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Has the COVID-19 pandemic affected the susceptibility to cyberbullying in India?



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ABSTRACT

Owing to the COVID-19 induced lockdown in India, most people's internet activity surged, leading to an expected increase in the rate of cybercrimes. This research focuses on analyzing whether the factors significant in cyberbullying susceptibility changed with the lockdown. The study was conducted by surveying 256 students before the pandemic, in October 2019, and 118 students during the lockdown, in June 2020. This included questions about the respondents' demographics, online presence, experience with offline bullying, perception of other's opinions, and the instances of cyberbullying that apply to them. The results showed factors important in both timespans, namely (i) experience with offline bullying; (ii) individuals' perceptiveness to others' opinions; (iii) frequency of social media posts. Additionally, in the period before lockdown, factors namely (i) tendency to interact with strangers online; (ii) whether they've started a relationship online (iii) hours spent on social media; were found significant. Conversely, during the lockdown, additional distinct factors namely (i) being opinionated on public platforms; (ii) preference of Instagram; (iii) preferred gaming platform; (iv) number of games played; (v) sexual orientation; (vi) age were significant. With the change in variables in the two timespans, we can conclude that the pandemic has affected our susceptibility to cyberbullying.

1. Introduction

Cyberbullying can be defined as hostile behavior via the use of information and communication technologies (ICT) to harm or cause discomfort to another (Camacho et al., 2014). With the ubiquity of internet access and social media accounts, cyberbullying has now become a prevalent concern among many young adults around the globe, transcending factors like sex, sexual orientation, age, etc. In a 2006 study of 1,500 adolescents, 33% of the respondents were found to be cyberbullied (Patchin and Hinduja, 2006). A February 2007 survey including 832 teenagers found that 43% of teens surveyed had been cyberbullied (Moessner, 2007). In a 2010 study by Tokunaga, about 20–40% of all youths had been cyberbullied (Tokunaga, 2010). According to Microsoft's 'Global Youth Online Behavior Survey' in 2012, covering more than 7,600 children across 25 countries aged between 8 and 17, India ranked third in the number of cyberbullying cases (53%) (Singh et al., 2015). The Ipsos report in November 2014 found that India was the highest in the number of child cyberbullying cases (32%) among 24 countries (Venkataraghavan, 2015). In spite of extensive studies in the past ten years of research, a study focusing on India specifically could not

be located. Hence, with such glaring statistics, it became essential to investigate the reasons and factors behind cyberbullying, which is one of the motivations behind this study.

An important aspect of the analysis revolves around the change in factors owing to the outbreak of the Coronavirus pandemic. A nationwide lockdown was implemented in India on 24th March 2020 and in the major metropolitan areas, the lockdown continued for another few months. The lockdown changed the external environment in all major aspects including interactions among social circles, attending school and college lectures online, and working from home. This change caused a dramatic increase in the online activity of most individuals. A study conducted in China during the pandemic revealed that more than 80% of the respondents noticed an increase in their Social Media Exposure (SME). This exposure, coupled with demographic trends, severely affected the mental health of these respondents who faced problems like depression and anxiety fueled by the fear of the uncertainty of the effects of the pandemic (Gao et al., 2020). Apart from this, owing to the growing digitalization and an increase in the "work from home" tradition, many cyber attackers have leveraged peoples' vulnerability to perform various acts of cybercrimes such as impersonation, data leaks, and targeting

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infrastructures such as healthcare and banking systems (Lallie et al., 2020). The increase in online banking transactions has left the majority of the population susceptible to phishing activities by perpetrators. Another aspect of cybercrimes that has not been covered in many analyses of the pandemic is cyberbullying.

During the pandemic, people have been isolated and thus, they are more vulnerable to the delinquencies of their bullies. Apart from this, individuals have also been actively posting new accomplishments they achieved during the pandemic induced lockdown and expressing their opinions more vocally than before since social media has now become the sole mode of communication for most individuals. When people consume more content online and have the majority of their social and professional interactions on these online mediums, regulating the activity is of utmost importance since people are more susceptible and vulnerable to comments and acts of hate online. In such situations, both the bully and the victim are not aware of the repercussions and endangerment of their actions online (Ozden and Icellioglu, 2014). Victims of cyberbullying often experience feelings of anger, powerlessness, fear, and sadness which is consistent with the negative effects of traditional bullying and with the added problem of anonymity in cyberbullying, victims tend to feel helpless as they are not aware how to stop such acts (Hoff & Mitchell, 2009). Keeping in mind such behavior and this growing trend, it was imperative to delve deeper and analyze the subsequent change in the factors affecting cyberbullying susceptibility and reasons for this change. Cyberbullying is a byproduct of both, increasing anxiety of individuals and the malevolence of cyber attackers. The motive behind this research study is to capture the various aspects of an individual which would make them more susceptible to cyberbullying during this pandemic and thus, keep regular checks and spread awareness for tackling the same.

This research study aims to identify which factors of an individual's demographics, social media presence, online gaming activity, indifference to others' opinions of them, and history of traditional bullying make them more susceptible to cyberbullying.

Even though there is a dispute over the correct definition of cyberbullying in the literature available (Beckman et al., 2012), there is a common factor that the definitions agree upon which is the 'intent to harm the victim' (Johnson, 2011). Since it is difficult to capture unbiased data that accurately explains the perpetrator's mindset towards harming the victim, we looked at this issue from the victim's point of view. The scope of this research is analyzing the factors significant to the susceptibility of the victim towards cyberbullying around a few specific instances as stated by Peled (2019) viz, (i) online harassment; (ii) stalking; (iii) posting derogatory comments about an individual and; (iv) sharing their images, videos or other information without consent.

This study was conducted in two parts: a group of respondents was surveyed in October 2019 (referred to as Period-I in this study), before the pandemic hit, and the same survey was then circulated to a similar group of individuals in June 2020 (referred to as Period-II in this study), once the pandemic induced lockdown was initiated. The objective of this research is to study these two groups individually and identify differences or similarities in the data collected before and during the pandemic and to test the same for significance when it came to cyberbullying susceptibility analysis. Among the various variables considered, three variables remained constantly significant irrespective of the COVID-19 pandemic. Apart from this, there was an increase in the number of variables that were found significant in Period-II than in Period-I.

The key contributions of this research are as follows:

1. The study was conducted solely in India, to analyze cyberbullying prevalent in Indian society, primarily in students, which is an area of study where research is currently lacking.
2. Variables under different aspects are considered including demographics, online presence (social media and gaming activity), history of traditional bullying encounters, and perception of others' opinions.

3. Unlike previous studies, a holistic approach has been employed in capturing the behavior of an individual to understand the effect on the susceptibility of cyberbullying.
4. Identification of changes in the aforementioned online behavior of an individual during the pandemic of COVID-19.
5. Studied the subsequent effect on susceptibility to cyberbullying as a result of these changes.

The factors considered give a holistic view of an individual's behavior and demographic as opposed to previously conducted research experiments that focused on one particular aspect in detail. The study also seeks to understand how a pandemic induced lockdown affects a specific area of cybercrime i.e. cyberbullying by understanding how the significance of these factors has changed with the lockdown implemented in India. This will not only help psychology experts discover new significant factors that may arise as a result of this pandemic but also identify factors that have been significant in cyberbullying susceptibility irrespective of the situation.

A description of the subsequent sections is as follows; in section 2, a review of the related literature in the relevant field of study is presented. Section 3 consists of the methodology employed for this research which describes the survey conducted and defines the variables considered. Section 4 illustrates the distribution of the data collected. Section 5 explains the inferential statistics conducted which defines the theoretical framework, specifies the statistical analyses conducted, and further elucidates the results. Finally, in section 6, the paper concludes with a summary of the findings and highlights the scope for future research.

2. Related work

Electronic bullying referred to as cyberbullying is a growing concern among teenagers and young adults, especially with the increasing influence of the internet and social media in our daily lives. As children's use of electronic communication technologies is unlikely to wane in the coming years, continued attention to electronic bullying is critical (Kowalski and Limber, 2007). It was also discovered that students who experienced cyberbullying, both as a victim and an offender, had significantly lower self-esteem than those who had little to no experience with cyberbullying (Patchin and Hinduja, 2010). Research findings suggest that experience with traditional bullying and cyberbullying is associated with an increase in suicidal ideation (Hinduja and Patchin, 2010). Emotional and behavioral problems exist not only among bullies, but also among victims, and bully-victims. Hence, it is imperative that treatment should not only focus only on the victims of bullying, as it is equally important for the bullies and bully-victims (Leiner et al., 2014).

Further studies into the same showed that the most common methods for electronic bullying, as reported by both victims and perpetrators, involved the use of instant messaging, chat rooms, and e-mail (Kowalski and Limber, 2007; Huang and Chou, 2010). Despite the adverse effects caused as a result of cyberbullying, research conducted showed that most teenagers would take no action, when told by their peers about a cyberbullying incident involving a mutual connection, to avoid conflicts and maintain group harmony (Huang and Chou, 2010). Awareness needs to be spread to not be passive about cyberbullying incidents as studies have clearly indicated that adolescents and young adults have experienced negative effects from receiving a cyberbullying message (Johnson, 2011).

A study showed that 20% of the youth population surveyed was involved in cyberbullying either as a victim, a bully, or both. The study further showed that younger students who spent more time playing games on weekdays while being more confident in cyberspace and active in using mobile phones are more likely to be involved in cyberbullying than other students (Shin and Ahn, 2015). Another study revealed that Facebook and text messaging were the most frequent mediums for cyberbullying and that sexual-minority students and students who texted at least 50 times per day were more likely to report cyberbullying

victimization (Rice et al., 2015). Another factor that was found to have high outcomes of cyberbullying victimization were individuals with disabilities (Kowalski et al., 2016). Social influence was found to have a significant impact on the cyberbullying behavior and intention of a person (Lee and Wu, 2018). Further findings also suggested that inherent factors like social media usage and cyber engagement amplify detrimental acts like cyberbullying, cyber harassment, and cyberstalking (Al-Rahmi et al., 2018; Peled, 2019). Many social media users have observed a spike in the amount of time they spent on social media, owing to the pandemic. This proportion of SME was higher among females than males, and younger people as compared to the elder. This could have possibly led to increased activity in cyberbullying as higher SME was found to be positively associated with the prevalence of mental health problems which was found to be highly associated with cyberbullying activity (Gao et al., 2020; Beckman et al., 2012).

One of the key challenges of understanding the impact of cyberbullying was found to be the victim’s perspective of the cyberbullying act (Camacho et al., 2014). Hence, the research conducted is more victim-centric, to get an objective understanding of the victim’s perspective. Over the years, studies have looked into different aspects of an individual’s persona specific to their demographics (Rao et al., 2018); or monitoring their online activity (Camacho et al., 2014; Chang et al., 2015); or targeted factors like having a disability (Kowalski et al., 2016); or if their mental health is not satisfactory (Beckman et al., 2012). Through this study, a holistic approach has been used to capture the various factors of an individual like their demographics, social media presence, gaming activity, and other factors to deep dive into their persona and identify what is making them more susceptible to cyberbullying. As there is a major change in the online environment and activity owing to the lockdown, with businesses and schools going completely online, this study aims to analyze the change in the susceptibility of cyberbullying of a person before and during the pandemic, which has not been explored in previous studies.

3. Methodology

The methodology employed for the research conducted is illustrated

in Fig. 1. As we want to address cyberbullying susceptibility based on an individual’s holistic profile, the following research questions are formulated to address these different aspects. The key research questions this study aims to answer are as follows:

1. Is there any change in the effect of *Demographics* on cyberbullying due to COVID-19?
2. Is there any change in the effect of *Social Media Presence* on cyberbullying due to COVID-19?
3. Is there any change in the effect of *Online Gaming Activity* on cyberbullying due to COVID-19?
4. Is there any change in the effect of *Traditional Bullying* on cyberbullying due to COVID-19?
5. Is there any change in the effect of *Perception of Opinions* on cyberbullying due to COVID-19?

To answer these questions, data were collected through surveying and statistical analysis was conducted in the flow shown in Fig. 1. These answers will help us determine the change in an individual’s susceptibility to cyberbullying due to COVID-19.

The data was gathered through primary research mainly targeted towards university students present in the Mumbai region, India. The same survey was circulated to the same target audience in two time periods i.e. October 2019 (Period-I), before the pandemic (256 respondents) and June 2020 (Period-II), once the pandemic induced lockdown was initiated (118 respondents). Since the responses were anonymous, despite having circulated the survey among the same target group, it was not possible to ensure that the same set of people responded to it.

Fig. 2 illustrates the flow of the survey circulated to the respondents. The first section focuses on the various demographics of an individual which could help us identify demographic trends among victims. The second section focuses on the social media presence of an individual which is a crucial research question for our study. After the second section, the respondent was asked whether or not they game online. If the response to the question was “Yes”, the respondent was directed towards the third section consisting of additional questions on their gaming

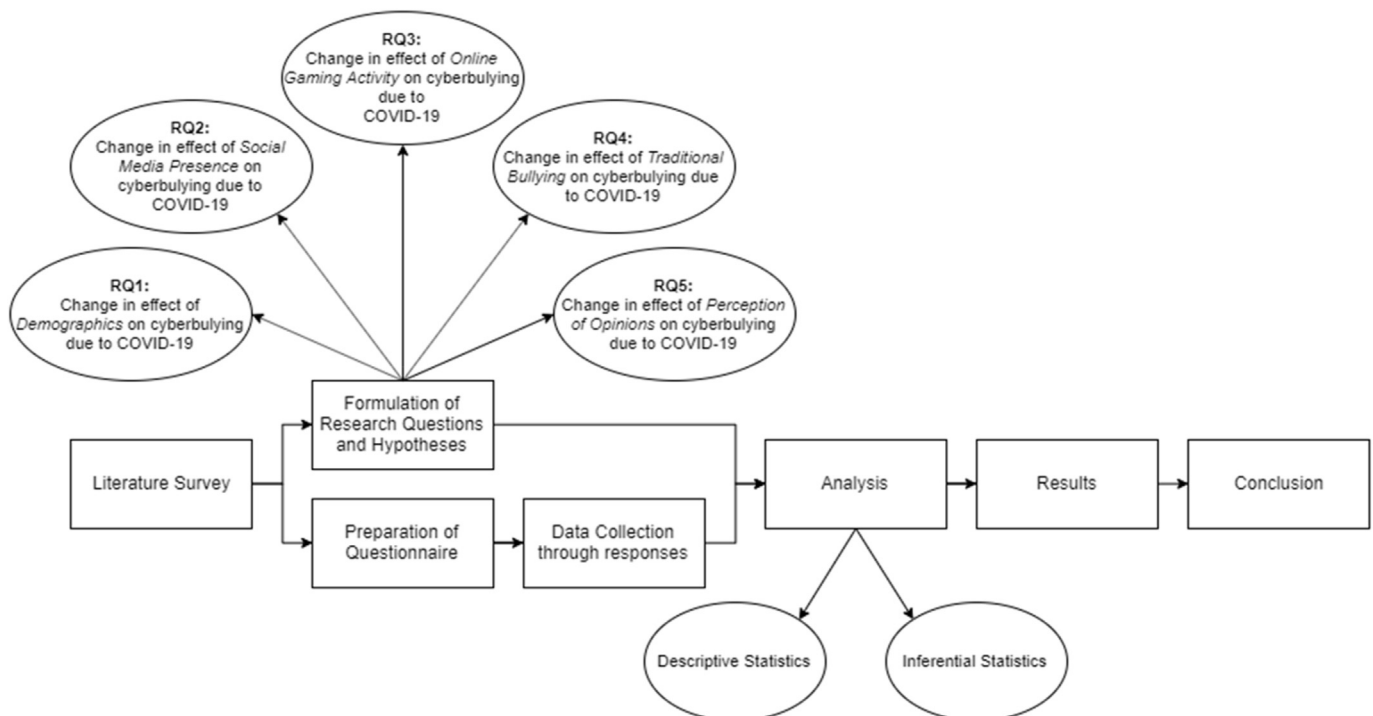


Fig. 1. Research Methodology followed.

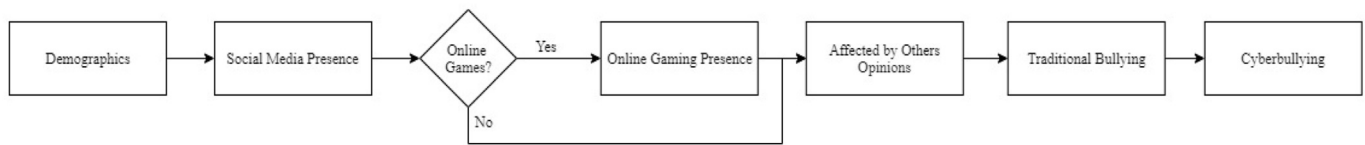


Fig. 2. Flow of the survey circulated among the target group.

activity, and respondents who answered “No” were directed towards the two additional questions regarding their perceptiveness to others’ opinions and bullying history. The fourth section is aimed at gathering more implicit insights from the respondents regarding particular cyberbullying instances. Various questions about their cyberbullying history were asked along with questions regarding the actions they took against those bullies, whether the perpetrator was known to them and if they were negatively impacted. The variables mentioned in Fig. 2 has been extensively explained in the following subsections.

3.1. Independent variables

3.1.1. Demographics

The demographics of a person were obtained by incorporating variables such as *sex*, *sexual orientation*, *age*, *religion*, *residence* (mainly categorized based on Mumbai as primary location), and presence of *disabilities*. Studies by Rao et al. (2018), rank India third in the world in cyberbullying thus, the location of the victims must be studied to get a better understanding of their susceptibility. The subjects between the ages of 15–25 years were surveyed and data regarding their Sex (Male, Female, Prefer not to disclose), Sexual Orientation (Homosexual, Heterosexual, Asexual, Bisexual and Prefer not to disclose), Religion (Hindu, Muslim, Jain, Christian, Sikh, Buddhist, Zoroastrian, Atheist/Agnostic, Other) and Residence (Suburban Mumbai, Central Mumbai, South Mumbai and Outside Mumbai) was collected. The studies by Kowalski et al. (2016) concluded that individuals with disabilities are particularly at risk of Cyberbullying thus, subjects were questioned on whether they have disabilities (physical or psychological).

3.1.2. Social media presence

The social media presence of the user was captured using several variables which included the number of social media accounts used (*num_sm_accounts*), top 3 most preferred social media platforms, hours spent on social media per day (*sm_hours*), posting frequency in a month (*sm_posts*), years since they joined social media (*sm_years*), degree of engagement with strangers online (*forums*) and the tendency of sharing polarized views online (*sm_opinions*). According to Camacho et al. (2014), the medium of communication between the bully and the victim plays a vital role in the susceptibility and this medium also contributes to the severity of cyberbullying. A victim may be more susceptible if their preferred social media platforms lack the technological mechanism to detect and prevent such activities and thus, the top 3 preferred social media platforms were collected by the user. For this, options namely *Facebook*, *WhatsApp*, *Instagram*, *Snapchat*, *Twitter*, *YouTube*, *LinkedIn*, *Hike*, *Telegram*, *Tumblr*, *Pinterest*, *Reddit*, and a popular online dating app, *Tinder* were given to the user to choose from.

3.1.3. Online gaming

Online gaming has shown to cultivate a feeling of aggression among teenagers (Anderson et al., 2010; Chang et al., 2015; Johnson and Pupilampu, 2008) which may increase their likelihood of bullying someone online. Studies by McInroy and Mishna (2017) show that at least 3% of individuals witnessed cyberbullying once or twice while gaming online. Thus, it is imperative to look at various aspects of online gaming that may increase one’s susceptibility to cyberbullying. For the same, we asked the subjects if they play games online (*games*). The subjects who responded “Yes” for the same were then further questioned

in more detail about their gaming activities namely the number of games they play (*num_games*), since how many years they have been gaming (*g_years*), how many hours in a day they spend gaming (*g_hours*) and their preferred online gaming chat platform (*g_platform*) which included channels like *Discord*, *Steam*, *Twitch*, *Faceit*, and *In-game chat*.

3.1.4. Bullied offline

The difference between “traditional” or offline bullying and cyberbullying is that offline bullying is usually face-to-face and one can eliminate it by withdrawing oneself from the encounter. These differences in their definitions are a matter of debate as is the inclusion or exclusion of the elements of offline bullying in cyberbullying (Slonje et al., 2013). Generally cyberbullying is more debasing, often more intentional and mostly repeated as opposed to offline bullying (Hinduja and Patchin, 2010). It is hence worth exploring if an individual’s experience with offline bullying (*bulled_offline*) makes them more likely to fall prey to cyberbullying.

3.1.5. Others’ opinion

Another important factor to consider is an individual’s perspective when it comes to others’ opinions of them (*others_opinions*). The subjects were asked to respond to a forced-choice Likert scale when asked about the extent to which they get affected by others’ opinions of them. An individual’s state of mind is crucial in perceiving an act as intended harm and cyberbullying (Camacho et al., 2014).

3.2. Dependent variable

3.2.1. Encounter with cyberbullies

The key part of our dataset is the dependent variable as our analysis hinges on the significance of the independent variables affecting this variable. However, when a cyberbullying act is carried out, often the victim does not realize it is an act of cyberbullying, which makes it difficult to measure the impact of the act on the victim (Camacho et al., 2014). This makes it challenging to get relevant data even from a survey, where a situation of the respondent being unaware of getting cyberbullied is extant. Hence, the ambiguity of a question as subjective as “Have you been cyberbullied?” has been replaced with a more objective set of questions by asking the respondents if they have experienced a particular activity that could undeniably be construed as an act of cyberbullying. These activities are viz, (i) sexual harassment; (ii) derogatory comments; (iii) stalking, and; (iv) sharing personal information without consent through the internet. Then, for the purpose of the research, the final dependent variable (*cyberbullied*) was computed by performing the logical ‘OR’ operation on each of the 4 (boolean) aforementioned forms of cyberbullying to determine if the individual had been cyberbullied or not.

3.3. Miscellaneous variables

The following variables gather information about the victim’s response to cyberbullying which would not aid the analysis of cyberbullying susceptibility and thus, have not been included in the statistical tests. However, these variables provide relevant insights into the victim’s experience with and reaction to cyberbullying. Respondents whose response to any of the aforementioned questions to Cyberbullying was “No” were given the option of “Does Not Apply To Me” in the following

questions.

3.3.1. Proximity to perpetrator

This variable gives us insights into whether the victim knew the perpetrator as most victims are unaware of who their perpetrator is (Kowalski and Limber, 2007). The respondent was asked whether or not they knew their bully since social media enables the perpetrator to anonymously bully the victim. Respondents were asked if they knew the perpetrator, knew the perpetrator in some instances, or didn't know the perpetrator.

3.3.2. Victim's response

The victim's response to cyberbullying is crucial in understanding the victim's mindset. The respondents were asked what action they took against the cyberbully to understand the intensity with which they reacted to the bullying. They were given the following options to choose from:

- o Reported them to the concerned Government Authorities.
- o Reported/Blocked them on the respective Social Medium.
- o Removed them from your Social Medium (Unfriended/Unfollowed them).
- o Confronted them/Called them out for it on Social Media.
- o Ignored them.

3.3.3. Negatively impacted

Considering the aforementioned negative impacts of cyberbullying, it is also imperative to understand how the respondents were affected by their encounter with a cyberbully. The respondents were asked if they were negatively impacted by any of the four incidents mentioned in the previous question about cyberbullying with the options "Yes", "Maybe" and "No".

4. Descriptive statistics

The data distribution tables in this subsection enable us to draw relevant insights from the data and obtain a general understanding of the background of the respondents. It forms the basis of our hypotheses defined in the next section.

Table 1 describes the distribution of the categorical variables in terms of percentage of the number of observations in the respective categories to the total number of observations, in Period-I and Period-II.

From Table 1 it can be observed that there has been a shift in the social media platforms during the lockdown. There is a significant increase in the percentage of people preferring LinkedIn, WhatsApp, and Telegram, whereas a decrease is seen in Snapchat and Pinterest as a preferred social medium. It was also noticed that even with an increase in social media usage, the percentage of people interacting with strangers online across different forums decreased during the lockdown (from 15.63 to 5.93) and the percentage of people expressing their opinions on social media also dropped (from 20.31 to 14.41). Apart from this, there was an increase in the percentage of individuals (from 53.91% to 61.02%) who started online gaming during the COVID-19 period.

Table 2 illustrates the mean and standard deviation of the numerical variables in Period-I and Period-II.

Table 2 illustrates the mean and standard deviation of the numerical variables in Period-I and Period-II. From Table 2 we observe that variables such as age, num_sm_accounts, sm_hours, sm_years, sm_years, and g_hours have seen an increase in their average in Period-II. Since people have more time on their hands during the lockdown, they have created new social media accounts and spend more time on it on average. An increase in the time spent on online gaming activity has also been observed in Period-II. The average number of gaming years has reduced in Period-II due to the increase in the percentage of individuals (as seen in Table 1) who started online gaming during the lockdown, reducing the average from 2.33 years to 1.89. Furthermore, an increase in daily online gaming activity has also been observed in Period-II.

Table 1 Distribution of data for categorical variables.

Categorical Variables	Category	Period-I Percentage (%)	Period-II Percentage (%)
sex	Male	60.16	53.39
	Female	39.06	46.61
	Prefer not to say	0.78	-
sexual_orientation	Asexual	1.17	0.85
	Bisexual	5.08	4.24
	Heterosexual	79.69	90.68
	Homosexual	6.64	3.39
	Prefer not to disclose	7.42	0.85
religion	Atheist/Agnostic	12.11	8.47
	Buddhist	0.39	0.85
	Christian	2.34	5.08
	Hindu	60.94	63.56
	Jain	11.72	12.71
	Muslim	7.81	2.54
	Sikh	1.17	1.69
	Zoroastrian	2.73	5.08
	Others	0.78	-
residence	Central Mumbai	16.01	11.86
	Outside Mumbai	10.55	30.51
	South Mumbai	15.23	10.17
	Suburban Mumbai	58.20	47.46
disabilities	Yes	5.86	0.85
	No	94.14	99.15
top_social_media ^a	Snapchat	43.75	32.20
	Instagram	84.76	84.74
	Facebook	13.28	13.55
	Twitter	6.25	5.93
	Youtube	32.03	33.05
	Whatsapp	75.00	82.20
	Telegram	2.73	7.62
	Hike	0.39	0
	Tinder	0.39	0
	Tumblr	1.17	0
	Pinterest	3.90	0.84
	Reddit	4.29	5.93
	LinkedIn	2.73	16.94
forums	Yes	15.63	5.93
	Sometimes	41.41	49.15
	No	42.97	44.92
sm_opinions	Strongly	20.31	14.41
	Weakly	22.27	21.19
	Don't express	57.42	64.41
relationship	Yes	18.36	17.80
	No	81.64	82.20
games	Yes	53.91	61.02
	No	46.09	38.98
g_platform	Discord	13.67	16.10
	In-game Chat	33.98	39.83
	None	46.09	38.98
	Steam	5.47	3.39
	Twitch	0.78	-
	Facelt	-	1.69
bullied_offline	Yes	35.55	35.59
	No	64.45	64.41
others_opinions	Strongly Agree	9.38	8.47
	Agree	47.66	58.47
	Disagree	29.69	19.49
	Strongly Disagree	13.28	13.56

^a NOTE: Respondents were asked their top 3 preferred social media platforms. The percentage represents the number of respondents that said they use the respective social media platform divided by the total number of respondents in each period.

5. Inferential statistics

The following section focuses on the framework created to determine the relationship between the dependent and independent variables and define the hypotheses for the study. The appropriate statistical tests have been employed based on whether the independent variables are categorical or numerical, and the corresponding results are mentioned in the following subsections.

Table 2
Distribution of data for numerical variables.

Numerical Variables	Period-I		Period-II	
	Mean	SD	Mean	SD
<i>age</i>	18.96	1.58	20.36	1.91
<i>num_sm_accounts</i>	4.39	2.46	4.84	2.63
<i>sm_hours</i>	3.72	2.80	4.02	2.05
<i>sm_posts</i>	2.68	5.61	2.32	5.55
<i>sm_years</i>	5.64	2.50	6.64	2.15
<i>num_games</i>	1.94	6.59	1.72	2.51
<i>g_hours</i>	1.03	2.03	1.22	1.77
<i>g_years</i>	2.33	3.15	1.89	2.54

5.1. Theoretical framework

Fig. 3 illustrates the theoretical framework which explains the formulation of the following non-directional hypotheses. The hypotheses are formulated for each of the independent variables on the left of the theoretical framework with the dependent variable on the right in Fig. 3.

H₀. Variables Xi and Y are independent $\forall i$ in [1, 21]

H_a. Variables Xi and Y are dependent $\forall i$ in [1, 21]

5.2. Analysis

The following subsections describe the various tests of significance performed for hypothesis testing on both, the categorical and numerical variables.

5.2.1. Categorical variables

For the analysis of categorical variables, the Chi-square test of independence was performed on variables that satisfied the assumptions of Chi-square (McHugh, 2013). Variables viz, *g_platform*, *bullied_offline*, *sexual_orientation*, *disabilities*, *forums*, *games*, *others_opinions*, *relationship*, *residence*, *sm_opinions*, *Snapchat*, *Instagram*, *Facebook*, *Twitter*, *YouTube*, *WhatsApp* in Period-I dataset and variables viz, *bullied_offline*, *games*, *relationship*, *sex*, *residence*, *sm_opinions*, *Snapchat*, *Instagram*, *Facebook*, *YouTube*, *WhatsApp*, *LinkedIn* in Period-II dataset fulfill the aforementioned assumptions.

Fisher's Exact Test was performed for the variables that violated the assumptions for the chi-square test of independence. Of the variables that violated the aforementioned assumptions for Chi-square, variables *Hike*, *Tumblr*, and *Tinder* in the Period-II dataset violated the assumptions of Fisher's Exact Test (Shan and Gerstenberger, 2017) and hence this test cannot be performed on these variables. Variables viz, *sex*, *religion*, *Telegram*, *Hike*, *Tinder*, *Tumblr*, *Pinterest*, *Reddit*, *LinkedIn* in Period-I and variables viz *disabilities*, *forums*, *g_platform*, *others_opinions*, *religion*, *sexual_orientation*, *Twitter*, *Telegram*, *Pinterest*, *Reddit* in Period-II fulfilled the assumptions of Fisher's Exact Test.

Table 3 describes the categorical variables that were found significant.

5.2.2. Numerical variables

Three tests of significance viz Multivariate Analysis of Variance (MANOVA), Non-parametric Correlation (Spearman correlation), and Multiple Logistic Regression were performed to identify numerical variables that determined cyberbullying susceptibility.

For the MANOVA test, dependent variables were taken as *age*, *g_hours*, *g_years*, *num_games*, *num_sm_accounts*, *sm_hours*, *sm_posts*, *sm_years*, and the independent variable was taken as *cyberbullied* to comply with the assumptions of MANOVA (French et al., 2008) in Period-I and Period-II.

For Spearman Correlation and Multiple Logistic Regression, all numerical (independent) variables viz *age*, *g_hours*, *g_years*, *num_games*, *num_sm_accounts*, *sm_hours*, *sm_posts*, *sm_years* satisfy the assumptions of Spearman Correlation (Verma and Abdel-Salam, 2019) and the assumptions of Multiple Logistic Regression (James et al., 2013) with our

dependent variable as *cyberbullied*. Table 4 describes the numerical variables that were found significant.

5.3. Results and discussions

In Period-I variables viz *bullied_offline*, *forums*, *others_opinions*, *relationship*, *sm_hours*, *sm_posts* and in Period-II variables viz *bullied_offline*, *sm_opinions*, *Instagram*, *g_platform*, *others_opinions*, *sexual_orientation*, *age*, *sm_posts*, *num_games* rejected their respective null hypotheses, implying that these variables significantly impact the dependent variable, *cyberbullied*. While it is noteworthy that *bullied_offline*, *others_opinions*, and *sm_posts* are significant in Period-I as well as Period-II, additional variables have emerged, and a few existing variables have become insignificant in Period-II as a result of increased social media and online gaming activity.

Based on the variables found significant with the aforementioned tests, further post hoc analysis revealed that ages 17–18 were highly susceptible to cyberbullying as almost 80% of this age group was cyberbullied in Period-II. In Period-I, around 79% of the respondents that were bullied offline were also cyberbullied and in Period-II, 66.67% of the respondents that were bullied offline continued to be cyberbullied even amidst the lockdown. Further, according to the data, individuals' interaction with strangers online reduced in Period-II from 15.62% to 5.9%. This showed a subsequent reduction in Cyberbullying instances among these individuals since in Period-I, 'forums' was a significant factor with 80% of individuals interacting with strangers on various online forums being cyberbullied. While considering the respondents' state of mind, specifically their perception of others' opinions of them, 91.6% of the individuals who strongly agreed that they were affected by others' opinions were cyberbullied in the Period-I dataset and 100% of them were cyberbullied in the Period-II dataset. Aside from this, respondents recorded a general increase in the average time they spent on social media, 3.72 h in Period-I to 4.01 h in Period-II. Respondents who posted more than 5 times a month on social media were 82.74% probable to be cyberbullied in Period-I and Period-II and respondents who express their opinions strongly on these social media platforms were 82.35% probable to be cyberbullied in Period-II. Among these social media platforms, Instagram seems of particular interest in the susceptibility analysis in Period-II with around 57% of the respondents who were active users of the platform being cyberbullied. Not only social media activity but also online gaming activity surged and individuals who played more than 10 games in Period-II were 100% probable to be cyberbullied.

From the results obtained, we can further answer the research questions raised in Section 3 for the scope of this study. As the age (*age*) and sexual orientation (*sexual_orientation*) of an individual became significant in determining their cyberbullying susceptibility only during Period-II, we suspect that there has been a change in the effect of the demographics on cyberbullying due to COVID-19. A possible reason for *age* to be significant, particularly the age group of 17–18 only in Period-II, is suspected to be due to the shift in classes to an online mode for students. As a result of this, there is a heavy surge in the number of hours spent online as well as the rate of cyberbullying activity. Unlike most research findings, our sample did not show gender to be a significant variable in determining the cyberbullying susceptibility of an individual.

When it comes to the social media presence of an individual, from the analysis conducted it was found that variables such as an individual's degree of engagement with strangers on various online forums (*forums*), their experience of starting relationships through a social medium (*relationship*), the number of hours spent on social media on an average daily (*sm_hours*) and the frequency with which they post in a month (*sm_posts*), were found significant in Period-I. On the other hand, variables that included the degree with which an individual voices their opinions on social media (*sm_opinions*), how preferred is Instagram as their top social medium (*Instagram*), and the frequency with which they post in a month (*sm_posts*), were found significant in Period-II. Thus, with the change in variables (except *sm_posts*) that were significant in Period-I and Period-II, we can conclude that there has been a change in the effect

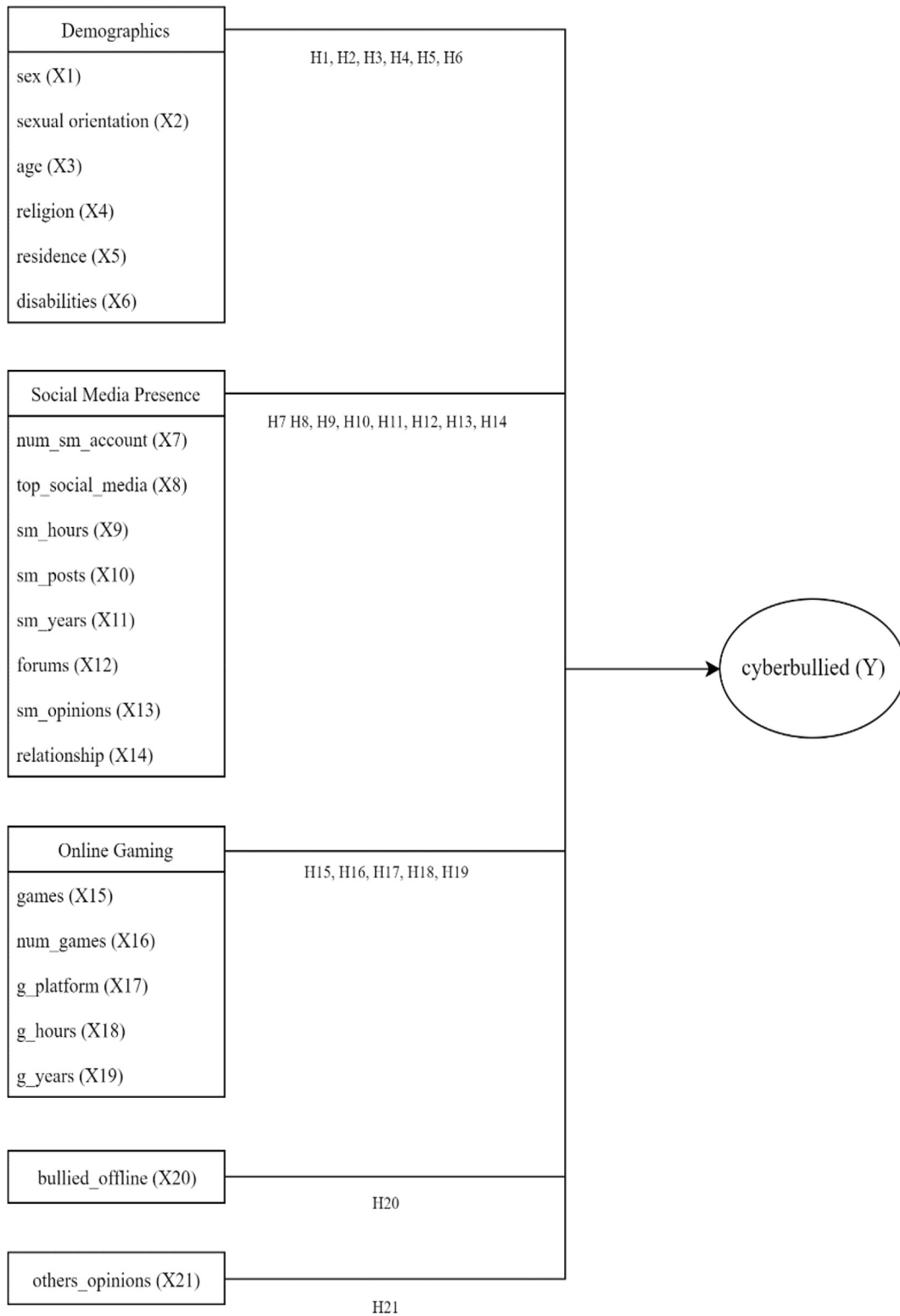


Fig. 3. Theoretical framework.

of the social medium presence of an individual on cyberbullying as a result of COVID-19. Despite the increase in engagement with strangers online, *forums* and *relationships* became insignificant in Period-II. The variable *sm_hours* is suspected to become insignificant during Period-II as there has been an increase in the amount of time spent on social media for everyone, making it a common trait in Period-II which wasn't necessarily the case in Period-I. *sm_posts* stayed significant in both the

periods and this is suspected to be due to its distribution remaining approximately the same (refer to Table 2). The variable *sm_opinions* emerged as significant only in Period-II and this is suspected to be due to more number of people openly expressing their opinions during this period. The amount of cyberbullying on Instagram reduced from 63.13% to 57% from Period-I to Period-II. This reduction is suspected to be the reason for *Instagram* to be significant during Period-II.

Table 3
Result of chi-square and Fishers tests on categorical variables.

Test	Period-I		Period-II	
	Variable Name	Significance Level ^a	Variable Name	Significance Level ^a
Chi-square	<i>bullied_offline</i>	0.000457	<i>bullied_offline</i>	0.03647
	<i>forums</i>	0.003762	<i>sm_opinions</i>	0.01799
	<i>others_opinions</i>	0.01862	<i>Instagram</i>	0.04243
	<i>relationship</i>	0.000157	-	-
Fishers	-	-	<i>g_platform</i>	0.027
	-	-	<i>others_opinions</i>	0.00033
	-	-	<i>sexual_orientation</i>	0.04976

^a NOTE: a two-tailed test was performed with the confidence level as 90%.

Table 4
Results of MANOVA, non-parametric spearman correlation and multiple logistic regression on numerical variables.

Test	Period-I		Period-II	
	Variable Name	Significance Level ^a	Variable Name	Significance Level ^a
MANOVA	<i>sm_hours</i>	0.04112	<i>age</i>	0.02965
Non-parametric Spearman Correlation	<i>sm_posts</i>	0.002013	<i>age</i>	0.01725
Multiple Logistic Regression	-	-	<i>sm_posts</i>	0.004065
	-	-	<i>age</i>	0.01266
	-	-	<i>num_games</i>	0.02711

^a NOTE: a two-tailed test was performed with the confidence level as 90%.

With respect to online gaming activity, from the analysis performed the number of online games an individual plays (*num_games*) and their most-used platform for interacting with other players (*g_platforms*) became a significant factor in determining their susceptibility to cyberbullying only during Period-II. A possible reason for this could be that not only did the activity of existing online gamers increase but also new individuals that previously did not partake in online games were now exposed to the environment of toxic gaming where cyberbullying is highly prevalent. Thus, with the emergence of new variables in Period-II, we suspect that there is a change in the effect of Online Gaming Activity on cyberbullying due to COVID-19.

When it comes to the effect of past traditional bullying experiences on the cyberbullying susceptibility of an individual, this variable (*bullied_offline*) is significant in both the periods. This leads us to conclude that COVID-19 has no impact on its effect to the cyberbullying susceptibility of an individual, which is mainly due to the fact that an individual's response will mostly not change for this question as there are very few chances of traditional bullying occurring during Period-II, where it is essential to follow social distancing norms.

As far as the perception of opinions is concerned, the variable *others_opinions* was a significant variable in Period-I as well as Period-II. This implies that the COVID-19 induced lockdown had no impact on the effect of one's perception of others' opinions about them, on their cyberbullying susceptibility. Additionally, one's perception of others' opinions about them also affects how severe they perceive an act of cyberbullying to be. This result is consistent with the hypothesis proposed by Camacho et al. (2014).

6. Conclusion and future scope

This study works towards giving a comparative analysis of the factors significant in determining the susceptibility to cyberbullying of a person, before and during the pandemic. Owing to the fact that some factors that were prevalent before were significant during the pandemic too, give a clear indication of the fact that these factors are deep-rooted and significant despite a change in the external environment of the victims. It is essential that these factors are specifically targeted while conducting cyberbullying awareness workshops or campaigns. There was a noticeable increase in the factors affecting cyberbullying susceptibility during

the COVID-19 pandemic as a result of an increase in social media and online gaming activity. New factors emerged such as Instagram as a preferred social media platform along with the number of games and gaming chat platforms preferred by respondents. Apart from these, even demographics of the respondent such as their age and sexual orientation were found significant during the COVID-19 pandemic, which were not significant before. The emergence of these new factors and their degree of significance, depicts a change in cyberbullying susceptibility and can provide for the basis of study for future researchers.

According to our data, the most prominent form of cyberbullying is stalking (71.21%) followed by posting derogatory comments (64.39%), leaking pictures/videos online (41.67%), and harassing (21.97%). This also signifies that most individuals have faced more than one type of cyberbullying. Cyberstalking is a predominant aspect of cybercrimes and further studies can be conducted focusing primarily on this form of cyberbullying. The majority of the victims said that they were not negatively impacted by the act (37.88%), whereas 30.30% said they were negatively impacted yet the most severe action taken by the majority of victims was only reporting or blocking the perpetrators on social media platforms (39.39%), followed by ignoring them (29.55%). Merely 4.55% of the victims took legal action against the bully by reporting them to the concerned government authorities. Since in 68.18% of the cases, the perpetrator was known to the victim, this might be the reason for the low rates of reporting the cyberbullying acts. The trends for these statistics of the forms of cyberbullying and the actions against the perpetrator are consistent in both periods i.e. before and during the COVID-19 pandemic. Various stakeholders such as students, parents, government authorities, psychology experts, and researchers can leverage these findings to spread more awareness about the impacts of cyberbullying to curtail the number of cases and encourage the victims to report these cases to proper authorities.

Further studies from the bully's perspective can also be conducted to get more information on the various reasons behind cyberbullying. Apart from this, studies can focus on the causal relations between the various significant factors. Statistical post hoc tests can be conducted to delve deeper into these causal relations. Various interaction effects can also be considered to get a better understanding of the matter and create a profile for an individual who is more susceptible to cyberbullying and understand its impact on different demographic groups. Furthermore, studies can be expanded to test on larger datasets to get a more generalized understanding of significant factors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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