The Impact of COVID-19 Infodemic on Depression and Sleep Disorders; Focusing On Uncertainty Reduction Strategies and Level of Interpretation Theory

Soyoung Jung, Sooin Jung

Submitted to: JMIR Formative Research
on: August 02, 2021

Table of Contents

The Impact of COVID-19 Infodemic on Depression and Sleep Disorders; Focusing On Uncertainty Reduction Strategies and Level of Interpretation Theory

Soyoung Jung[1*] PhD; Sooin Jung[2*] PhD

[1]The School of Journalism and Communication Renmin University of China Beijing CN
[2]College of Education Department of Kinesiology and Health Education University of Texas, at Austin Austin US
[*]these authors contributed equally

Corresponding Author:
Soyoung Jung PhD
The School of Journalism and Communication
Renmin University of China
59 Zhongguancun Street, Haidian District,
Room 502, Mingde Building,
Beijing
CN

Abstract

Background: Along with the pandemic situation, information diffusion about the COVID-19 has attracted public attention through SM. WHO (World Health Organization) declared a term “infodemic” that indicates “overwhelming amounts of information about COVID-19;” the misinformation and disinformation from SM could promote adverse psychological effects.

Objective: The current study uses the hypothetical distance of construal level to predict peoples’ negative psychological symptoms from social media usage. The psychological distance of construal-level theory (CLT) intends to show peoples’ psychological proximity about objects and events, applied to the COVID-19 pandemic situation for this study. Also, this study links the uncertainty reduction strategy (URS) and CLT to preventive behaviors of COVID-19 and affective reactions to see their effects on mental health problems.

Methods: With an online survey, the social media users were asked to answer their social media usage behavior, concern on COVID-19, URS, hypothetical distance with COVID-19, preventive behaviors, affective reactions, and psychological disorders symptoms including anxiety and sleep disorder.

Results: After measuring participants’ SM usage behavior, it is concluded that an increase in general SM usage led to the use of URS and higher construal-level (CL) on COVID-19. The URS results in preventive behaviors, but CLT doesn’t show any association with preventive behaviors while it increases affective reactions. Moreover, increased preventive behavior reduced symptoms of mental health problems, i.e. depression, and sleep disorders. However, the affective reaction tends to be positively associated with depression and sleep disorder.

Conclusions: Due to the “infodemic” of COVID-19, the pandemic situation’s psychological perception negatively influenced users’ psychological symptoms. The findings of this study imply that the information from SM usage heightened the concerns. Still, SM users with higher URS equip preventive behavior, which lowers the mental problems, while those with lower URS and more emotional reaction show negative mental symptoms.

(JMIR Preprints 02/08/2021:32552)
DOI: https://doi.org/10.2196/preprints.32552

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users. Only make the preprint title and abstract visible.

No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✔ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**

Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v

Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Original Manuscript

The Impact of COVID-19 Infodemic on Depression and Sleep Disorders; Focusing On Uncertainty Reduction Strategies and Level of Interpretation Theory

Abstract

Along with the pandemic situation, information diffusion about the COVID-19 has attracted public attention through social media. The WHO declared an infodemic of coronavirus disease (COVID-19) on February 15, 2020. Misinformation and disinformation, including overwhelming amounts of information about COVID-19 from social media, could promote adverse psychological effects. The current study uses the psychological distance of construal level to predict peoples' negative psychological symptoms from social media usage. The psychological distance of construal-level theory (CLT) intends to show peoples' psychological proximity about objects and events, applied to the COVID-19 pandemic situation for this study. Also, this study links the uncertainty reduction strategy (URS) and CLT to preventive behaviors of COVID-19 and affective reactions to see their effects on mental health problems. A path model was tested (N=297) with data from an online survey to examine how social media usage behaviors are associated with URS and psychological distance with COVID-19 (CLT), leading to preventive behaviors and affective reactions. Finally, the path model was also examined how preventive behaviors and affective reactions are associated with mental health problems, including anxiety and sleep disorder. After measuring participants' social media usage behavior, it is concluded that an increase in general social media usage led to the higher use of URS and lower construal-level on COVID-19. The URS is associated with preventive behaviors, but CLT doesn't show any association with preventive behaviors while it increases affective reactions. Moreover, increased preventive behavior showed negative associations with symptoms of mental health problems, i.e., depression and sleep disorder. However, the affective reaction tends to be positively associated with depression and sleep disorder. Due to the "infodemic" of COVID-19, the psychological perception of the pandemic negatively influenced users' mental health problem. The findings of this study imply that the information from social media usage heightened concerns so that they have lower construal level, which doesn't help them take preventive actions but reinforces the negative emotional reaction and mental health problem. Thus, higher URS is a desirable strategy to be equipped.

Keywords: COVID-19, Social Media, Infodemic, Construal Level Theory, Uncertainty Reduction Strategy (URS), Depression, Sleep Disorders, Preventive Actions, Affective Reaction.

Introduction

The pandemic situation caused by Coronavirus Disease 2019 (COVID-19) is still on the verge of going on globally after the World Health Organization (WHO) declared the pandemic outbreak as of March 11, 2020 [1]. Moreover, the second wave of the COVID-19 pandemic in European countries was observed in the summer of 2020 [2, 3]. And WHO reported that most confirmed cases and deaths were found in the U.S. due to COVD-19 [4]. Also, COVID-19 introduced NPI (Non Pharmical Interventions) to people's lives, which negatively impacted their everyday life, i.e., working, studying, schooling, shopping, and dining [4–6]. Large portions of people's everyday life changed to telecommuting (working remotely) and online learning. The NPI lifestyle pattern (i.e., limited offline activities) have possibly impacted people's psychological responses such as anxiety, depression, and sleep disorder [7].

For over 20 years of pandemic outbreaks history, i.e., severe acute respiratory syndrome (SARS) in 2002, A/H1N1 influenza pandemic in 2009–2010, and Middle East Respiratory Syndrome (MERS) Coronavirus in 2015, including COVID-19, healthcare workers' psychological symptoms have been mostly examined [8, 9], however, relatively few studies focused on ordinary people's psychological symptoms [10]. Compared to previous pandemic outbreaks, COVID-19 has occurred uniquely in the age of social media. As a result of these changes and self-isolation, people's social lives, especially their communication strategies, have experienced unprecedented changes. Their period of self-isolation was expressed as videos of user-generated content (UGC) or pictures of their lives with #quarantine tag & #viewfromquarantine tag [11]. Citizens in a state of confinement can experience psychological constraints and express fixation on the state of the disease and psychological disorder: sleep disorder and depression [8]. The social media usage led to the emergence of the novel situation called "infodemic"[12–17]. The impact of infodemics on social media users' psychological perception, i.e., construal level [18], has been barely considered for the pandemic. Also, the complicated information contagion with negative feelings is complicatedly

associated, while the individual differences such as frequent social media usage and uncertainty reduction strategy (URS) have not been considered.

How social media usage behavior and overflow of contents on COVID-19 impact the users' mental problems, including their URS, also known as information-seeking strategy, still needs to be further examined. Ever since the pandemic started, it raised the following questions: first, could social media usage increase concerns for COVID-19 and reduce the psychological distance between perceivers and COVID-19? Second, among these associations, do individual differences such as URS impact on further reactions such as preventive behavior, and do they help to maintain mental health?

To answer these questions, we investigated how their psychological symptoms are impacted by the URS and the perception of the psychological distance of CLT [19] on the pandemic situation of COVID-19 [20]. We also examined how preventive behaviors and affective reactions are associated with CLT and URS.

CLT and Hypothetical Distance with Social Media Usage

The psychological distance that was examined with CLT explains how people perceive an event or an object by their subjective feeling of distance. According to Trope & Liberman [21], defined the psychological distance is "the perception of when an event occurs, where it occurs, to whom it occurs, and whether it occurs (p. 4)."Psychologically the more distant from an event/object is described as a more abstract that is called "higher construal" level. In contrast, a more proximal form of object/event is shown to be more concrete and specific, that is, a "lower construal" level [18, 22]. This tendency can be applied to social perception [23], decision making, and self-control [24]. In CLT research, known dimensions of the CLT are temporal, spatial, social, and hypothetical distance. Among them, the hypothetical distance is mainly an applied dimension in the consumer behavior research domain [13, 25] and health communication in the context of mediated communication [26]. The hypothetical distance is based on *whether* the event could be happening or not, which means

"the likelihood of a target event happening" p. 497 [27] or the amount of possibility. The COVID-19 could be interpreted as a hypothetical dimension. As COVID-19 news and information is acquired from social media, the frequent social media users perceive that they are closer to the event, and they feel that their community/residency is exposed to a higher chance of being infected by COVID-19. Because CLT is about how people experience psychological distance and how it affects attitudes, perception, and behaviors, CLT has been considered a valuable framework for understanding a pandemic [20].

Changed news consumption patterns and UGC disseminations [28–31] were also observed on social media during the pandemic outbreaks. During emergency situations, social media could be a major channel of news consumption [28, 30] and the primary source to hear from neighbors' and community news during the pandemic i.e., Nextdoor.com [32]. The changed pattern of information acquisition was observed in three different types: 1) the mobile news adoption [29], 2) news consumption via social media such as Twitter [31], and 3) UGC contents from social media. The first case of mobile adoption allows people to consume the news incidentally: whenever and wherever. The second pattern is the news recommended by other users such as friends from SNS and a personalized recommendation system in social media. In the third, with emergent processes like the pandemic outbreaks, the users become a source of news, creating their own news to deliver their real-time situation.

The filtered and recommended news that is curated by computer recommendation systems is hard to be ignored. That curated news accurately targets the users' tastes based on their social media usage behavior, i.e., reading time, preferring topic, commenting, pressing "like" buttons, and following, including real-time topics[33] and user location[34]. The location information from location-based systems (LBS) enabled researchers on CLT and SNSs. For example, proximity effects (i.e., geographic, social, and temporal proximity) on audiences' expression of terrorism and CL theoretical approach had been researched during the Boston Marathon [35].

Also, the impact of information consumption via social media about COVID-19 has been defined as “infodemic” [13, 17]—the more information regarding pandemic is acquired from social media, the more excessive sensitivity the users perceived. The UGC enabled information to be broadcasted in real-time about the COVID-19 outbreak—even faster than legacy media. These UGC showed devastating impacts of COVID-19; for example, how contagious the COVID-19 could be, how quickly those infected people develop symptoms, and the outcome of those, including death. Thus, the perceivers who saw those UGC and circulated the news on social media regarding the pandemic may get frightened. Moreover, the higher level of social media usage behavior may provide more chances to be exposed to more information and news regarding COVID-19. This may result in arousing the users to develop greater concern on the pandemic than those who have not been exposed to social media.

Increased social media usage may result in a feeling proximal to the COVID-19 while the social media users are kept exposed to the updated information regarding the pandemic. Thus, their perception of the possibility of infection is higher; in other words, the hypothetical distance with COVID-19 is closer than those who show a lower level of social media usage.

Therefore, we propose the following research question (RQ) and hypothesis (H):

RQ1: To what extent does information acquisition on social media associate concerns of COVID-19 with CLT and URS?

H1: More information acquisition through social media usage associates with the CLT on COVID-19 positively.

Preventive Behaviors and Emotional Reactions

Consuming more news of COVID-19 through social media can significantly result in psychological proximity with the pandemic. Once individuals apply a lower construal level to the event, they use more concrete representations. They feel the event is closer to them, focusing on the *how* and evoking the negative emotion [20]. Conversely, the others have a higher construal level to

the event, having more abstract representations and perceive the event or object distantly from self. The higher construal level is known to lead people to focus on the *why*. For example, if the pandemic event took place geographically far away from the perceivers (i.e., other country or other continents) and have a gap of time (i.e., a couple months ago), one would think of social, political, and structural reasons, including mechanism of contagion, i.e., the airborne aerosol transmission of the SARS-CoV-2 [36], and preventive methods, i.e., wearing protective equipment, such as masks, gloves, and goggles, and avoid to visit public areas. Contrarily, suppose the pandemic event occurred closer to the place recently. In that case, the perceivers are likely to focus on how to avoid the dangerous situation (e.g., pay attention to others' process of contagion), and how to reserve everyday necessities (i.e., food, water, toilet paper, and other essentials). Though people acquire information regarding how to prevent COVID-19, social media users could acquire deviant stories such as panic buying in the grocery stores or cases of rapid development of symptoms. Bowen [21] also explained how people interpret the pandemic and its impact on behaviors with an example of grocery shopping in a pandemic situation. He highlighted the emotional evoking by each construal level; with the higher construal level, the abstracted and macro view evokes thankful minds for enabling grocery shopping and how the agricultural pipeline was maintained during the pandemic. However, the lower construal level approach generates anxiety among people on the issue of transmission from unknown sources or safety guidelines (i.e., keeping six feet distances). When an individual comes to know about the safety guidelines, for example, failing to maintain a six-feet distance from others can increase the chance of infection, that person now not only knows how vital keeping distance is but also realizes the severity of the infection of COVID-19, which increases anxiety ever further. To extend this construal level to preventive behaviors, the lower construal level makes people focus on the specific things; in doing so, they tend to avoid the infection, but it is quite difficult for them to think about preventive behaviors related to those people with higher construal level [20]. As Bowen [21] suggested, when people have a lower construal level, they react negatively and could not think of

preventive behaviors.

To examine the application of CLT on the COVID-19 pandemic situation, to what extent does the lower construal level impact on preventive behaviors and reinforce the negative affective reactions, the following RQ and hypotheses are proposed.

RQ2: To what extent does construal level affect preventive behavioral actions (i.e., wearing masks, using sanitizer, and avoiding attending public space)? And to what extent does it reinforce affective reactions (i.e., fear, difficulties, stress, and negative feelings)?

H2 a&b: The lower construal level (shortened hypothetical distance) shows (a) a negative association with preventive behaviors and (b) a positive association with emotional reactions.

However, though the participants were exposed to information from COVID-19, the users with uncertainty reduction strategies could have preventive health behavioral information and may lower their concerns and negative psychopathological impacts such as depression, anxiety, and sleep disorder.

Linking URS to Information Seeking and Prevention Behaviors

The uncertainty reduction theory (URT) is used for information-seeking behaviors when uncertainties arise, utilizing many strategies to seek information about others [37], to reduce social anxiety that was caused by revealing users' identity to those who are anonymous [38]. However, the extended URT was applied to the affection in mediated communication and the virtual world [39] and in seeking health information[40]. When health-related information has not been acquired enough from the traditional medical professions, uncertainties arise, and then the online information becomes the main source. Substituting the conventional information source, online information can be sought and shared by users to evaluate and verify [41]. Taking URS to information-seeking strategies, Berger [37] initially identified three types of knowledge-seeking techniques that an individual might use to minimize uncertainty: interactive, active, and passive knowledge-seeking techniques. First, interactive knowledge-seeking techniques are those in which the individual

actively interacts directly with the target person and provides input. Second, active knowledge-seeking is whether an individual obtains information about a target from a second party who is more familiar with the target. Finally, passive knowledge-seeking techniques entail the person observing the target discreetly. Ramirez, Walther, Burgoon, and Sunnafrank [42] explained extractive knowledge-seeking strategies, in which a person "draws upon a vast storehouse of written comments provided by targets" (p. 220) to acquire information and minimize confusion, utilizing the increase in information archived and retrievable online [43]. The URS in the "infodemic" situation, the passive and extractive knowledge-seeking strategies are possible to be applied. The passive and extractive knowledge-seeking strategy used leads to examine how excessive social media usage may result in higher URS.

We argue that the URS in the communication domain is possible to link to the concern of COVID-19 pandemic outbreaks to find preventive knowledge. Also, people with higher URS may have less emotional reactions, and having URS leads to control mental health problems.

Therefore, we propose the following RQ and Hs to test:

H3: The more Information acquisition through social media usage associates with URS positively.

RQ3: To what extent does the URS affect preventive behavioral actions (i.e., wearing masks, using sanitizer, and avoid attending public space) and affective reactions (i.e., fear, difficulties, stress, psychological burden, and negative feelings)?

H4 a&b: The weighted URS shows: (a) a positive association with preventive behaviors and (b) a negative association with affective reactions.

The Negative psychological symptoms: Depression and Sleep Disorder

In the COVID-19 pandemic situation, the multiple factors could be an ever-increasing number of confirmed cases, depletion of protection equipment and daily necessity, feeling isolated, and lack of support. A combination of multiple factors may instigate mental burden and the feeling

of anxiety. However, most of those factors can be known through media coverage, including social media. Through social media usage, the acquired COVID-19 news and UGC result in shortening the hypothetical distance with it, leading to negative emotional reactions such as stress, psychological burden, and anxiety. The feeling of stress and burden shows a higher association with psychological disorders—depression and sleep disorder.

Facing this critical situation, the people with the COVID-19 pandemic situation are at risk of developing mental health symptoms. The multidimensional threatening situation can be known through widespread media coverage and social media. The sensational news from social media in users' smartphones always delivers provocative and devastating news from personalized recommendation features of social media or recommendations by other users. However, the changed information acquisition and consumption with social media and mobile environment may result in a different psychological distance of construal level for the pandemic situation by the level of social media usage. Also, individuals with URS may be influenced to have more preventive information, leading to preventive behaviors, i.e., wearing gloves and masks or avoiding attending public spaces. Those preventive behaviors may decrease the feeling of depression and sleep disorder. In sum, the overwhelmed information may contribute to these frequent social media users' mental burden, while the URS reduces the mental health problem.

Therefore, we propose the following research question (RQ) and hypotheses (H) that are indicated in the proposing path model of Figure 1:

RQ4: To what extent did the participants' self-reported mental health symptoms, i.e., depression, and sleep disorder, were affected by COVID-19 and preventive behaviors?

H5 a&b: Increased preventive behaviors of COVID-19 indicate negative associations with mental health symptoms: a) depression and b) sleep disorder.

H6 a&b: Affective reactions on COVID-19 indicate positive associations with mental health symptoms: a) depression and b) sleep disorder.

[Figure 1 HERE]

Methods

Participants & Procedure

To measure general populations' perception of COVID-19 and their psychological response, we adopted an online-based cross-sectional survey through Amazon Mechanical Turk (AmTurk) to collect data. The Turk represents the general U.S. population in terms of age and ethnicity more than the college survey pool. Also, the participants' motivation and ability are better than the college sample [44–46].

Through the AmTurk advertisement, the participants could begin answering the online survey by clicking the participation agreement on the online consent form. The survey questionnaire included social media usage behavior, psychological distance on COVID-19, preventive behavior and emotional reactions, the Center for Epidemiology Scale for Depression (CES-D), and Pittsburgh Sleep Quality Index (PSQI).

We used WarpPLS 7.0 not only to examine the path model we proposed, but also to test the finesses of the hypothesized model.

Measurements

The survey questionnaire included social media usage behaviors, concern on COVID-19, modified URS, a hypothetical distance of COVID-19, COVID-19 preventive behaviors, affective reactions, psychological symptoms, Center for Epidemiology Scale for Depression (CES-D), and Pittsburgh Sleep Quality Index (PSQI).

Social Media Usage Behavior

To measure social media usage behavior, we adopted suitable questions from questionnaires of Media Technology Usage and Attitude (MTUA)[47], Digital Natives Assessment Scale (DNAS)[48], and Social Media and Digital Natives. For example, "I send 'links' of contents to others using social media," "I expect the social media that I visit regularly to be constantly updated," and "I use the

social media every day." (Cronbach's Alpha = 0.92) The answers were composed with 7-point Likert scales (1 = never; 7 = always).

Uncertainty Reduction Strategy

The URS measurement [40] has been modified for the current study; for example, "I use the Internet and social media to find information regarding prevention for the COVID-19," "I use the Internet and social media to find the symptoms of COVID-19 that were not discussed yet," "I use the Internet and social media to seek alternative treatment or medical information regarding COVID-19 cure," "I use the Internet and social media to find the right information about the COVID-19." (Cronbach's Alpha = 0.87).

Psychological distance of construal level on COVID-19

To measure the hypothetical distance of construal level on COVID-19, the question asked was "How is the COVID-19 situation in your residence area?" and the answers were adjectives, "Mild (1) – Severe (7)," "Good (1) – Bad (7)," "Positive (1) – Negative (7)," with 7 Likert point scale. And for "Do you feel that your residential area is near to the impact of COVID-19?" and answers consisted of 7 Likert scales with "Near (1) - Far (7)" (reversed coding was applied). The value of Chronback's alpha was 0.87.

COVID-19 Preventive Behaviors

The preventive behaviors consist of the following statements: for example, "Worn a face mask," "Washed/Sanitized hands," "Worked or studied at home," "Avoided in-person contact with high-risk people" (Chronback's alpha = 0.85). And their answers are from Never as 1 point to Always as 7 points [49].

Emotional Reactions

To measure the participants' affective reactions, the questions asked were "How often do you feel afraid of COVID-19," and "Do you feel that you are safe from the COVID-19?" "How often do you feel that you lack companionship?" "How often do you feel isolated from others?" "How often do

you feel left out?" "How much has your sleep been interrupted or disturbed by concern about the outbreak?" "How much difficulty do you have obtaining the food that you need because of the COVID-19 pandemic or social distancing rules?" (Cronbach's alpha = 0.86), and the answers were 7-point Likert scales [49].

Depression (CES-D) and Sleep Quality (PSQI)

To measure their depression symptoms, Center for Epidemiology Scale for Depression (CES-D) was borrowed, and for the sleep disorder, Pittsburgh Sleep Quality Index (PSQI) was borrowed. Detailed items and their reliability are reported in tables 1-2.

Statistical Power

Statistical power was estimated with sample size. When a significance level used 0.05 (range from 0.001 to -0.5), and power level required 0.80 (range from 0 to 0.99), the minimum absolute significant path coefficient in the model was 0.15, the inverse square root methods required minimum sample size to be approximately 275 to run the path model, and the 297 participants of this study are above said sample size threshold.

Results

To examine how social media usage and individual differences are associated with the impact of psychological responses, a path model analysis using WarpPLS 7.0 [43–45] software was executed.

In total, 296 participants (male = 106 and female = 191) were included in the path model analyses. The ethnicity of participants consisted of White (157/297, 52.9%), African American (45/297, 15.2%), Asian American (35/297, 12.1%), American Indian or Alaska Native (54/297, 18.2%), Native Hawaiian or Pacific Islander (2/297, 0.67%), and others (3/297, 1.01%). Also, their age distributions are reported in table 1 and one of the participants refused to answer.

Table 1

Age of participants

	Age	*N*	*Percent*
	18 - 24	13	4.6
	25 - 34	168	56.6
	35 - 44	67	22.6
	45 - 54	28	9.4
	55 – 64	18	6.1
	65 – 74	2	.7
	Total	296	99.7
Missing		1[1]	.3
Total		297	

The measurement with items and their reliability are reported in tables 2 and 3.

Table 2

Items and Reliability of Mental Health Measurement

	Items	Cronbach's alpha
Center for Epidemiology Scale for Depression (CES-D)	1. I was bothered by things that usually don't bother me. 2. I did not feel like eating; my appetite was poor 3. I felt that I could not shake off the blues even with help from my family or friends. 4. I felt I was just as good as other people 5. I had trouble keeping my mind on what I was doing. 6. I felt depressed. 7. I felt that everything I did was an effort. 8. I felt hopeful about the future. 9. I thought my life had been a failure. 10. I felt fearful. 11. My sleep was restless. 12. I was happy. 13. I talked less than usual. 14. I felt lonely. 15. People were unfriendly 16. I enjoyed life 17. I had crying spells. 18. I felt sad. 19. I felt that people dislike me.	.93

[1] The one missing was who refuse to answer their ages.

	20. I could not get “going.”	
Pittsburgh Sleep Quality Index (PSQI)	a. Cannot get to sleep within 30 minutes b. Wake up in the middle of the night or early morning c. Have to get up to use the bathroom d. Cannot breathe comfortably e. Cough or snore loudly f. Feel too cold g. Feel too hot h. Have bad dreams i. Have pain	.87

Table 3

Items and Reliability of Measurement

	Items	Cronbach’s alpha
Social Media Usages	Read and comment or write feedback (for example, on the opinion board, RT on Twitter or on the Facebook) I send "links" to contents to others using social media I habitually surf around information/contents I surf around and click whatever get my attention I surf around information just for fun I expect quick access to information when I need it I do not particularly look for information/news and just "surf" habitually. Watch TV shows, movies, etc. on a computer. I feel it is important to be able to access the social media any time I want. Technology will provide solutions to many of our problems. I use the social media every day I expect the social media that I visit regularly to be constantly updated	.92
Hypothetical distance CL on COVID19	How is the COVID 19 situation in your residence area? Mild - Severe Good – Bad Positive - Negative Do you feel that your residence area is near to the impact of COVID-19? Near – Far [reversed] Do you feel that your neighbors are under the impact of COVID-19? Impactful – Not impactful [reversed] Do you feel that you are under the impact of COVID-19? Near - Far [reversed]	.87
URS	I use internet and social media, to find information regarding prevention for the COVID-19 to find the symptoms of COVID-19 that were not discussed yet to seek alternative treatment or medical information regarding COVID-19 cure to find right information about the COVID-19	.87
Preventive Behaviors	Worn a face mask Washed/Sanitized hands Worked or studied at home Cancelled/postponed work or school activities Prayed Avoided public places/crowds Avoided in-person contact with high-risk people Cancelled/postponed travel	.85
Affective Reactions	How often do you feel that you lack companionship? How often do you feel isolated from others? How often do you feel left out? How much has your sleep been interrupted or disturbed of concern about the outbreak? How much difficulty do you have obtaining the food that you need because of the COVID-19 pandemic or social distancing rules?	.86

Statistical Analysis

Overall, the path model analysis shows the goodness fit: APC = .20, $p < .001$ and AARS = .08, p =.04, AVIF = 1.014, which shows a good average block VIF. The proposed hypotheses testing, and the results of the path model are available in Figure 2.

[FIGURE 2 HERE]

The social media usage increases the URS (H3) and hypothetical distance of construal level (H1). Both H1 and H3 are supported. The increased URS results in more preventive behaviors (H4a was supported), but it doesn't show an association with emotional reactions (H4b was not supported). Contrarily, the psychological proximity on COVID-19 could not predict their preventive behaviors (H2a was not supported), but it predicted the emotional reactions (H2b was supported). The preventive behaviors positively associated with symptoms of mental health: depression and sleep disorder (H5 a&b were supported). The participants' greater affective reactions predicted the increased mental health symptoms: depression and sleep disorder (H6 a&b were supported).

Discussion

Principal Findings

The principal objectives of this study were to examine the effects of social media usage on CLT and URS; while higher URS promoted the preventive behaviors, which reduced the self-reported mental health symptoms during the devastating pandemic outbreak situations, the CLT did not. Contrary to higher URS, those who have low URS and react emotionally showed increasing mental health symptoms: depression and sleep disorders. The findings of the underlying mechanism of mental health problems indicated several points in terms of social media usage.

First, with increased social media usage, we predicted lower construal levels on COVID-19 (H1 supported). By leveraging the CLT, we extended Lin et al.'s [40] uncertainty reduction action from the health communication domain to the context of pandemic outbreaks with "infodemic."

Prior research on CLT was applied to the marketing research area to predict the consumers' behavior. However, we tried to have a fresh perspective on CLT and extend its application area, such as the pandemic situation with preventive behaviors and evoking negative emotions. In doing so, the hypothetical thoughts actually lead them to react emotionally; however, the increased possibility to behave preventive action was not followed. The lower construal level is known to be focused on the thought of "how" and specifics, but the social media usage and lower construal level could not consider aerosol transmission for COVID-19 and it also fail to predict the preventive behaviors, i.e., wearing gloves, masks, hand washing, etc. A possible explanation of this: because the lower construal level narrows down the thoughts to the specifics, and the participants focus on the specific incident and risks of the pandemic, not on transmission mechanism including behaviors to prevention. With higher construal, they have a broad perspective to think about the constructional perspective and its prevention. The preventive behaviors could be a target. When there is a target or goal-oriented situation, a higher construal results in an intervention being viewed in terms of a higher construal and thus increased goal commitment [50]. Therefore, the lower construal level couldn't show the association with preventive behaviors. As we predicted (H2b), the participants indicated a lower construal level and showed negative emotional reactions due to the shortening of the hypothetical distance. The overwhelming information with their emotional response may deprive them of the chance to think about the situation objectively or cognitively. Thus, the emotional reaction leads to higher self-reported depression and sleep problems, resulting in a vicious circle. Both URS and CLT were predicted to help people maintain their mental health and take the necessary precautions. As a result, only URS has a positive impact, while CLT increases anxiety against the COVID-19.

Second, contrary to the hypothetical concept on COVID-19, increased URS by more social media usage were positively related to preventive behaviors and didn't associate emotional reactions. The increased preventive behaviors indicated lower mental health symptoms, such as depression and

sleep disorder, which imply that it would decrease mental health problems as they show preventive behaviors more. This finding implies that those who have URS find proper knowledge from social media, including the general Internet, to maintain their healthy life rather than focus on the negative emotional reactions—even in devastating situations. The higher SM usage and recommended news, including popular UGC suggested in social media, are highly related to each other, which provide targeted information. Therefore, the users are hard to ignore. In this “infodemic” situation, URS is a more desirable ability to find the right behaviors and maintain their mental symptoms.

Limitations and Future studies

Though the findings of this study are legitimate, the interpretation of results requires caution for the following points. First, the recruited participants showed gender imbalance; the female participants were 64.2%, while male participants were 36.7%. To control the gender imbalance, the path analyses were controlled by gender imbalance effects. Second, though the participants show divergent racial distribution and age, the sample was collected only in the U.S., so the generalizability of the results may be threatened. The sample and generalizability issues are common in academic studies. Future studies will expand our sampling context to a larger and diverse cross-section of the population, i.e., other countries and nationalities. Also, the sample bias on Amazon Mechanical Turk was raised by Almaatouq, et al., [47]. For the current study, though we used the Amazon Mechanical Turk, which is a convenient sampling that may jeopardize the research's reliability, the present study attempts to reach a diverse group of social media users. Amazon Turk users have a greater proclivity for social media use. As a result, sampling bias is less than that of the overall school population. Moreover, the quality of data was relatively well managed compared to other methods [48].

In addition, the results of COVID-19 are not directly similar to the posttraumatic stress disorder (PTSD) or effects of tragic events. However, in terms of experiencing sudden loss and isolation from people and facing financial problems, it is a novel situation like war and tragic, violent

events that may cause PTSD [51], [52]. Also, the second effect of PTSD on their family members may be affected by one's mental health problems. As the quarantine is getting longer, a higher rate of family violence was reported [51–53]. Consequently, mental health issues may exceed secondary effects on their family, community, and society [54, 55]. Therefore, for future study, we need to investigate the effect of mental health problems by COVID-19 on family, community, and society.

Conclusions

Due to the importance of severe disease prevention and stopping the contingence, psychological and mental issues are treated as secondary problems. However, the findings of this study imply that the URS is associated with prevention behaviors and consequently, their mental health problems tend to be managed. While, the UGC in social media provides a chance to arouse people to live in a tragic situation by shortening the proximity with COVID-19 and it heightened the affective reactions as well as reinforcing mental health problems. The implications of this study are that while using social media, media literacy i.e., information seeking behavior in URS, is essential to maintain their mental health during the quarantine and the pandemic situation to keep their psychological responses.

References

[1] R. J. Barro, J. F. Ursúa, and J. Weng, “The coronavirus and the great influenza pandemic: Lessons from the ‘spanish flu’ for the coronavirus’s potential effects on mortality and economic activity,” National Bureau of Economic Research, 2020.
[2] E. Bontempi, “The Europe second wave of COVID-19 infection and the Italy ‘strange’ situation,” *Environ. Res.*, vol. 193, p. 110476, 2021.
[3] A. Strzelecki, “The second worldwide wave of interest in coronavirus since the COVID-19 outbreaks in South Korea, Italy and Iran: A Google Trends study,” *Brain. Behav. Immun.*, vol. 88, p. 950, 2020.
[4] V. Ratten, “Coronavirus (covid-19) and entrepreneurship: changing life and work landscape,” *J. Small Bus. Entrep.*, pp. 1–14, 2020.
[5] C. Fuchs, “Everyday life and everyday communication in coronavirus capitalism,” *TripleC Commun. Capital. Crit. Open Access J. Glob. Sustain. Inf. Soc.*, vol. 18, no. 1, pp. 375–399, 2020.
[6] S. Mair, “How will coronavirus change the world?,” *BBC Future*, vol. 31, 2020.
[7] D. Jiménez-Pavón, A. Carbonell-Baeza, and C. J. Lavie, “Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people,” *Prog. Cardiovasc. Dis.*, 2020.
[8] Y. Huang and N. Zhao, “Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey,” *Psychiatry Res.*, vol. 288, p. 112954, Jun. 2020, doi: 10.1016/j.psychres.2020.112954.
[9] E. Preti *et al.*, “The Psychological Impact of Epidemic and Pandemic Outbreaks on Healthcare Workers: Rapid Review of the Evidence,” *Curr. Psychiatry Rep.*, vol. 22, no. 8, pp. 1–22, 2020.
[10] S. Zhu *et al.*, “The immediate mental health impacts of the COVID-19 pandemic among people with or without quarantine managements,” *Brain. Behav. Immun.*, 2020.
[11] A. Nikjoo, B. Shabani, and A. Hernandez, “What do people share from quarantine?,” *Curr. Issues Tour.*, pp. 1–5, Aug. 2020, doi: 10.1080/13683500.2020.1808598.
[12] D. Bunker, “Who do you trust? The digital destruction of shared situational awareness and the COVID-19 infodemic,” *Int. J. Inf. Manag.*, p. 102201, 2020.
[13] M. Cinelli *et al.*, “The covid-19 social media infodemic,” *ArXiv Prepr. ArXiv200305004*, 2020.
[14] T. L. I. Diseases, “The COVID-19 infodemic,” *Lancet Infect. Dis.*, vol. 20, no. 8, p. 875, 2020.
[15] J. Hua and R. Shaw, “Corona virus (Covid-19)‘infodemic’ and emerging issues through a data lens: The case of china,” *Int. J. Environ. Res. Public. Health*, vol. 17, no. 7, p. 2309, 2020.
[16] P. Patwa *et al.*, “Fighting an infodemic: Covid-19 fake news dataset,” *ArXiv Prepr. ArXiv201103327*, 2020.
[17] V. Tangcharoensathien *et al.*, “Framework for managing the COVID-19 infodemic: Methods and results of an online, crowdsourced WHO Technical Consultation,” *J. Med. Internet Res.*, vol. 22, no. 6, p. e19659, 2020.
[18] Y. Trope and N. Liberman, “Construal-Level Theory of Psychological Distance,” *Psychol. Rev.*, vol. 117, no. 2, pp. 440–463, Apr. 2010, doi: 10.1037/a0018963.
[19] I. Pentina and M. Tarafdar, “From ‘information’ to ‘knowing’: Exploring the role of social media in contemporary news consumption,” *Comput. Hum. Behav.*, vol. 35, pp. 211–223, 2014.
[20] J. D. Bowen, “Psychological distance and the pandemic: Insights from Construal Level Theory and relationship science,” *Soc. Personal. Psychol. Compass*, 2021.
[21] Y. Trope and N. Liberman, “Construal level theory,” *Handb. Theor. Soc. Psychol.*, vol. 1, pp.

118–134, 2011.
[22] Y. Trope and N. Liberman, “Temporal construal.,” *Psychol. Rev.*, vol. 110, no. 3, p. 403, 2003.
[23] S. Rim, J. S. Uleman, and Y. Trope, “Spontaneous trait inference and construal level theory: Psychological distance increases nonconscious trait thinking,” *J. Exp. Soc. Psychol.*, vol. 45, no. 5, pp. 1088–1097, 2009.
[24] N. Liberman, Y. Trope, and C. Wakslak, “Construal level theory and consumer behavior,” *J. Consum. Psychol.*, vol. 17, no. 2, pp. 113–117, 2007.
[25] M. Broersma and T. Graham, “Social media as beat: Tweets as a news source during the 2010 British and Dutch elections,” *Journal. Pract.*, vol. 6, no. 3, pp. 403–419, 2012.
[26] S. J. Ahn, “Incorporating immersive virtual environments in health promotion campaigns: A construal level theory approach,” *Health Commun.*, vol. 30, no. 6, pp. 545–556, 2015.
[27] M. Zhang and J. Wang, “Psychological distance asymmetry: The spatial dimension vs. other dimensions,” *J. Consum. Psychol.*, vol. 19, no. 3, pp. 497–507, Jul. 2009, doi: 10.1016/j.jcps.2009.05.001.
[28] P. J. Boczkowski, E. Mitchelstein, and M. Matassi, “‘News comes across when I’m in a moment of leisure’: Understanding the practices of incidental news consumption on social media,” *New Media Soc.*, vol. 20, no. 10, pp. 3523–3539, 2018.
[29] S. Chan-Olmsted, H. Rim, and A. Zerba, “Mobile news adoption among young adults: Examining the roles of perceptions, news consumption, and media usage,” *Journal. Mass Commun. Q.*, vol. 90, no. 1, pp. 126–147, 2013.
[30] K. Fiedler, “Construal level theory as an integrative framework for behavioral decision-making research and consumer psychology,” *J. Consum. Psychol.*, vol. 17, no. 2, pp. 101–106, 2007.
[31] H. Kwak, C. Lee, H. Park, and S. Moon, “What is Twitter, a social network or a news media?,” in *Proceedings of the 19th international conference on World wide web*, 2010, pp. 591–600. [Online]. Available: http://dl.acm.org/citation.cfm?id=1772751
[32] P. Vogel, C. Grotherr, F. Von Mandelsloh, U. Gaidys, and T. Böhmann, “Older Adults’ Use of Online Neighborhood Social Networks: Perceptions, Challenges and Effects,” presented at the Hawaii International Conference on System Sciences, 2021. doi: 10.24251/HICSS.2021.474.
[33] O. Phelan, K. McCarthy, and B. Smyth, “Using twitter to recommend real-time topical news,” in *Proceedings of the third ACM conference on Recommender systems*, 2009, pp. 385–388.
[34] G. Kazai, I. Yusof, and D. Clarke, “Personalised news and blog recommendations based on user location, Facebook and Twitter user profiling,” in *Proceedings of the 39th International ACM SIGIR conference on Research and Development in Information Retrieval*, 2016, pp. 1129–1132.
[35] K. H. Kwon, M. Chadha, and K. Pellizzaro, “Proximity and terrorism news in social media: A construal-level theoretical approach to networked framing of terrorism in Twitter,” *Mass Commun. Soc.*, vol. 20, no. 6, pp. 869–894, 2017.
[36] D. G. Anderson, “Coping strategies and burnout among veteran child protection workers,” *Child Abuse Negl.*, vol. 24, no. 6, pp. 839–848, 2000.
[37] C. R. Berger, “Beyond initial interaction: Uncertainty, understanding, and the development of interpersonal relationships,” *Lang. Soc. Psychol.*, pp. 122–144, 1979.
[38] C. Courtois, A. All, and H. Vanwynsberghe, “Social network profiles as information sources for adolescents’ offline relations,” *Cyberpsychology Behav. Soc. Netw.*, vol. 15, no. 6, pp. 290–295, 2012.
[39] S. C. Srivastava and S. Chandra, “Social presence in virtual world collaboration: An uncertainty reduction perspective using a mixed methods approach,” *MIS Q.*, vol. 42, no. 3, pp. 779–804, 2018.
[40] W.-Y. Lin, X. Zhang, H. Song, and K. Omori, “Corrigendum to ‘Health information seeking in the Web 2.0 age: Trust in social media, uncertainty reduction, and self-disclosure’ [Computers in Human Behavior 56 (2016) 289–294],” *Comput. Hum. Behav.*, vol. 61, p. 690, Aug. 2016, doi:

10.1016/j.chb.2016.01.040.
[41] S. Fox, “The social life of health information,” *Pew Research Center*, 2014. https://www.pewresearch.org/fact-tank/2014/01/15/the-social-life-of-health-information/ (accessed Apr. 19, 2021).
[42] A. Ramirez Jr, J. B. Walther, J. K. Burgoon, and M. Sunnafrank, “Information-seeking strategies, uncertainty, and computer-mediated communication: Toward a conceptual model,” *Hum. Commun. Res.*, vol. 28, no. 2, pp. 213–228, 2002.
[43] A. Ramirez and Z. Wang, “When Online Meets Offline: An Expectancy Violations Theory Perspective on Modality Switching,” *J. Commun.*, vol. 58, no. 1, pp. 20–39, Mar. 2008, doi: 10.1111/j.1460-2466.2007.00372.x.
[44] M. Buhrmester, T. Kwang, and S. D. Gosling, “Amazon’s Mechanical Turk: A new source of inexpensive, yet high-quality data?,” 2016.
[45] M. Buhrmester, T. Kwang, and S. D. Gosling, “Amazon’s Mechanical Turk: A New Source of Inexpensive, Yet High-Quality, Data?,” *Perspect. Psychol. Sci.*, vol. 6, no. 1, pp. 3–5, Jan. 2011, doi: 10.1177/1745691610393980.
[46] C. J. Holden, T. Dennie, and A. D. Hicks, “Assessing the reliability of the M5-120 on Amazon’s mechanical Turk,” *Comput. Hum. Behav.*, vol. 29, no. 4, pp. 1749–1754, Jul. 2013, doi: 10.1016/j.chb.2013.02.020.
[47] L. D. Rosen, K. Whaling, L. M. Carrier, N. A. Cheever, and J. Rokkum, “The media and technology usage and attitudes scale: An empirical investigation,” *Comput. Hum. Behav.*, vol. 29, no. 6, pp. 2501–2511, 2013.
[48] T. Teo, “An initial development and validation of a Digital Natives Assessment Scale (DNAS),” *Comput. Educ.*, vol. 67, pp. 51–57, Sep. 2013, doi: 10.1016/j.compedu.2013.02.012.
[49] P. Cawthon *et al.*, “Assessing the impact of the covid-19 pandemic and accompanying mitigation efforts on older adults,” *J. Gerontol. Ser. A*, 2020.
[50] G. Ülkümen and A. Cheema, “Framing goals to influence personal savings: The role of specificity and construal level,” *J. Mark. Res.*, vol. 48, no. 6, pp. 958–969, 2011.
[51] T. A. Beks, “Walking on eggshells: The lived experience of partners of veterans with PTSD,” *Qual. Rep.*, vol. 21, no. 4, pp. 645–660, 2016.
[52] J. A. Bodkin, H. G. Pope, M. J. Detke, and J. I. Hudson, “Is PTSD caused by traumatic stress?,” *J. Anxiety Disord.*, vol. 21, no. 2, pp. 176–182, 2007.
[53] A. Anurudran, L. Yared, C. Comrie, K. Harrison, and T. Burke, “Domestic violence amid COVID-19,” *Int. J. Gynecol. Obstet.*, vol. 150, no. 2, pp. 255–256, 2020.
[54] B. Boserup, M. McKenney, and A. Elkbuli, “Alarming trends in US domestic violence during the COVID-19 pandemic,” *Am. J. Emerg. Med.*, vol. 38, no. 12, pp. 2753–2755, 2020.
[55] C. Bradbury-Jones and L. Isham, *The pandemic paradox: The consequences of COVID-19 on domestic violence*. Wiley Online Library, 2020.
[56] C. M. Monson, S. J. Fredman, and C. T. Taft, “Couple and family issues and interventions for veterans of the Iraq and Afghanistan wars.,” 2011.
[57] Y. Rezapour Mirsaleh, A. Behjat Manesh, and S. V. Tavallaei, “Role of Secondary Post-Traumatic Stress Disorder and Resilience on Academic Motivation and Performance of Veterans’ Student Children,” *Iran. J. War Public Health*, vol. 8, no. 4, pp. 225–233, 2016.

Supplementary Files

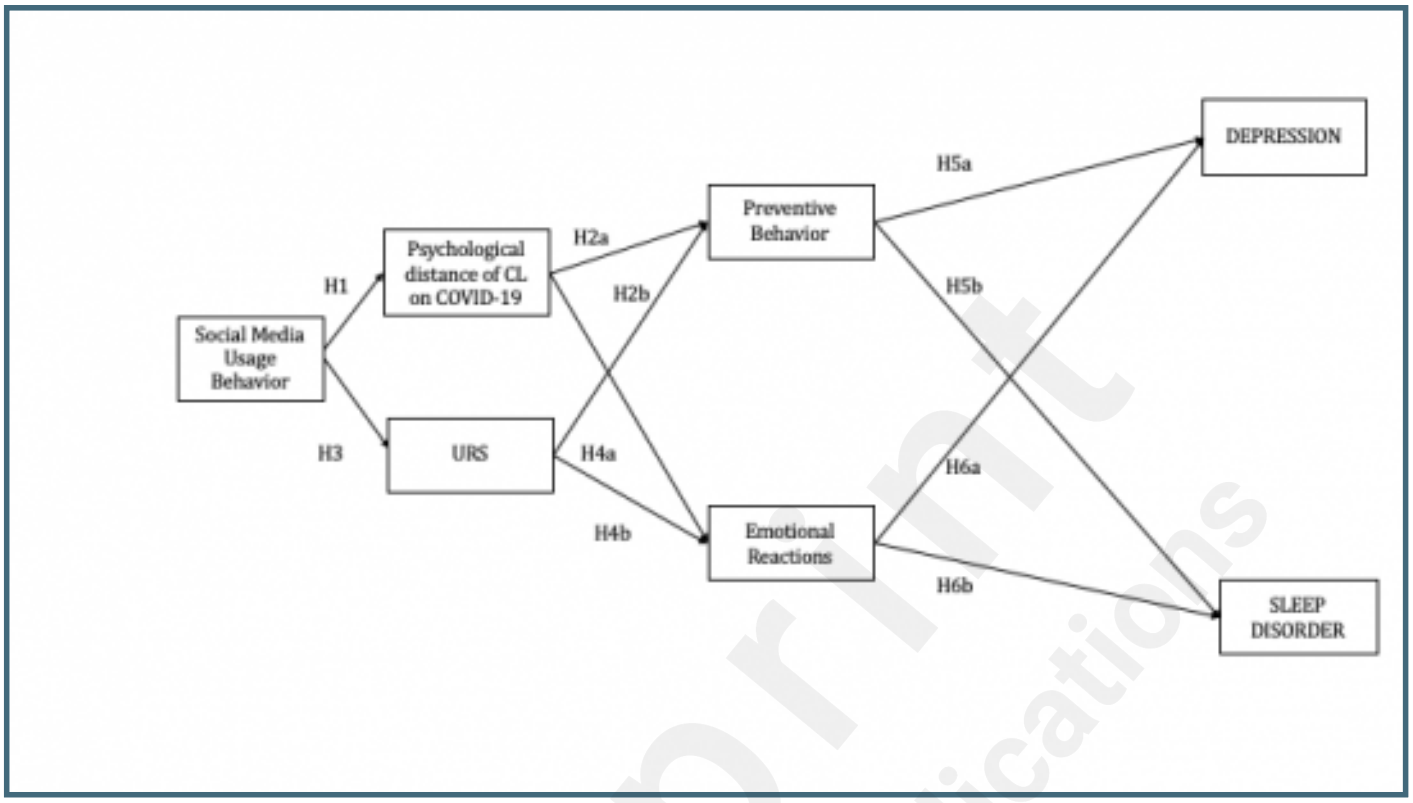
Untitled.
URL: http://asset.jmir.pub/assets/c585b40d80985e32e1466c788175032d.docx

Untitled.
URL: http://asset.jmir.pub/assets/d3e29d2fadafdb757bd320bde98f6031.docx

Untitled.
URL: http://asset.jmir.pub/assets/4253abc65762c744a08514ece23a83f4.docx

Figures

Proposed path model.



Analyzed path model.