial(link = "logit"),
    data = imp)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.6340  -1.3690   0.7815   0.9972   0.9972

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)      1.02962    0.36839   2.795  0.00519 **
Ptype.cAmbivert -0.58967    0.42306  -1.394  0.16337
Ptype.cExtrovert -0.01802    0.55332  -0.033  0.97402
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 211.41  on 164  degrees of freedom
Residual deviance: 208.48  on 162  degrees of freedom
AIC: 214.48

Number of Fisher Scoring iterations: 4
```

However,the variables came out to be statistically insignificant and were therefore not taken into consideration in the final model.

Change in attitude towards work

Lastly, on enquiring the respondents about how their attitude towards work has changed, the following results were

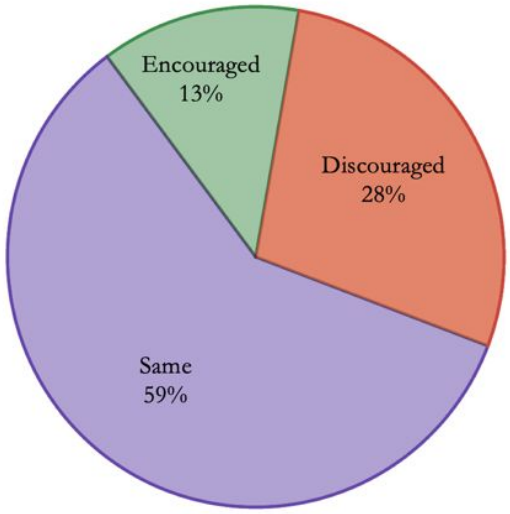

Fig. 1: Change in attitude towards work during the lockdown

28% of the respondents felt that they were unable to work at home.
However, 13% actually said that they enjoyed their work even more. This variable when related with the previous variable, stress from work, gave meaningful results as those who enjoyed the work also experienced lesser or same stress towards work.

§4 Conclusion

In the study, 165 individuals were surveyed and after considering various factors that influence mental health, a model was created to predict the impact of the lockdown on mental health on the average individual. On an average, there is a probability of 66% that an individual will have a negative impact on her mental health. However, one must also heed attention to the fact that although the future seems uncertain, one can observe many positive aspects from the data such as better family support, growing concern towards family members' feelings and reduced stress from work. For the individuals having a positive impact on mental health, it is observed that they have better exercise routines. Most of all it is encouraging to see that there has been an increase in the attention towards self care and mental health.

The current situation changes the attitude towards work as people also spend an increasing amount of time on family, household chores and their other personal interests. While this may discourage some people from working, some may find it easier to work in this kind of a work-life balance.

In other questions posed to the respondents, one also finds answers such as growing concern towards marginalised communities, safety of healthcare workers and economic problems post the lockdown. As we move towards a society that also cares for each other, it is as important to not stigmatise the topic of mental health and rather move towards one that realises its importance.

Limitations

- Some results in the document may be speculative and may not necessarily demonstrate a cause and effect relationship.
- Sample size for the study is very small and may not be generalised to the whole population.Also, kids i.e. individuals under 18 years of age were not surveyed.
- While the author has attempted to cover the major variables indicative of mental health, these are certainly not the only factors. An individual's past history of exposure to traumatic events, family conditions, standard of living among many others are important variables indicative of as well as influencing mental health.

Acknowledgements

The author expresses her immense gratitude towards her mentor, Prof. Shameem for her guidance and insights.

§7 References

[1] Onyeaka H K, Zahid S, Patel R S (March 21, 2020) The Unaddressed Behavioral Health Aspect During the Coronavirus Pandemic . Cureus 12(3): e7351. DOI 10.7759/cureus.73

[2] Joseph T.F. Lau, Xilin Yang, H.Y. Tsui, Ellie Pang, Yun Kwok Wing (August 2006) Positive mental health-related impacts of the SARS epidemic on the general public in Hong Kong and their associations with other negative impacts.Journal of Infection, Volume 53, Issue 2

[3] Samantha K Brooks, Rebecca K Webster, Louise E Smith, Lisa Woodland, Simon Wessely, Neil Greenberg, Gideon James Rubin (February 26, 2020),The psychological impact of quarantine and how to reduce it: rapid review of the evidence

[4] Xinhua Liu, Meghana Kakade, Cordelia J. Fuller, Bin Fan, Yunyun Fang, Junhui Kong, Zhiqiang Guan, Ping Wu (2012), Depression after exposure to stressful events: lessons learned from the severe acute respiratory syndrome epidemic, Comprehensive Psychiatry, Volume 53, Issue 1