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Cyberchondria and COVID-19 Health Threats Related to Attentional Bias and Safety Behaviors

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Cyberchondria and COVID-19 Health Threats Related to Attentional Bias and Safety Behaviors

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Abstract

Cyberchondria is described as excessively searching online for health information that ultimately increases worry and anxiety about one's health (Starcevic et al., 2019). Research has demonstrated an increased attentional bias in anxious individuals for threat-related stimuli. Attentional bias for health information exacerbated by the frequent exposure to health threats during the COVID-19 pandemic may contribute to additional health-seeking behavior. The current study aimed to explore the potential relationship between COVID-19 health threats and cyberchondria level on attentional bias toward illness-related stimuli (symptom words) and the intent to perform safety behaviors while controlling for Trait Anxiety and Health Anxiety. Participants (n=49) were randomly assigned to the COVID-19 prime group or the control group. An EST using illness words and neutral words was then used to assess attention allocation. Scores from surveys were used to measure safety behavior intention, cyberchondria, trait anxiety, and health anxiety. A t-test was used to measure group differences. The primed participants did not significantly differ from the control group for all measures. The regression analyses showed that Emotional Stroop performance and safety behavior intentions were not related to cyberchondria or the COVID-19 health threatening prime. Research has suggested that instead of increased attention to threatening information individuals may demonstrate increased avoidance to

threat, which could explain the null findings. Further research is needed to investigate potential predictors that may influence adoption, attitudes, and intentions toward safety behaviors.

Keywords: cyberchondria, COVID-19, Emotional Stroop Task, attentional bias, safety behaviors

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On December 12th, 2019, the first confirmed case of COVID-19 was reported and is now classified as a pandemic infecting a devastating number of people across many countries (Centers for Disease Control and Prevention, 2020). The pandemic has impacted all facets of daily life and required a change in human behavior to subdue and eradicate the virus by compliance with safety guidelines (van Rooi et al., 2020). Since the first case, COVID-19 has spread worldwide, with over 238 million cases and more than four million deaths reported to the World Health Organization as of October 13th, 2021. A factor that has been reported to play an influential role in the decision to comply with safety guidelines is mass media (Jungmann & Witthöft, 2020).

Mass media includes TV, the internet, social media, radio, and newspapers which provided ample coverage of the pandemic (Dhanashree et al., 2021). In news reports, the framing effect suggests that the positive or negative manner in which the news is presented will affect the audiences' attention, perception, and behavioral responses (Wen et al., 2021). It is critical for the media to promote appropriate safety measures to the public; however, the way the content is conveyed can either cause avoidance or acceptance of recommendations (Garfin et al., 2020). The frequent exposure to COVID-19 related information has served as a reminder of the risk of infection while also potentially increasing motivation to comply with recommended safety behaviors (Farooq

et al., 2020). Melki et al. (2020) found that the adoption of preventative measures positively related to media exposure to COVID-19 news. In line with those findings, another study found that exposure to COVID-19 information increased intent to comply with safety measures; however, COVID-19 information also induced attention avoidance (Siebenhaar et al., 2020). Attention avoidance toward health information ultimately leads to less compliance with safety guidelines due to a lack of important information (Siebenhaar et al., 2020). Information overload is also linked to information avoidance due to the overexposure to information caused by the abundance of media attention (Barbour et al., 2012; Farooq et al., 2020). During the COVID-19 pandemic mass media, and other Internet sources were found to be the primary sources of information (Soroya et al., 2021). During mandatory lockdowns, mass media and the internet contributed to an increase in online activity. Although searching online for information is beneficial for most, some people exhibit compulsions that lead to excessive online health-seeking behavior known as cyberchondria (Varma et al., 2021).

Cyberchondria is a form of excessive online health-seeking behavior to reduce anxiety about health that ultimately increases distress and anxiety (Starcevic et al., 2020). The Internet allows people access to severe conditions that often list common non-emergent symptoms that are frequently used as a way to self-diagnose (Tyrer et al., 2019). Findings suggest information overload, perceived COVID-19 severity, and vulnerability influence cyberchondria (Laato et al., 2020). Recent research has found a bidirectional relationship between cyberchondria and COVID-19 anxiety, where greater

COVID-19 anxiety directly predicted cyberchondria and a higher level of cyberchondria predicted a higher level of COVID-19 anxiety (Wu et al., 2021). A study in Croatia conducted across the first two waves of the COVID-19 pandemic found that high cyberchondria levels were associated with high levels of COVID-19 anxiety and faster adoption of safety behaviors (Jokic-Begic et al., 2020). Cyberchondria has been reported to influence adoption to safety behaviors; however, little is known about how exposure to COVID-19 information will impact cyberchondria symptoms leading to increased attention to threat or if it will induce information avoidance for illness information.

Cyberchondria, even though a newer phenomenon, has recently gained more attention as an increase in Internet usage during the COVID-19 pandemic influenced a rise in cyberchondria. Research has associated cyberchondria with COVID-19 anxiety and perceived severity impacting compliance to safety behaviors (Jokic-Begic et al., 2020; Starcevic et al., 2020; Varma et al., 2021). Research suggests that mass media influences safety behaviors and attention to health information. However, findings have been contradictory on whether it induces attention versus avoidance toward health information. The contradictory findings between information avoidance and intentions to comply with safety behaviors are of substantial interest since being unaware or uninformed of safety measures elicits the same health implications as choosing not to comply. Therefore, the ways in which attention towards illness information relates to intentions to comply with safety behaviors, specifically COVID-19 illness prevention guidelines, should be further investigated. Therefore, investigations of how

cyberchondria and COVID-19 news exposure influence attention to illness information and intentions toward safety behaviors are essential for future promotions of public health recommendations (Nosratabadi & Halvaiepour, 2021). The current study aims to investigate how exposure to COVID-19 news influences attention toward illness stimuli and compliance to safety measures in individuals with cyberchondria.

Cyberchondria

Cyberchondria is described as excessive online health-seeking behavior related to increased health anxiety levels (Starcevic et al., 2019). Although cyberchondria is not a distinct disorder in the DSM-5, the development and validation of the cyberchondria severity scale described cyberchondria as a multidimensional construct that is "syndrome-like" and consists of five domains. The factors of cyberchondria include compulsion, distress, excessiveness, reassurance, and mistrust of medical professionals (McElroy & Shevlin, 2014).

McElroy and Shevlin (2014) explain that compulsion refers to excessive online searching for health-related information that interferes with other aspects of daily life. Distress is caused by the increasing anxiety factor associated with searching for health information online, which can also cause problems with irritability, sleep, and worry. Excessiveness pertains to multiple and repeated online searches for health information that is often time-consuming and involves the excessive escalatory factor of cyberchondria. Reassurance is related to the need to seek medical advice from a

professional due to increased anxiety and distress from excessively searching online for health information. The fifth factor is mistrust of medical professionals suggesting that cyberchondria would lead to conflicting thoughts on whether to trust a doctor or the internet. After the development of the Cyberchondria Severity Scale (CSS), the mistrust factor was repeatedly questioned because it did not significantly correlate with the rest of the factors and lacked internal consistency (McElroy et al., 2019). Therefore, it was removed as a factor in the shorter 2019 version of the CSS-12 (McElroy et al., 2019).

Cyberchondria has become more prevalent in recent years due to the rise and ease of access to the Internet. With the increase of cyberchondria, it is important to investigate the escalation in behavior and the potential features involved in potentially maintaining cyberchondria.

Features of Cyberchondria

Cyberchondria has been reported to have various associative features to other constructs. Cyberchondria has been associated with health anxiety (Bajcar & Babiak, 2021; Jokic-Begic et al., 2020; Starcevic et al., 2019), obsessive-compulsive symptoms (Bajcar & Babiak., 2021; Jokic-Begic et al., 2020), intolerance of uncertainty and neuroticism (Bajcar & Babiak, 2020). Although research suggests similarities between the symptoms of each construct and cyberchondria, previous findings indicate that cyberchondria is a distinct construct different from all proposed associations (Starcevic et al., 2019). Research has investigated which related constructs display the strongest relationship to cyberchondria.

Cyberchondria was originally a concept derived from the merging of the words cyber and hypochondria. Due to the relation to hypochondria (known now as Illness Anxiety Disorder or Somatic Symptom Disorder in the DSM-5), research on cyberchondria has investigated the association between cyberchondria and health anxiety (Erdogan & Hocaoglu, 2020; Kurcer et al., 2020; Starcevic et al., 2019; Vismara et al., 2020). Network analysis identified a strong relationship between cyberchondria and health anxiety (Starcevic et al., 2019). Searching online for health information is more frequent in health-anxious individuals (Singh & Brown, 2015). Kurcer et al. (2021) found that university students' health anxiety scores were higher for students who reported a higher frequency of online health searching. The frequency of online health-seeking behavior may be a counterproductive attempt to lessen feelings of anxiety and uncertainty about the state of their health (Starcevic & Berle, 2013). Excessive searching online for health information may increase health anxiety and has the potential to reinforce health-seeking behavior. Individuals with higher levels of health anxiety spent a more extended amount of time searching, visiting more web pages, and reported greater anxiety levels during and after online health searches (Vismara et al., 2020). Less health-anxious individuals also report increased anxiety after health-related internet searching and are at risk of developing cyberchondria (Singh & Brown, 2015). Seeking health information online often leads to an increase in anxiety due to the unpredictability of the Internet, causing an increase in search behavior in an attempt to find reassurance.

Only a few studies have analyzed the escalation factor to cyberchondria. Escalation is when concerns about non-threatening common symptoms turn into serious, rare illnesses within one session, causing an excess of anxiety (White & Horvitz, 2009). This escalation of medical concerns is potentially related to the amount and distribution of medical content viewed by users, the presence of advanced terminology in pages, and a user's predisposition to escalate or seek more reasonable explanations for ailments.

Gibler et al. (2019) investigated whether pain catastrophizing predicted variance in cyberchondria. In relation to cyberchondria, pain catastrophizing uniquely predicted compulsion, distress, reassurance, and excessiveness. Furthermore, results suggest that individuals who catastrophize about pain experiences may be vulnerable to developing cyberchondria.

Problematic Internet use was found to have an even stronger relationship to cyberchondria than health anxiety (Starcevic et al., 2019). As a result of this relationship, increased online activity during the COVID-19 pandemic may have triggered cyberchondria in individuals with increased vulnerability factors.

Cyberchondria and COVID-19

The panic and uncertainty about the novel threat led to a high public response in the news, social media, and on the internet. The benefits of the internet at this time were that it was less costly, easy to access, especially during mandatory quarantines, and it provided a way to keep up with new information (Kurcer et al., 2021). The internet is

also time-saving, and it gives people a chance to learn more about their health care and potentially bridge some of the informational gaps between patients and medical professionals (Kurcer et al., 2021). Along with the benefits, an information overload of bias, inaccurate or misleading information mixed with advanced terminology increased anxiety and distress (Starcevic & Berle, 2013). Research has found that exposing people with inadequate medical knowledge to descriptions of medical illnesses and complex terminology may be hazardous and increase their risk of self-diagnosing or self-treatment (Benigeri & Pluye, 2003 in White & Horvitz, 2009).

Kurcer et al. (2021) explored if fear and panic from COVID-19 triggered cyberchondria in university students, leading to increased health anxiety. The researchers measured the relationship between the belief of previously having COVID-19, health anxiety, and cyberchondria. The findings suggested that individuals who believed that they had previously had COVID-19 had significantly lower cyberchondria levels. The same study also found that females, people who live alone, and people who live in the city had significantly high cyberchondria levels.

Jokic-Begic et al. (2020) found that high cyberchondria and high levels of concern about COVID-19 are associated with intense avoidance behaviors. Individuals with high cyberchondria levels are at risk for self-diagnosing and increased catastrophic thinking. Cyberchondria is a contributing factor for long-term anxiety, and its impact during the pandemic on the general mental health burden should therefore be further investigated.

Safety Behaviors During COVID-19

The COVID-19 pandemic has detrimentally impacted lives worldwide due to the rapid spread of the virus. Since the first case, more than 238 million people have been infected, and over four million people have lost their lives to COVID-19, as reported to the World Health Organization as of October 13th, 2021. COVID-19 has become a global emergency state of health (Aydin et al., 2020). The infection rate has displayed rapid changes in just a few weeks (Aydin et al., 2020). Within 10 days, news articles went from reporting decreased rates of infection to "Hospitalizations Rising Among Fully Vaccinated." Considering the impact of increasing rates of infection and the vulnerability of getting COVID-19, compliance with safety behavior guidelines is essential in slowing the spread of the virus (Papageorge et al., 2021). Therefore, understanding why individuals engage or refrain from safety behaviors is crucial.

Many factors have been examined as potential contributors to the adoption or avoidance of safety behaviors. The perception of risk and coping appraisals are influential in the decision-making process of illness prevention behaviors (Monge-Rodríguez et al., 2021). Proper perceptions regarding symptoms, cause, and transmission of COVID-19 were prevalent in individuals who also reported frequent use of recommended safety behaviors (Lahiri et al., 2021). Fear of contamination, increased media exposure, and perception of outbreak severity were found to significantly predict safety behaviors usage (Knowles & Olatunji, 2021; Zickfeld et al., 2020). These factors associated with compliance to safety behaviors have also been reported as factors

contributing to cyberchondria during the COVID-19 pandemic (Starcevic et al., 2020). Another influential factor in aversion or acceptance to safety guidelines is the media due to frequent exposure to concerning or threatening events (Jungmann & Witthöft, 2020).

Mass media can be beneficial in providing individuals with updates and information during a pandemic (Collinson et al., 2015). Increased knowledge about illness prevention can potentially decrease the chance of developing the virus. However, mass media fatigue was found to be associated with relaxed illness prevention behaviors. Excessive media coverage of social problems may lead to desensitization to media reports and diminished emotional responsiveness to a negative or an aversive stimulus after repeated exposure. This same phenomenon can occur with health events; individuals may be more likely to take precautions against becoming ill with the first reports of an epidemic or health threat, but individual sensitivity to disease reports may diminish with time, and social distancing practices may be relaxed, affecting disease transmission. To better control infectious diseases, a better understanding of the effects of mass media on the uptake and waning of social distancing practices is needed.

Interactive health websites where threat appeals are incorporated have become a popular strategy to promote safety behaviors (Nah & Oh, 2021). Nah and Oh examined how website interactivity enhances the effectiveness of threat appeals and encourages safety behaviors. In the context of an anti-sugar campaign, the effects of website interactivity on sugar control intentions demonstrated that higher interactivity elicited greater fear and disgust, which then subsequently increased perceived threats of sugar

intake. Perceived threats heightened by interactivity led to greater preventive behavioral intentions.

Information overload occurs due to exposure to a surplus of information that has exceeded one's ability to read, understand and properly process the available information (Farooq et al., 2020). Information overload leads to an increase in uncertainty and may make it challenging to perceive the situation objectively. Farooq et al. (2020) investigated the impact of online information during the COVID-19 pandemic in relation to cyberchondria and information overload on the motivation to adopt health measures, specifically the intention to self-isolate. Findings suggest that cyberchondria and information overload significantly impacted individuals' threat and coping perceptions and self-isolation intention. Perceived severity and self-efficacy positively impacted self-isolation intention. Using social media as an information source increased both cyberchondria and information overload. During COVID-19, frequent internet use contributed to information overload and overconcern among individuals influencing illness prevention behaviors such as intent to self-isolate. Due to possible disturbing information or overexposure, the media may also induce further safety-seeking behavior and increase compliance to safety behaviors in individuals with cyberchondria (Jungmann & Witthöft, 2020).

Attentional Bias

Attention bias involves the differences in attention allocation towards a present stimulus when presented with additional stimuli (Abado et al., 2020; Cannito et al., 2020;

Cisler & Koster, 2010; Leung et al., 2007). Three components of attentional bias have been proposed: faster engagement with threatening stimuli compared to neutral stimuli; slower disengagement from threatening stimuli compared to neutral stimuli; avoidance, in which participants avoid the fearful stimulus (Cisler & Kostler, 2010). If observed in individuals with increased cyberchondria, the proposed components of attentional bias could potentially explain what reinforces excessive online health-seeking behavior. Compulsions, distress, and escalation could be due to increased attention toward stimuli and increased difficulty to disengage (Starcevic, 2017; Starcevic et al., 2021). However, individuals with cyberchondria may avoid responsibilities in relation to excessive health-searching (Zickfeld, 2021). Additionally, an attentional bias toward threatening stimuli may contribute to the maintenance and exacerbation of cyberchondria.

Previous attention research has shown that certain words, pictures, or sounds capture users' attention more than others. Researchers have used spatial cueing tasks, visual search tasks, dot-probe tasks (Jasper & Witthöft, 2011), and the Emotional Stroop task (EST; Witthöft et al., 2013; Witthöft et al., 2008) to provide evidence for an attentional bias. The EST is the most robust paradigm to assess attention bias and emotional interference (Witthoft et al., 2016).

Attentional Bias and The EST

The EST investigates emotional interference effects on cognitive processing (Witthoft et al., 2016). The Emotional Stroop effect involves the participants naming the ink color of word stimuli as fast and accurately as possible while at the same time

ignoring the word meaning (Dresler et al., 2009). The emotional Stroop effect indicates emotional interference and attentional bias toward emotionally salient information when slower reaction times to emotional words than neutral words are displayed. (Williams et al. 1997; Dresler et al., 2009). EST has become the most widely used indicator of selective attention, attentional bias, or disruption of ongoing processing by specific emotion contents (Witthoft et al., 2016).

Dresler et al. (2009) examined if the arousal level of positive and negative words would impact reaction times during an EST using only healthy participants. Results showed an increased reaction time and better recall and recognition for positive and negative words compared to neutral words. Positive and negative words did not differ when equal in arousal level. Therefore, words higher in arousal would elicit emotional interference and an increase in attention and memory independent of positive or negative valence.

An EST was used in Witthoft et al.'s (2016) research to investigate the differences in cognitive processes between individuals with pathological health anxiety, depression, and healthy individuals. The findings suggest that multiple cognitive biases are simultaneously present in pathological health anxiety. Results showed an attentional bias to both symptom words and illness words in the health-anxious individuals compared with the two control groups. Individuals with pathological health anxiety elicited slower reaction times and difficulty diverting away from symptom and illness-related information.

Witthoft et al. (2008) compared individuals with health anxiety to non-health anxious participants in a blocked emotional Stroop paradigm. Analyses focused on differences between categories of health threatening information, on reaction time, and test order effects using symptom and illness words. When symptom words were presented first in the experiment, the health-anxious group showed a stronger emotional intrusion effect to symptom words in the first test half compared to the control group. A similar pattern of results with a smaller effect size was demonstrated when illness words were presented first.

Attentional Bias and Trait Anxiety

Trait anxiety is described as a personality trait that predisposes an individual to increased anxiety in response to new and stressful situations (Cisler & Koster, 2010; Spielberger et al., 1983). Attentional bias has been suggested to be related to increased trait anxiety (Cirneci, 1999). Elevated trait anxiety has also been associated with heightened emotional interference (Witthoft et al., 2008). High trait anxiety has been shown to be related to increased sensitivity to threat by influencing the perceived evaluation of the threatening stimuli (Cisler & Koster, 2010). A classical conditioning procedure was performed, where neutral stimuli were classically conditioned to elicit emotional interference in individuals with high trait anxiety (Blanchette & Richards, 2004). These results suggest that frequent exposure to threatening stimuli, can condition neutral stimuli to be associated with emotional interference and increased attention to threat. Moreover, individuals during the COVID-19 pandemic may be at an increased risk

of associating previously neutral stimuli with anxiety-provoking stimuli (Presti et al., 2020). However, the same effects could potentially influence intentions towards safety behaviors or avoidance of the anxiety-provoking stimuli.

Anxious individuals may respond differently when presented with threatening stimuli depending on the level of anxiety (Egloff & Hock, 2001). Highly anxious individuals show increased vigilance, and low anxious individuals show cognitive avoidance when in the presence of an increasing threat. If a stimulus is perceived as highly threatening, behavior and attention may be redirected to the stimuli (Cisler & Koster, 2010). High trait anxiety has been suggested to be related to an increased tendency to perceive non-threatening or mildly threatening information as highly threatening, leading to increased attention for the perceived stimuli (Cisler & Koster, 2010). Therefore, individuals with increased anxiety may display greater attention toward the threatening stimuli while low, anxious individuals may demonstrate decreased attention by deflecting their attention away from the threatening stimuli.

State and trait anxiety on attentional bias toward threat-related stimuli using a card version of the EST was conducted (Egloff & Hock 2001). Results showed that state anxiety was only positively correlated with Stroop interference when the individual was also high in trait anxiety. Therefore, high trait anxiety significantly increased reaction times and attentional bias toward threatening stimuli. In addition to these findings, a substantial amount of research has demonstrated an attentional bias for threatening stimuli in individuals high in trait anxiety (Albery et al., 2021; Cisler & Koster, 2010;

Egloff & Hock, 2001; Stefan et al., 2019). Allocating attention opposite of the location of the threat is described as attentional avoidance (Cisler & Koster, 2010). Low trait anxiety has been associated with attentional avoidance of threatening, frightening, or disgusting stimuli (Cisler & Koster, 2010; Egloff & Hock, 2001; Sagliano et al., 2014; Stefan et al., 2019). Trait anxiety has exhibited significant influence in increased attentional bias and increased attentional avoidance. Thus, trait anxiety may influence results on measures used to assess attention and therefore should be controlled for on tasks such as the EST.

Purpose of the Current Study

Trait anxiety has been reported to be associated with increased attentional bias. Even though the relationship between cyberchondria and trait anxiety has been explored, research has yet to investigate the relationship between cyberchondria and attention bias to threatening stimuli. The contradictory findings between information avoidance and intentions to comply with safety behaviors related to mass media exposure are of particular interest since being uninformed of safety measures elicits the same health implications as choosing not to comply. Compliance with safety behaviors is crucial especially in a global health crisis such as the COVID-19 pandemic. Therefore, the current study investigated the potential relationship between COVID-19 health threats and cyberchondria on attentional bias and the intent to perform safety behaviors while controlling for trait anxiety.

Hypotheses

Hypothesis 1: Individuals with higher cyberchondria levels will have slower RTs to illness words than individuals with lower levels of cyberchondria demonstrating a higher attentional bias for illness words.

Hypothesis 2: Participants with higher cyberchondria levels will report a greater intent to perform safety behaviors than participants with low levels of cyberchondria.

Hypothesis 3: COVID-19 primed participants will have a slower RT to illness words than those who viewed neutral articles, demonstrating a higher attentional bias for illness words.

Hypothesis 4: COVID-19 primed participants will report a greater intent to perform safety behaviors than the participants in the control group.

Hypothesis 5 The performance on the EST is positively correlated with the intent to perform safety behaviors. Slower RTs and an increased attentional bias for illness words will relate to a greater intent to perform safety behaviors.

Hypothesis 6: An interaction between cyberchondria level and news article manipulation on EST performance is expected. Individuals with high cyberchondria levels exposed to COVID-19 prime will demonstrate slower RTs to illness words on the EST than those with high cyberchondria not exposed to the COVID-19 prime. Individuals with low cyberchondria levels will not show as much of a difference in reaction time between COVID and neutral prime.

Hypothesis 7: An interaction between cyberchondria level and news article manipulation on the intent to perform safety behaviors is expected. Individuals with high cyberchondria levels exposed to COVID-19 prime will report more safety behaviors than individuals in the control group with high cyberchondria, but low cyberchondria will not show as much of a difference in safety behaviors between groups.

Method

Participants

An *a priori* analysis was conducted using an alpha of 0.05, a power of 0.80, and a medium effect size ($f^2 = 0.15$) with 5 predictors. Based on the results in G*Power, it was determined that $n = 92$ is the desired sample size (Faul et al., 2007).

The participants for the current study consist of undergraduates from Stephen F. Austin State University in East Texas. The undergraduate students were recruited from the Psychology Department at Stephen F. Austin State University through an online database, SONA Systems. All participants were at least 18 years old and received course credit upon completing the study. Data were collected during Spring 2022.

Measures

Cyberchondria Severity Scale (CSS-12)

The Cyberchondria Severity Scale (CSS-12) is a 12-item measure (see Appendix I), loading on four factors, assessing the elements of cyberchondria: (1) excessiveness (e.g., repeatedly seeking online health information; (2) distress (e.g., increase of anxiety from researching health information online); (3) reassurance (e.g., seeking professional examination due to the increase in emotional distress/worry); (4) compulsion (e.g., excessive online health searching interfering with daily life). The items are measured using a 5-point Likert scale (1= *Never*, 2= *Rarely*, 3= *Sometimes*, 4= *Often*, 5= *Always*) with scores ranging from 3-15 for each of the four factors with a possible total score of

60. This total score was used in the analysis. Higher scores indicate higher levels of Cyberchondria. The CSS-12 has demonstrated good reliability and validity.

Priming Task

Eight online news articles were created using information obtained from real news articles found on the CBS News. Changes were made to have text-only priming conditions, removing pictures, videos, and ads. The real names of the people in the articles were changed, and the articles were made to all be Times New Roman with 16pt font for the body, 30pt font for the headers, and all articles were shortened to be 150 words each. News articles were used to prime participants with a COVID-19 health threat by reading COVID-19 related news articles. Participants were randomly assigned to read either four neutral (see Appendix C) or two COVID-related articles along with two neutral articles (see Appendix B). Participants were told that the purpose of the study is to test memory of the content presented in recent news articles. Before the participants read the articles, they were informed that they would have five minutes to read each article and would later be tested on the information from the articles.

The Emotional Stroop Task (EST)

A computerized version of the EST was used to measure emotional interference effects from the viewing of COVID-19 related news articles. Neutral and illness stimuli were taken from Witthoft et al. (2016) and consisted of 10 neutral and 10 illness words (see Appendix D). Each word was presented in three different colors (green, red, blue), and participants responded using corresponding keys on the keyboard. Participants

responded to 80 stimuli in total, 40 illness-related and 40 neutral. Stimulus presentation order was randomized for each participant. Stimuli remained on the screen until a response is made with an interstimulus interval of 500 ms. Reaction time to neutral words was subtracted from the reaction time of the illness words to get a difference score (D) reflective of emotional interference related to illness words. D was used in the regression analysis as a measure of Emotional Stroop Performance. Higher D scores indicate slower reaction times to illness words than neutral words.

Safety Behaviors Survey

The Safety Behaviors Survey is a self-report measure modified from a COVID Behaviors Scale (Potts, 2021) and includes the Anaki and Sergay (2021) Safety Behaviors Survey for the present study to assess Safety Behaviors related to COVID-19 (see Appendix H). The survey includes questions from the Covid-19 Behaviors scale (Potts, 2021) assessing safety behaviors related to COVID-19, belief about effectiveness of COVID-19 preventing behaviors, and belief about COVID-19. Questions assessing COVID-19 safety behaviors include “Do you wear a mask indoors” and “Do you avoid big crowds” measured on a 5-point Likert scale (1= Always, 2=Most of the time, 3= About half the time, 4= Sometimes, 5= Never). Questions assessing belief about effectiveness of COVID-19 preventing behaviors include “Do you think hand washing is effective in stopping the spread of COVID-19” and “Do you think wearing a mask is effective in stopping the spread of COVID-19” measured on a 5-point Likert scale (1= Definitely yes, 2=Probably yes, 3= Might or might not, 4= Probably not, 5=Definitely

not). Questions assessing belief about COVID-19 include “Do you think COVID-19 is dangerous” and “Do you think COVID-19 is political” measured on a 5-point Likert scale (1= Definitely yes, 2=Probably yes, 3= Might or might not, 4= Probably not, 5=Definitely not). The Safety Behavior Survey also includes a six-item measure that was used to assess future intent to perform COVID-19 related safety behaviors (Anaki & Sergay, 2021). The items are measured using a 5-point Likert scale (1= Definitely will not take, 2= Probably will not, 3= Neutral, 4= Probably will, 5= Definitely will) indicating if the participant “will take these measures” regarding COVID-19 safety behaviors. Protective behaviors were also measured for questions see Appendix H.

The State-Trait Anxiety Inventory (STAI-T)

The State-Trait Anxiety Inventory-Trait Scale (STAI-T; Spielberger et al., 1983) was used to measure the control variable, Trait Anxiety (see Appendix J). The STAI-T is a 20-item scale consisting of questions, such as “I feel nervous and tense” and“I feel inadequate,” answered using a 4-point Likert scale (1=*Almost Never*, 2= *Sometimes*, 3= *Often*, 4= *Almost Always*) with scores ranging from 20-80. We used the validated French version of this scale (Bruchon-Schweitzer & Paulhan, 1993). Items denoting the absence of anxiety (e.g., I feel rested) were reverse scored. As a result, higher scores on any item correspond to more severe anxiety. The internal reliability and validity of the STAI-T are high. This total score was used in the analysis. Higher scores indicate higher levels of Trait Anxiety.

Short Health Anxiety Inventory (SHAI)

The Short Health Anxiety Inventory (SHAI; Salkovskis et al., 2002) was used to measure the control variable, Health Anxiety (see Appendix K). The SHAI is an 18-item scale with scores of 0 to 3 for each question. Participants may select more than one answer however only the higher score was used in the analysis (Salkovskis et al., 2002). For questions and answer choices on the 18-item scale see Appendix D. Higher scores on any item correspond to higher levels of health anxiety. The internal reliability and validity of the SHAI are high. This total score was used in the analysis.

Procedure

Participants signed up for the in-person study online using the SONA system. Once in the lab, participants were randomly given either the COVID-19 threat news articles or the Neutral news articles. Before the participants read the articles, they were informed that they would have five minutes to read each article and would later be tested on the information from the articles. After the participants finish reading all of the articles, they were instructed to perform a "distractor task" where they then completed the EST. Upon completion of the EST was a manipulation check where participants were given a recognition task in relation to the articles, they had previously read to assess attention toward the news article manipulation (see Appendix E). The recognition task included five words from each of the four articles previously presented. The words from the articles were also presented with neutral filler words. Recognition for target words was used as a measure to determine if participants were properly primed. Participants

were then falsely debriefed in order to properly assess safety behavior intent without interference from the previous study (see Appendix F). The participants were then asked if they would like to take part in an additional ongoing study that would only take about 15 minutes to complete. If the participant agreed to participate in the study, they were given an additional consent form (see Appendix G) before completing the CSS-12, STAI-T, SHAI, Safety Behavior Survey and a demographic questionnaire before being fully debriefed (see Appendix L for final debrief). Participants were then thanked for their participation and given course credit.

Analysis

Correlation analysis was used to test hypotheses 1, 2, and 5. Hypothesis 1 predicted cyberchondria would be positively related to D. It was then predicted in hypothesis 2 that those with higher cyberchondria would have higher safety behavior intention scores indicating a positive relationship between variables. Lastly, hypothesis 5 predicted that safety behavior intention and D would be positively related.

An independent samples *t*-test was then used to measure group differences hypothesized in hypotheses 3 and 4. Hypothesis 3 predicted COVID-19 primed participants would have higher D scored than participants in the control group indicating a greater attention bias. In the context of safety behavior intention hypothesis 4 also predicted a group difference where the COVID-19 primed participants would receive higher scores than the control group.

Regression analysis was used to investigate the association between variables addressed in hypothesis 6 which hypothesized an interaction between cyberchondria level and news article manipulation on EST performance. It was predicted that primed participants with higher cyberchondria scores would have higher D scores than those with high cyberchondria in the control group. Those in the prime and control group with low cyberchondria levels will not show much difference between groups. The regression was run with D as the criterion and group, CSS-12, group and CSS-12 interaction, STAI-T, and SHAI, as predictor variables. Trait anxiety and health anxiety were used as control variables.

A second regression analysis was also used to test hypothesis 7 which predicted an interaction between cyberchondria level and news article manipulation on the intent to perform safety behaviors. It was predicted that primed participants with high cyberchondria scores would have higher safety behavior intention ratings than the control group. Those in the prime and control groups with low cyberchondria will not show much difference between groups. The regression was run with safety behavior intention as the criterion and group, CSS-12, group and CSS-12 interaction, STAI-T, and SHAI, as predictor variables. Trait anxiety and health anxiety were used as control variables.

Results

Data

Data were collected from 57 participants. However, data were not available for all measures for all participants due to a number of reasons outlined here: did not complete the study (*n*=4), did not complete the manipulation check (*n*=1), low accuracy on the EST (*n*=1), were more than 3 *SD* from the mean (*n*=2). For all measures full datasets were available for 49 participants (12 male, 36 female, 1 prefer not to answer; age range 18-51). Participants reported their race as American Indian/Alaska Native (*n*=1), Asian (*n*=2), Native Hawaiian or Other Pacific Islander (*n*=1), African American (*n*=6), Caucasian (*n*=35), More than one race (*n*=1), Unknown or not reported (*n*=3). Data distributions were examined for all variables, Safety Behavior scores were reflected, log-transformed and reflected back, and CSS-12 scores and SHAI scores were log-transformed to normalize the distributions. However, the non-transformed data were used in the figures. Survey reliability was also assessed with Cronbach's alpha, which showed strong internal consistency for all measures: CSS-12 ($\alpha = .93$), STAI trait ($\alpha = .87$), SHAI ($\alpha = .89$), and SB ($\alpha = .84$).

Correlation Analyses

The correlation matrix is presented in Table 1. Cyberchondria displayed a significantly strong positive correlation to health anxiety and a significantly moderate

positive correlation to trait anxiety. Health anxiety and trait anxiety also showed a significantly strong positive correlation.

Results showed a significant moderate positive correlation between Trait Anxiety and current protective behaviors, current safety behaviors and beliefs about COVID-19. However, Trait Anxiety did not show a significant relationship to safety behavior intention. Cyberchondria was moderately related to safety behavior effectiveness beliefs however was not significantly related to safety behavior intention or EST performance (see Figures 1 and 2), therefore hypotheses 1 and 2 were not supported. Results were also not significant between EST performance (D) and intent to perform safety behaviors as shown in Figure 3, therefore hypothesis 5 was not supported.

Table 1

Correlation matrix for predictor variables

	D	CSS-12	STAI-T	SHAI	SB1	SB2	CB1	CB2
CSS-12	.06	—						
STAI-T	-.09	.40*	—					
SHAI	-.01	.76*	.63*	—				
SB1	.09	.14	.20	.06	—			
SB2	.22	.27	.37*	.37*	.58*	—		
CB1	.32*	.18	.47*	.28	.58*	.64*	—	
CB2	.09	.34*	.27	.35*	.56*	.50*	.41*	—
CB3	.05	.28	.40*	.26	.30*	.42*	.42*	.30*

D: Difference score; CSS-12: Cyberchondria Severity Scale-12; STAI-T: State-Trait Anxiety Inventory-Trait; SHAI: Short Health Anxiety Inventory; SB1: Safety Behavior Intention; SB2: Protective Behaviors; CB1: COVID-19 Safety Behaviors; CB2: Effectiveness Belief of COVID-19 Preventing Behaviors; CB3: Belief about COVID-19.
* $p < .05$

Figure 1

Scatterplot Depicting the Correlation Between D and Cyberchondria

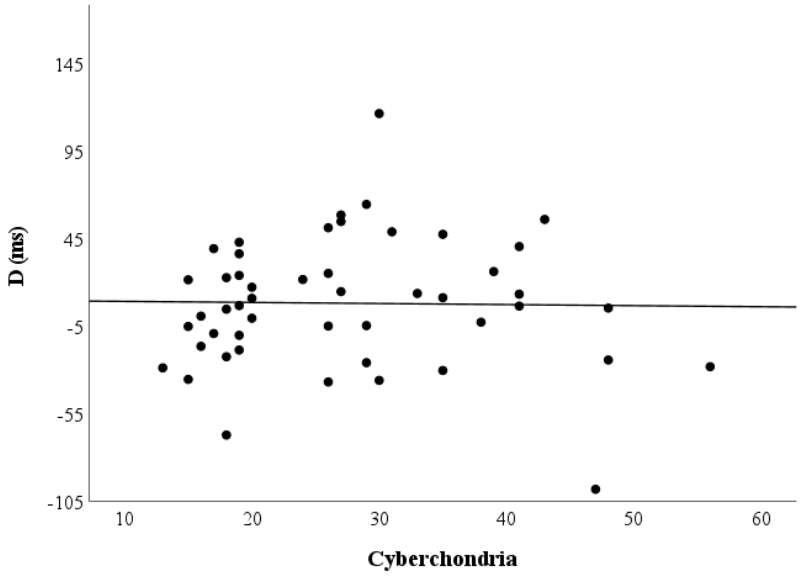


Figure 2

Scatterplot Depicting the Correlation Between Safety Behavior Intention and Cyberchondria

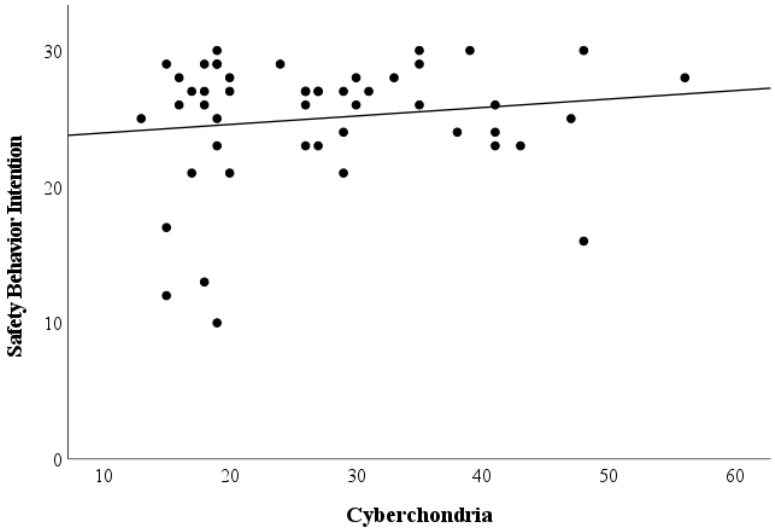
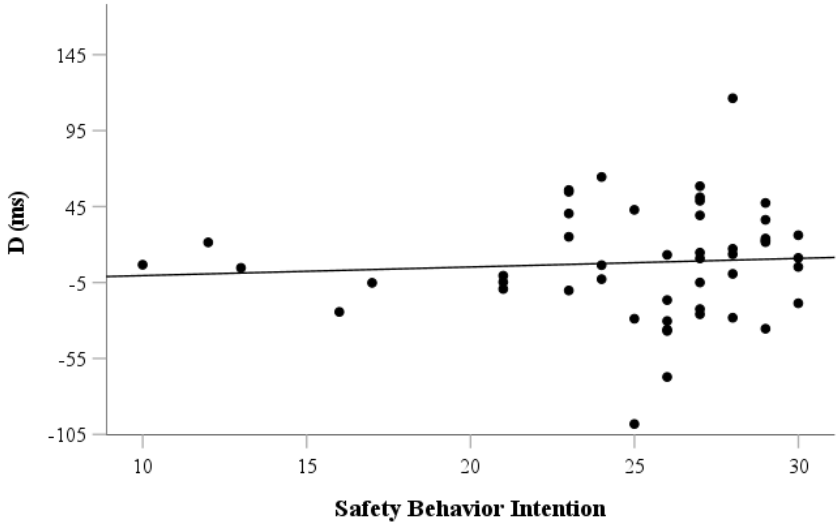


Figure 3

Scatterplot Depicting the Correlation Between D and Safety Behavior Intention



Group Difference Analyses

Descriptive statistics for all measures by group are presented in Table 2. An independent samples t-test was done to assess group differences for all variables. The COVID-19 prime group did not differ significantly compared to the control group for all measures. There was no significant difference between the COVID-19 primed participants (M = 24.68, SD = 5.17) and the control group participants (M = 25.02, SD = 4.65), $t(47) = -.03$, $p = .979$ intention to perform safety behaviors as seen in Figure 5. Therefore, hypotheses 3 and 4 were not supported. Although, not significant COVID-19 primed participants had lower mean D scores (M = -0.28, SD = 42.81) than participants

who viewed neutral articles (M = 14.93, SD = 30.48), $t(47) = 1.45$, $p = .153$ (see Figure 4).

Table 2

Descriptive statistics for all measures by group (SD)

	All	Neutral Article (n=27)	Covid Article (n=22)	Cohen's d
D	8.10 (36.93)	14.93 (30.48)	-0.28 (42.81)	.42
SB	25.02 (4.65)	25.29 (4.25)	24.68 (5.17)	.13
CSS-12	27.28 (10.65)	25.37 (9.03)	29.63 (12.14)	-.41
SHAI	15.92 (8.42)	14.44 (5.40)	17.72 (10.93)	-.39
STAI-T	47.69 (10.87)	47.07 (9.40)	48.45 (12.63)	-.13

D; Difference score, SB; Safety Behavior Intention, CSS-12; Cyberchondria Severity Scale-12, STAI-T; State-Trait Anxiety Inventory-Trait, SHAI; Short Health Anxiety Inventory. *$p < .05$.

Figure 4

Mean D scores and SE for different groups

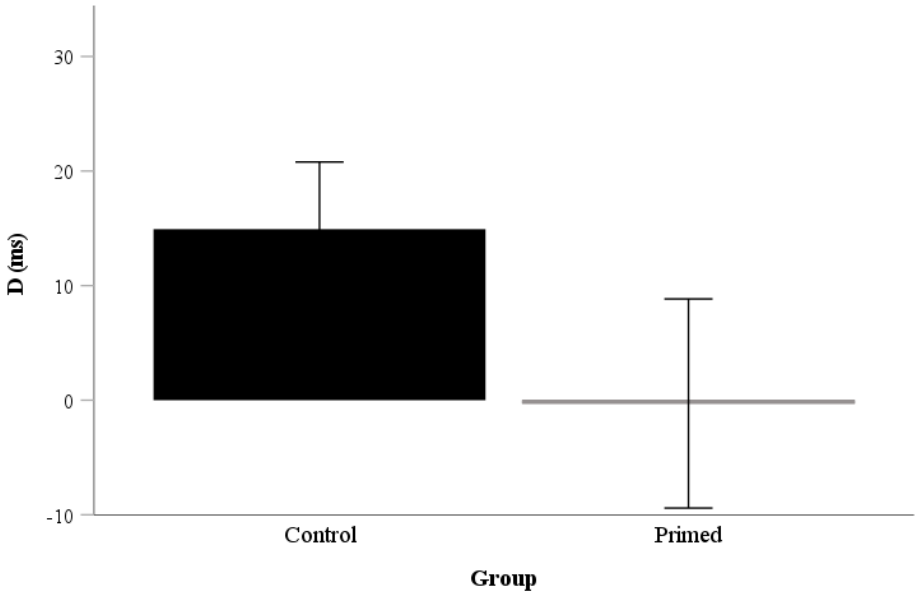
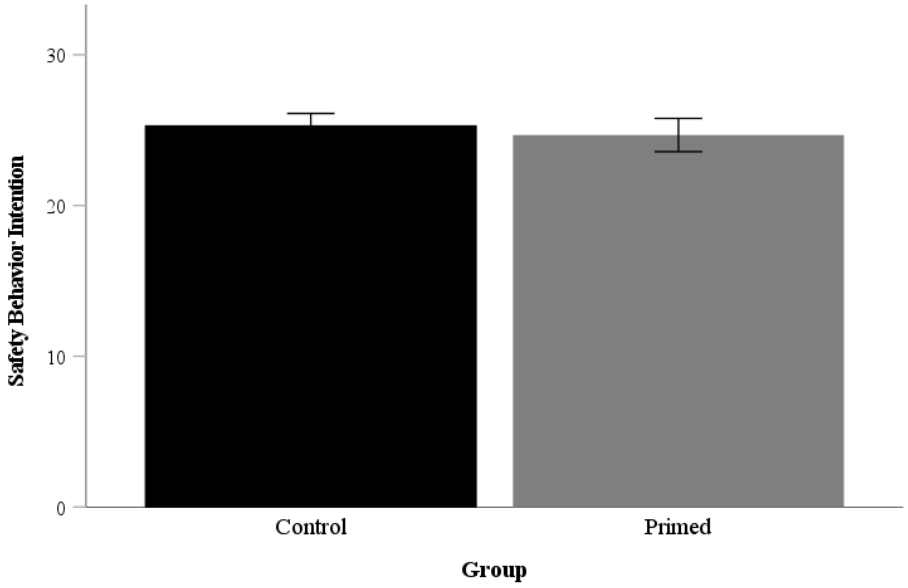


Figure 5

Mean Safety Behavior Intention scores and SE for different groups



Regression Analyses

Regression analysis was used to assess the impact of reading COVID-related articles on the performance of the EST and reported future safety behaviors. Two regressions were run, the first predicting Stroop performance from news article manipulation, cyberchondria levels, the interaction between News article manipulation and cyberchondria levels while controlling for trait anxiety and health anxiety. A second regression was run to predict safety behaviors using the same variables. The two-regression analysis are presented in Table 3.

The regression analysis with D as the criterion and group, CSS-12, group and CSS-12 interaction, STAI-T, and SHAI, as predictor variables predicted 12% of the variance but was not significant R^2= .12, $F(5, 43) = 1.21$, $p = .320$. Although not significant, Figure 6 shows an interaction between cyberchondria and group predicting D. The regression analysis with SB as the criterion and group, CSS-12, the interaction between group and CSS-12, STAI-T, and SHAI as predictor variables predicted 8% of the variance but was also not significant R^2= .09, $F(5, 43) = .83$, $p = .534$. Figure 7 shows the results of the second regression analysis. Therefore, hypotheses 6 and 7 were not supported.

A post hoc was conducted for the first regression analysis with EST performance as the criterion. A power of 0.43 was achieved and a sample size of 100 participants would be needed to achieve a power of 0.8. A post hoc analysis was conducted for the second regression analysis with safety behavior intention as the criterion. A power of

0.31 was achieved and a sample size of 136 participants would be needed to achieve a power of 0.8.

Table 3

Unstandardized regression coefficients with standard error from regression analyses

Criterion	Predictors	B	SE	*P*
D	Group	-16.14	10.69	.139
R^2= .12	CSS-12	11.80	22.22	.598
p=.320	Group x CSS-12	-49.60	29.81	.103
	SHAI	5.99	20.56	.772
	STAI-T	-0.47	0.63	.458
SB	Group	-0.05	0.22	.822
R^2= .09	CSS-12	0.61	0.46	.195
p=.534	Group x CSS-12	0.45	0.62	.478
	SHAI	-0.60	0.43	.168
	STAI-T	0.02	0.01	.110

D; Difference score, SB; Safety Behavior Intention, CSS-12; Cyberchondria Severity Scale-12, STAI-T; State-Trait Anxiety Inventory-Trait, SHAI; Short Health Anxiety Inventory. *$p < .05$.

Figure 6

Scatterplot Depicting Association Between Cyberchondria and D by Group

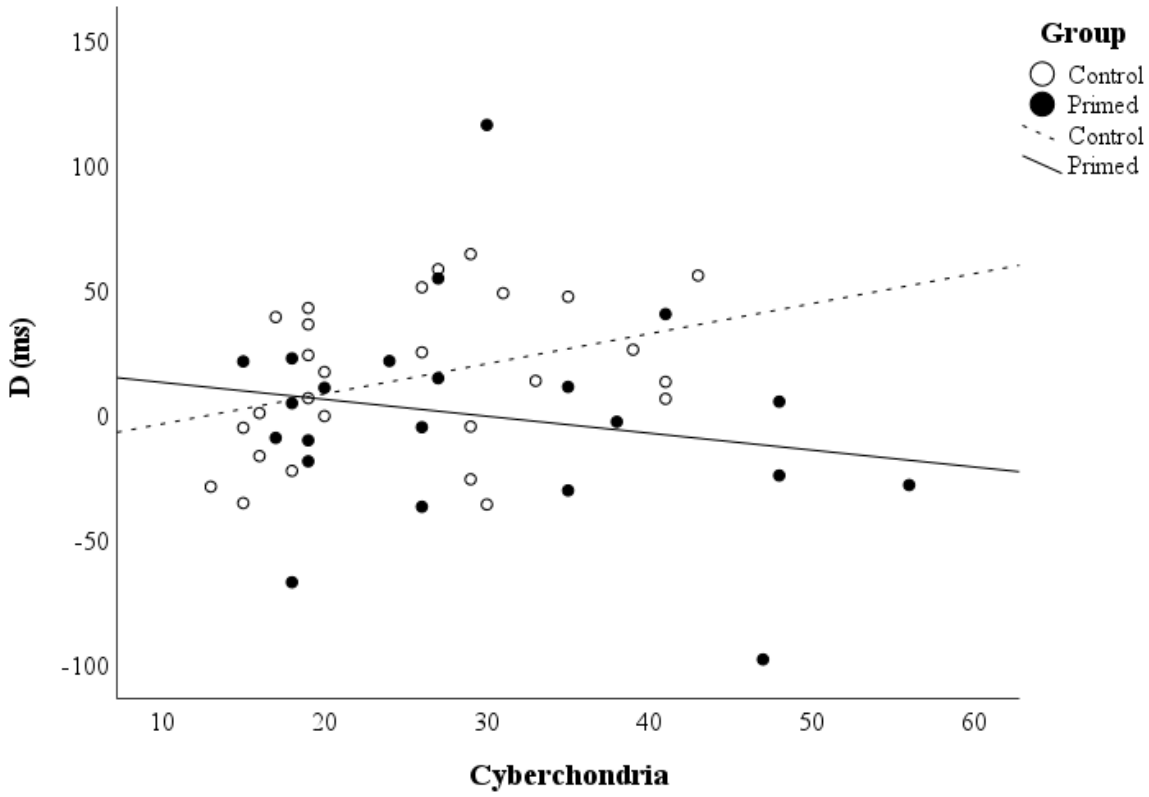
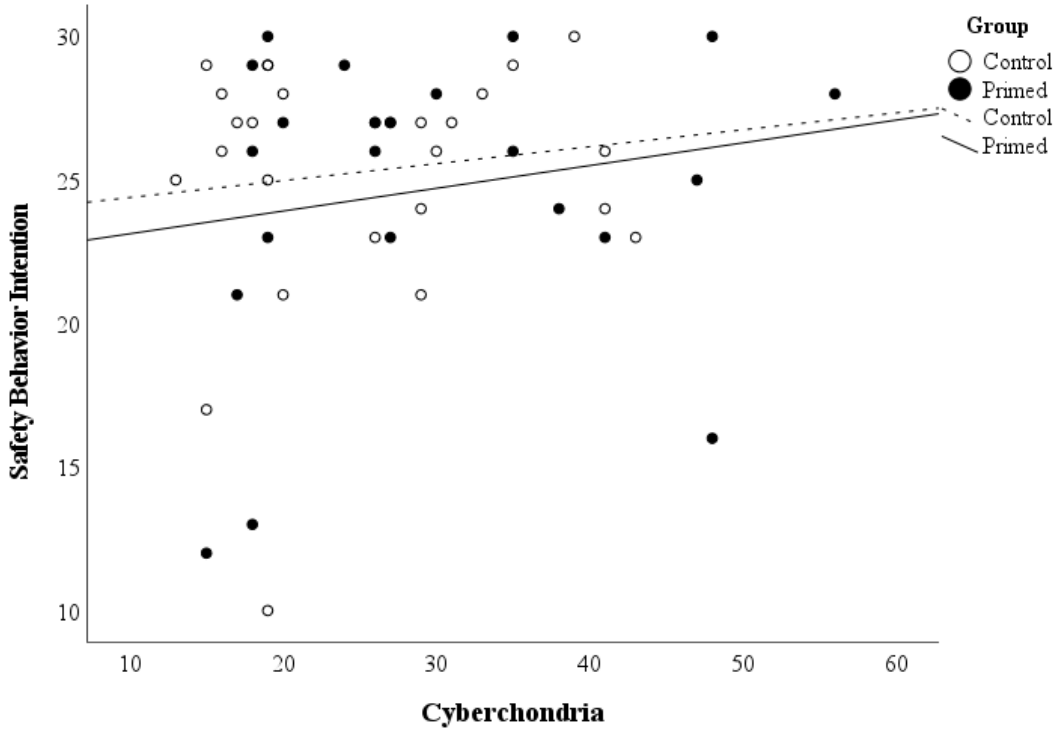


Figure 7

Scatterplot Depicting Association Between Cyberchondria and Safety Behavior Intention by Group



Discussion

The purpose of the current study was to investigate the potential relationship between COVID-19 health threats and cyberchondria on attentional bias and the intent to perform safety behaviors. During the pandemic cyberchondria research has increased due to the escalation of health searching on the internet. A better understanding of the relationship between attention to health threatening information, cyberchondria and safety behaviors is needed due to their influential role during the pandemic.

The current study investigated this potential relationship where it was hypothesized that individuals with higher cyberchondria levels would demonstrate a greater intent to perform safety behaviors than participants with lower levels of cyberchondria. Previous studies have found a significant relationship between cyberchondria and safety behaviors (Jokic-Begic et al., 2020; Starcevic et al., 2020; Varma et al., 2021). The findings from the current study however mostly did not support the hypothesis and showed no significant relationships between variables.

Findings from the current study support previous findings suggesting an association between cyberchondria and health anxiety (Bajcar & Babiak., 2021; Jokic-Begic et al., 2020; Starcevic et al., 2019). Even though there is minimal research on cyberchondria pertaining to attention bias; health anxiety has been reported to be significantly related to attention bias. Thus, it was hypothesized that individuals with higher cyberchondria levels would demonstrate a higher attentional bias for illness words

than participants with lower levels of cyberchondria. The findings of the current study, however, did not support the hypothesis and no significant relationship was found between cyberchondria and attention bias.

Research has suggested that individuals may have an increased attentional bias to threating information (Abado et al., 2020; Cisler & Koster, 2010). Stefan et al. (2019) found that participants demonstrated increased attention for health threatening stimuli compared to general threatening stimuli. Melki and colleagues (2020) found a positive relationship between exposure to COVID-19 news and the adoption of preventative measures. However, the present results from the t-test did not support the hypothesis from the current study that the COVID-19 primed group would demonstrate a higher attentional bias for illness words and a greater intent to perform safety behaviors compared to the control group.

In addition to research investigating attentional bias to threat and increased safety behaviors; safety behavior compliance has also been associated with cyberchondria (Jokic-Begic et al., 2020). It has also been suggested that those with cyberchondria may demonstrate selective attention to health information (Starcevic, 2017). As a result, hypotheses 6 and 7 predicted an interaction between cyberchondria level and news article manipulation on EST performance and an interaction between cyberchondria level and news article manipulation on the intent to perform safety behaviors. It was also predicted that primed participants with high cyberchondria would receive higher D and safety behavior intention scores than the primed participants with low cyberchondria and those

in the control group. Contrary to hypotheses 6 and 7, the results from the regression analysis were not significant and did not support the predictions.

Limitations

The present study is not without limitations. The most notable limitation being sample size. A larger sample size could potentially be more representative, increase power and provide more reliable results. Due to the current study having a small sample size, the current study should be replicated with a larger sample size to determine if increasing power would elicit different results. Future studies should also investigate other potential influences on safety behavior intentions due to the implications that compliance to health recommendations have on the spread and rate of disease transmission.

The study took place in 2022 two years after the first case of COVID-19. COVID-19 has been everywhere in the news and media. As a result, the prime may not have been as effective due to desensitization. Despite the timing of the study, COVID-19 is still prevalent and the articles used in the study were current news articles demonstrating that COVID-19 is still a problem and an active topic in the media.

The methodology used to measure attentional bias may be a potential limitation. Although, the EST has been used in previous research as a measure of attentional bias it is not the only method used to measure attention. The dot-probe task (Cannito et al., 2020; Jasper & Witthoft, 2011), spatial cueing task (Stefan et al., 2019), and the go/no go

task have also been used to measure the effects of emotion on attention. Perhaps, the use of a different methodology as a measure of attention would receive different results.

A possible limitation is that cyberchondria may not be a distinct construct different from health anxiety. The findings from the current study support previous findings demonstrating a significantly strong correlation between cyberchondria and health anxiety (Bajcar & Babiak, 2021; Jokic-Begic et al., 2020; Starcevic et al., 2019). Cyberchondria and health anxiety have been previously found to be strongly related and involve many of the same symptoms and features however, the main difference is the online factor associated with cyberchondria. Starcevic et al. (2019) found that cyberchondria demonstrated a stronger relationship to problematic internet use than to health anxiety. Cyberchondria has also been associated with intolerance of uncertainty and OCD due to the compulsive factor during the online health seeking behavior.

Research has shown that individuals with high cyberchondria levels do not find reassurance from online health searching due to increased distress from the search (Starcevic et al., 2019). Individuals with health anxiety may experience reassurance seeking behavior in the form of online health searching however, those with cyberchondria are likely not reassured by the online information and experience compulsions to excessively search online that usually escalates from minor symptoms to serious conditions.

Future Directions

Further research is needed to investigate how exposure to health information through mass media influences increased attention to threat or induces information avoidance for illness information. Previous research has demonstrated contradictory findings related to exposure to health information and how it influences avoidance versus attention. Witthoft et al. (2016) found that when exposed to health threat related stimuli an induvial with health anxiety showed increased attention to the threatening stimuli. While Siebenhaar et al. (2020) found that exposure to health threat related stimuli induced avoidance in individuals. In addition, the current study although not significant found that the participants that read the COVID-19 articles had a lower mean D score than the participants that read the neutral articles demonstrating faster reaction times to illness words than neutral words. Therefore, the results could be interpreted to mean that participants displayed more avoidance to the illness stimuli after exposure to the COVID-19 news. Factors that could contribute to the contradictory findings are the content, length of exposure, and media source. The present study utilized news articles as the priming method for health information. However, the use of a different methodology could elicit different results.

Information overload has been mentioned as a potential variable influencing safety behaviors and attention to health information. As a result, future studies could also manipulate exposure times to illness stimuli. Avoidance toward illness stimuli may occur due to information overload. Avoidance to health information has been suggested to be a

defense response to avoid negative information that interferes with a person's happiness (Siebenhaar et al., 2020). Soroya et al. (2021) found that individuals showed avoidance to COVID-19 information after experiencing information anxiety. In the same context another study found that increased distress from COVID-19 information increased information avoidance (Siebenhaar et al., 2020). Moreover, increased exposure to health information from the media may lead to avoidance. Therefore, the way that health information is presented should be further investigated in order to minimize avoidance to potentially crucial information.

Conclusion

In conclusion the current study investigated how exposure to health threatening news impacts attention to illness stimuli and safety behavior intentions. Participants were primed with COVID-19 news articles followed by an EST to assess attention toward illness stimuli. The findings of the current study were insignificant and did not support the hypotheses. However, the present findings could potentially be explained by previous research suggesting that individuals may avoid threatening information. Further research is needed to determine how the presentation of health recommendations influence attention toward the information and compliance to the recommendations. Compliance with safety guidelines ultimately influences transmission and mortality rates. Therefore, understanding and predicting these patterns of behavior in the event of another wave of the COVID-19 pandemic and for future global health crises is imperative and could save millions.

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Appendix A

INFORMED CONSENT FORM

Investigator's statement

RESEARCH DESCRIPTION: You are invited to participate in a research study conducted by Jacqueline Charles and Dr. James D. Schaeffer. The overall purpose of this research is to look at memory for information in current news.

DURATION: The length of time you will be involved with this study is approximately 60 minutes.

PROCEDURES: If you agree to be in this study, we will ask you to do the following things: Read four current news articles, an EST will be used as a distractor task where you will be asked to press the key that corresponds to the color of the word. Following the EST will be a word recognition task for words used in the articles previously read.

RISKS: We do not anticipate any risks from participating in this research, which include minor psychological stress.

There are no direct benefits associated with your participation in this research other than the enhancement of scientific knowledge.

COMPENSATION: Students recruited from participating introductory psychology classes will receive 1 credit for every 30 minutes of research participation. This study is worth 2 research participant credit. Students from other classes will receive credit in that class in an amount that is considered appropriate by the course instructor (e.g., 5 points extra credit or 1-2% of the overall points possible in the class).

CONFIDENTIALITY: The records of this study will be kept private. Your name will not be attached to answers you provide. The investigators will have access to the raw data. In any sort of report that is published or presentation that is given, we will not include any information that will make it possible to identify a participant. This number will not be tied to any type of identifying information about you. Once collected, all data will be kept in secured files, in accord with the standards SFASU, federal regulations, and the American Psychological Association. In addition, please remember that the researchers are not interested in any individual person's responses. We are interested in how people in general respond to the measures.

VOLUNTARY NATURE OF THE STUDY: Your participation is entirely voluntary and you may choose not to participate in this study or withdraw your consent at any time. You will not be penalized in any way should you choose not to participate or withdraw. You may skip any question that makes you uncomfortable or any question you do not wish to answer. You will be compensated for your time, even if you do not complete the study.

CONTACTS AND QUESTIONS:

Jacqueline Charles: Charlesjj@jacks.sfasu.edu
Dr. James D. Schaeffer: Schaeffejd@sfasu.edu

If you have questions or concerns regarding this study and would like to speak with someone other than the researchers, you may contact The Office of Research and Sponsored Programs at (936) 468-6606.

STATEMENT OF CONSENT

The procedures of this study have been explained to me and my questions have been addressed. The information that I provide is confidential and will be used for research purposes only. I am 18 years of age and I understand that my participation is voluntary and that I may withdraw anytime without penalty. I have read the information in this consent form and I agree to be in the study.

_____ _____

Signature of Research Participant **Date**

_____

Printed Name of Research Participant

_____ _____

Signature of person obtaining consent **Date**

_____

Printed Name of person obtaining consent

Appendix B

PRIMING TASK
COVID-19 NEWS ARTICLES

COVID-19 NEWS ARTICLE PRIME 1

Woman Loses Her Entire Family to Coronavirus

Bonnie Najera from El Paso Texas relayed that six of her family members died from COVID-19.

"They were all being very careful," she said, recounting the incredible loss she'd experienced over the course of the pandemic.

The family's COVID-19 saga began when Najera's mother contracted the disease and was taken to the hospital, only to deteriorate quickly—she was placed on a ventilator after three days into her stay and eventually died there. Her father also was diagnosed with the coronavirus and was being placed on a ventilator at the hospital right as her mother died.

Though her father seemed to show improvement after a treatment, he died as the family was heading to the funeral home for his wife's services. Shortly after that, dealing with the grief of both her parents being gone, Najera received news of her own positive test.

Though Najera recovered, she would soon meet with additional tragedy, as her cousin, two aunts, and uncle, died of COVID-19 shortly after.

Even those who are vaccinated can still get the virus and spread it to the rest of their family. Health officials are advising people to seek treatment if they suspect they're experiencing symptoms related to COVID-19.

COVID-19 NEWS ARTICLE PRIME 2

"Don't wait": WHO urges U.S. to pay attention as surging COVID cases flood Europe's hospitals again

COVID-19 has been resurging across places where it was thought to be well under control. Trends show that success today does not necessarily mean success tomorrow.

Europe has seen a jump of more than 50% in new cases over the last month, and the World Health Organization has warned the continent could see another half of a million deaths by February.

Dr. Kluge, the World Health Organization's Regional Director for Europe, told CBS News "vaccination uptake has plateaued and, at the same time, there's a relaxation of the public health and social measures, which is a cocktail for what we see: a fourth wave." Case rates are up and the daily mortality rate is surging.

"Vaccines are a game-changer. But alone, they are not enough. We need to keep pressure on the virus, not surrendering on masks, hand-washing, indoor ventilation — particularly in the schools," said Kluge.

In the U.K., the virus' spread in schools — where anti-virus mandates were dropped from the beginning of this academic year — is being blamed for rising case numbers.

Kluge told CBS News, "If there is a situation where the peak is accelerating, don't wait to bring back anti-virus measures, the earlier, the stricter, the better."

COVID-19 NEWS ARTICLE PRIME 3

(NEUTRAL)

Space Station Crew Returns To Earth With A Night Re-Entry, Splashdown

Two NASA astronauts and two crewmates undocked from the International Space Station and plunged back to Earth on Monday, safely splashing down in the Gulf of Mexico to close out a 199-day mission.

Over the course of their mission, the crew helped with the arrival of five cargo ships, a new Russian lab module and a Soyuz crew ferry ship. Pesquet participated in four spacewalks, Kimbrough ventured outside three times and Hoshide once.

"It's kind of a bittersweet feeling," Pesquet told reporters Friday, reflecting on the end of the mission. "We might never come back. And it's really a magical place that flies in the sky, it's almost impossible to get to and gives you superpowers of floating and seeing the Earth and doing good things for the people on Earth.

"So, to me, that's what dreams are made off. And I'm very thankful that people dreamt the ISS some time ago and then went ahead and worked hard to make it happen and to build it for the benefit of everyone. "The trip home began at 2:05 p.m. when the Endeavour undocked from the space-facing port. While astronauts aboard the station radioed "Take care. Fly safe. Get home safely."

COVID-19 NEWS ARTICLE PRIME 4

(NEUTRAL)

U.N. To Elon Musk: Here's How We Would Spend Your Money To Fight Global Hunger

Prompted by a challenge from Tesla founder Elon Musk, the United Nations has released a plan for how it would spend nearly $7 billion to combat hunger around the world.

The proposal comes three weeks after David Beasley, executive director of the U.N.'s World Food Programme, or WFP, told CNN that roughly 2% of Musk's $279 billion net worth could help end hunger.

After seeing the interview, Musk said on Twitter "If WFP can describe on this Twitter thread exactly how $6 billion will solve world hunger, I will sell Tesla stock right now and do it,".

The U.N. said its proposed plan would feed 42 million starving people. The U.N. emphasized that $6 billion would not eradicate world hunger. But the money would provide one meal a day to millions of people facing famine.

"This hunger crisis is urgent, unprecedented, and avoidable," Beasley tweeted, telling Musk that "we're ready to talk with you — and anyone else — who is serious about saving lives. The ask is $6.6 billion to avert famine in 2022." Musk so far has not responded to the U.N.'s proposal. However, he recently has sold a significant number of his Tesla shares cashing in about $5 billion.

Appendix C

PRIMING TASK

NEUTRAL NEWS ARTICLES

NEUTRAL NEWS ARTICLE 1

Bride Wears Special Wedding Dress For Husband, Who Is Blind

Kelly Ferraro met Anthony in 2017. Kelly knew Anthony was blind – but soon learned there was much more to him.

"Anthony didn't have a cane or anything and no one was guiding him around," Kelly told CBS News, adding that he can see some light outside, but nothing indoors. "So I was like, 'Why isn't anyone helping you?'"

"Kelly grabbed on to me and was helping me the rest of the day," said Anthony. "I was like, 'This girl's amazing.'"

Kelly wanted to do something special for their first date so she got a dress he could feel.

"She's like, 'Well, he can't see me, so I have to wear something that feels nice. No one's ever thought to do that, like ever," Anthony said.

After four years of dating, the couple got married. Ahead of the wedding, Kelly got a custom wedding dress – one with many textures, so he could "see" by feeling.

"My mind was blown. I started crying. It was like I was able to see Kelly. That was the best part, I was able to feel her dress and was just creating this image of an angel in my brain, it was just beautiful." he said.

NEUTRAL NEWS ARTICLE 2

Ava Roberts ran 95 marathons in 95 days. Her next challenge is to blaze a new trail

This month, ultra-marathoner Ava Roberts will attempt a 335-mile trek – with 50,000 feet of elevation change – on the Pinhoti Trail near the Appalachian Mountains. The feat seems harrowing – but Roberts is no stranger to extreme physical challenges. In fact, she's a trailblazer in distance running.

Last year, Roberts ran 95 marathons in 95 days – setting a world record.

She started her marathon quest in March 2020. She not only ran daily – she ran 26.21 miles each day. "It just kind of became a part of my everyday routine, running marathons gave me purpose, " Roberts said.

She now holds the record for most consecutive days to run a marathon distance by a woman.

Next, she is attempting a fastest known time for the Pinhoti Trail.

"No woman has set a [supported] record on it, there's only men's times," Roberts said. Only one woman has attempted the fastest known time for the trail, with a self-supported run lasting more than 10 days. "I'm kind of hoping that we can get a woman's time up on the board, that I can encourage other women to go after this record. We should encourage each other and ourselves to challenge those limits," she said.

NEUTRAL NEWS ARTICLE 3

Teacher Builds School Desks, Furniture For Children In Need

An Iowa schoolteacher who's also a part-time woodworker put together a team to create homemade desks for kids in need.

Evan's mission – dubbed "Woodworking with a Purpose" – started last fall. I just felt in my heart that this is what I need to do." Nate Evans, who has worked in education for 16 years told Fox News.

Evans already had his own business, Evan's Woodworking, that he started out of his garage.

Evans and his team of 20 regular volunteers, as well as his family, began pumping out a few hundred desks to send them off to children throughout central Iowa.

Evan's efforts were noticed by the Core Foundation, which works to "ignite and support charitable projects," according to its website.

"Through their nonprofit status, it gave us a chance to take larger donations from more corporations in our area and from different places around the country," Evans said.

Not only did lumber yards start sending in donations, but hundreds of people started offering to help. Woodworking with a Purpose even had building events where they would create 250 desks in a single day. Making over 2,100 desks Evans hopes to eventually touch the lives of children throughout the country.

NEUTRAL NEWS ARTICLE 4

This Bride Didn’t Have A Gown or Photographer On Her Wedding Day A Redo, 77 Years Later

Frankie King did not have an extravagant wedding day. It was 1944 — at the height of World War II —like many young men at the time, Royce joined the military and was moved to a base in another state.

Their daughter, Sue Bilodeau, told CBS News. "He got a short leave. They had been engaged, so they decided to have a wedding before he was deployed overseas."

On their 77th anniversary, their nurse asked Frankie if she could see a wedding photo. And she said, “'Well, we don't have a picture because we actually didn't have a photographer that day.'"

The nurse was inspired to help the couple get some wedding photos. A photoshoot was arranged.

Frankie was honored to wear a wedding dress and felt special. Royce agreed. He stood outside, in his original Air Force uniform that he married Frankie in. "He was really excited to be able to dress up for mom," their daughter said.

When it was time for his "first look" at his bride, Royce took off his blindfold as she crossed the yard in her white gown. "He just gazed at her and just beamed. They both did. It was very sweet," Bilodeau said.

Appendix D

EST

EST WORDS

Symptom word	Neutral words
Dizziness	Toaster
Nausea	Wooden spoon
Headache	Basin
Diarrhea	Canteen
Breathlessness	Teaspoon
Pain	Bowl
Tachycardia	Hand brush
Sickness	Soup spoon
Abdominal pain	Oven gloves
Cough	Plate

Appendix E

MANIPULATION CHECK

Recognition of COVID-19 Prime Task

Target Words	Neutral Words
Contracted	Ambition
Diagnose	Brush
Symptoms	Blossom
Mortality	Guarantee
Masks	Transfer
Spread	Follow
Mission	Basket
Floating	Driven
Ventured	Hour
Hunger	Locate
Challenge	Influence
Crisis	Fence

MANIPULATION CHECK

Recognition of Neutral Article Task

Target Words	Filler Words
Custom	Career
Blind	Brush
Angel	Blossom
Marathon	Meadow
Trailblazer	Doubled
Routine	Guarantee
Teacher	Water
Family	Basket
Children	Coffee
Bride	Locate
Photo	List
Deployed	Influence

Appendix F

DEBRIEF FORM

Thank you for taking part in this study.

You have read 4 current news articles, and after a distractor task were given a recognition task for words in the news articles previously read. You will be given research credits for your time.

Your participation in this study is confidential. Your name will not be associated with any of the answers you provided. If you would like to be informed of the results of this study please notify us so that we can follow-up with you after the study is concluded. If you have any questions, complaints, or concerns, please contact:

Jacqueline Charles: Charlesjj@jacks.sfasu.edu

Dr. James D. Schaeffer: Schaeffejd@sfasu.edu

Appendix G

INFORMED CONSENT FORM

Investigator's statement

RESEARCH DESCRIPTION: You are invited to participate in a research study conducted by Jacqueline Charles and Dr. James D. Schaeffer. The overall purpose of this research is to look at the relationship between safety behaviors and anxiety.

DURATION: The length of time you will be involved with this study is approximately 15 minutes.

PROCEDURES: If you agree to be in this study, we will ask you to do the following things: complete questionnaires pertaining to safety behavior intentions and anxiety. There are no right or wrong answers, and you can leave a question blank if you feel uncomfortable answering it.

RISKS: We do not anticipate any risks from participating in this research, which include minor psychological stress.

There are no direct benefits associated with your participation in this research other than the enhancement of scientific knowledge.

COMPENSATION: Participants will not receive compensation for participation in this research.

CONFIDENTIALITY: The records of this study will be kept private. Your name will not be attached to answers you provide. The investigators will have access to the raw data. In any sort of report that is published or presentation that is given, we will not include any information that will make it possible to identify a participant. This number will not be tied to any type of identifying information about you. Once collected, all data will be kept in secured files, in accord with the standards SFASU, federal regulations, and the American Psychological Association. In addition, please remember that the researchers are not interested in any individual person's responses. We are interested in how people in general respond to the measures.

VOLUNTARY NATURE OF THE STUDY: Your participation is entirely voluntary and you may choose not to participate in this study or withdraw your consent at any time. You will not be penalized in any way should you choose not to participate or withdraw. You may skip any question that makes you uncomfortable or any question you do not wish to answer. You will be compensated for your time, even if you do not complete the study.

CONTACTS AND QUESTIONS:
Jacqueline Charles: Charlesjj@jacks.sfasu.edu
Dr. James D. Schaeffer: Schaeffejd@sfasu.edu

If you have questions or concerns regarding this study and would like to speak with someone other than the researchers, you may contact The Office of Research and Sponsored Programs at (936) 468-6606.

STATEMENT OF CONSENT

The procedures of this study have been explained to me and my questions have been addressed. The information that I provide is confidential and will be used for research purposes only. I am 18 years of age and I understand that my participation is voluntary and that I may withdraw anytime without penalty. I have read the information in this consent form and I agree to be in the study.

_____ _____

Signature of Research Participant **Date**

_____

Printed Name of Research Participant

_____ _____

Signature of person obtaining consent **Date**

_____

Printed Name of person obtaining consent

Appendix H

SAFETY BEHAVIORS SURVEY

COVID-19 behaviors

Please indicate how often you perform the following behaviors.

Always	Most of the time	About half the time	Sometimes	Never
(1)	(2)	(3)	(4)	(5)

Do you wear a mask indoors?

Do you wear a mask outdoors?

Do you wear a mask around friends?

Do you wear a mask only when around other people?

Do you avoid big crowds?

Please indicate your opinion on the following questions.

Definitely yes	Probably yes	Might or might not	Probably not	Definitely not
(1)	(2)	(3)	(4)	(5)

Do you think hand washing is effective at stopping the spread of COVID?

Do you think wearing masks is effective at stopping the spread of COVID?

Do you think getting vaccinated is effective at stopping the spread of COVID?

Do you think practicing social distancing is effective at stopping the spread of COVID?

Do you think COVID is dangerous?

Do you think COVID is a pandemic?

Do you think we should be worried about COVID?

Do you think we should shut down?

Do you think COVID is a conspiracy?

Do you think COVID is political?

Safety Behaviors Survey

Imagine that health authorities' advice these measures. For each measure, please indicate <u>if you will take</u> this measure.

Definitely will not take (1)	Probably will not take (2)	Neutral (3)	Probably will take (4)	Definitely will take (5)

Wash your hands frequently (with an alcohol-based hand rub, or with soap and water).

Maintain at least 1 meter (3 feet) distance between yourself and anyone who is coughing or sneezing

Avoid touching your eyes, nose and mouth

Wear face masks if you are taking care of a person with suspected Coronavirus

Avoid regions/persons with the Coronavirus

Seek medical advice with the onset of symptoms

What have you done so far to prevent yourself from getting the Coronavirus disease (COVID-19)? You can select more than one answer

- ☐ Nothing (1)
- ☐ I avoid crowded places (2)
- ☐ I maintain distance between myself and people who are coughing and sneezing (3)
- ☐ I bought a face mask (4)
- ☐ I sought medical consultation (5)
- ☐ I avoid regions/persons with the Coronavirus (6)
- ☐ I wash my hands frequently (7)
- ☐ Other (8)

If you chose other, please elaborate

_____

Appendix I
CSS-12

Please read the following statements and indicate how they typically apply to you by circling the appropriate number. Please note that this questionnaire relates to *perceived medical conditions* (i.e. conditions you think you might have) rather than conditions that have been diagnosed by a medical profession.

	Never	Rarely	Some-times	Often	Always
1. If I notice an unexplained bodily sensation I will search for it on the internet	1	2	3	4	5
2. Researching symptoms or perceived medical conditions online distracts me from reading news/sports/entertainment articles online	1	2	3	4	5
3. I read different web pages about the same perceived condition	1	2	3	4	5
4. I start to panic when I read online that a symptom I have is found in a rare/serious condition	1	2	3	4	5
5. Researching symptoms or perceived medical conditions online leads me to consult with my GP	1	2	3	4	5
6. I enter the same symptoms into a web search on more than one occasion	1	2	3	4	5
7. Researching symptoms or perceived medical conditions online interrupts my work (e.g. writing emails, working on word documents or spreadsheets)	1	2	3	4	5
8. I think I am fine until I read about a serious condition online	1	2	3	4	5
9. I feel more anxious or distressed after researching symptoms or perceived medical conditions online	1	2	3	4	5
10. Researching symptoms or perceived medical conditions online interrupts my offline social activities (e.g. reduces time spent with	1	2	3	4	5

	friends/family)					
	11. I suggest to my GP/medical professional that I may need a diagnostic procedure that I read about online (e.g. a biopsy/ a specific blood test)	1	2	3	4	5
	12. Researching symptoms or perceived medical conditions online leads me to consult with other medical specialists (e.g. consultants)	1	2	3	4	5

Appendix J

The State-Trait Anxiety Inventory

A number of statements which people have used to describe themselves are given below. Read each statement and then select the appropriate number to the right of the statement to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

(trait)	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
I feel pleasant	O	O	O	O
I feel nervous and restless	O	O	O	O
I feel satisfied with myself	O	O	O	O
I wish I could be as happy as others seem to be	O	O	O	O
I feel like a failure	O	O	O	O
I feel rested	O	O	O	O
I am "calm, cool, collected"	O	O	O	O
I feel that difficulties are piling up so that I cannot overcome them	O	O	O	O
I worry too much over something that really doesn't matter	O	O	O	O
I am happy	O	O	O	O
I have disturbing thoughts	O	O	O	O
I lack self-confidence	O	O	O	O
I feel secure	O	O	O	O
I make decisions easily	O	O	O	O
I feel inadequate	O	O	O	O
I am content	O	O	O	O
Some unimportant thought runs through my mind and bothers me	O	O	O	O
I take disappointments so keenly that I can’t put them out of my mind	O	O	O	O
I am a steady person	O	O	O	O
I get in a state of tension of turmoil as I think over my recent concerns and interests				

Appendix K

SHORT HEALTH ANXIETY INVENTORY

Each question in this section consists of four statements. Please read each group of statements carefully and then select the one which best describes your feelings, over the past six months. Identify the statement by ringing the letter next to it, i.e. if you think that statement (a) is correct, ring statement (a); it may be that more than one statement applies, in which case, please ring any that are applicable.

1.	(a) I do not worry about my health (b) I occasionally worry about my health (c) I spend much of my time worrying about my health (d) I spend most of my time worrying about my health
2.	(a) I notice aches / pains less than most other people (of my age) (b) I notice aches / pains as much as most other people (of my age) (c) I notice aches / pains more than most other people (of my age) (d) I am aware of aches / pains in my body all the time
3.	(a) As a rule I am not aware of bodily sensations or changes (b) Sometimes I am not aware of bodily sensations or changes (c) I am often aware of bodily sensations or changes (d) I am constantly aware of bodily sensations or changes
4.	(a) Resisting thoughts of illness is never a problem (b) Most of the time I can resist thoughts of illness (c) I try to resist thoughts of illness but am often unable to do so (d) Thoughts of illness are so strong that I no longer even try to resist them
5.	(a) As a rule I am not afraid that I have a serious illness (b) I am sometimes afraid that I have a serious illness

	(c) I am often afraid that I have a serious illness (d) I am always afraid that I have a serious illness
6.	(a) I do not have images (mental pictures) of myself being ill (b) I occasionally have images of myself being ill (c) I frequently have images of myself being ill (d) I constantly have images of myself being ill
7.	(a) I do not have any difficulty taking my mind off thoughts about my health (b) I sometimes have difficulty taking my mind off thoughts about my health (c) I often have difficulty in taking my mind off thoughts about my health (d) Nothing can take my mind off thoughts about my health
8.	(a) I am lastingly relieved if my doctor tells me there is nothing wrong (b) I am initially relieved but the worries sometimes return later (c) I am initially relieved but the worries always return later (d) I am not relieved if my doctor tells me there is nothing wrong
9.	(a) If I hear about an illness I never think I have it myself (b)If I hear about an illness I sometimes think I have it myself (c) If I hear about an illness I often think I have it myself (d) If I hear about an illness I always think I have it myself
10.	(a) If I have a bodily sensation or change I rarely wonder what it means (b) If I have a bodily sensation or change I often wonder what it means (c) If I have a bodily sensation or change I always wonder what it means (d) If I have a bodily sensation or change I must know what it means
11.	(a) I usually feel at very low risk for developing a serious illness

	(b) I usually feel at fairly low risk for developing a serious illness (c) I usually feel at moderate risk for developing a serious illness (d) I usually feel at high risk for developing a serious illness
12.	(a) I never think I have a serious illness (b) I sometimes think I have a serious illness (c) I often think I have a serious illness (d) I usually think I have a serious illness
13.	(a) If I notice an unexplained bodily sensation I don't find it difficult to think about other things (b) If I notice an unexplained bodily sensation I sometimes find it difficult to think about other things (c) If I notice an unexplained bodily sensation I often find it difficult to think about other things (d) If I notice an unexplained bodily sensation I always find it difficult to think about other things
14.	(a) My family / friends would say I do not worry enough about my health (b) My family / friends would say I have a normal attitude towards my health (c) My family / friends would say I worry too much about my health (d) My family / friends would say I am a hypochondriac

For the following questions, please think about what it would be like if you had a serious of a type which particularly concerns you (such as heart disease, cancer, multiple sclerosis and so on). Obviously you cannot know for definite what it would be like; please give your best estimate on what you know about yourself and serious illness in general.

15.	(a) If I had a serious illness I would still be able to enjoy things in my life quite a lot

	(b) If I had a serious illness I would still be able to enjoy things in my life a little (c) If I had a serious illness I would be almost completely unable to enjoy things in my life (d) If I had a serious illness I would be completely unable to enjoy my life at all
16.	(a) If I developed a serious illness there is a good chance that modern medicine would be able to cure me (b) If I developed a serious illness there is a moderate chance that modern medicine would be able to cure me (c) If I developed a serious illness there is a very small chance that modern medicine would be able to cure me (d) If I developed a serious illness there is no chance that modern medicine would be able to cure me
17.	(a) A serious illness would ruin some aspects of my life (b) A serious illness would ruin many aspects of my life (c) A serious illness would ruin almost every aspect of my life (d) A serious illness would ruin every aspect of my life
18.	(a) If I had a serious illness I would not feel that I had lost my dignity (b) If I had a serious illness I would feel that I had lost a little of my dignity (c) If I had a serious illness I would feel that I had lost quite a lot of my dignity (d) If I had a serious illness I would feel that I had totally lost my dignity

Appendix L

FINAL DEBRIEF

Thank you for taking part in this study.

Please read the material on this form carefully to learn important information about your experience in this study, and ask me any questions that you have.

For this study, it was important that I provide you with incorrect information about some aspects of the study. Now that your participation is completed, I will describe what information was incorrect and why. I will also answer any of your questions, and give you the opportunity to decide whether you would like to have your data included in this study or removed from it.

What You Should Know About This Study

The first study that you participated in and the second study you agreed to also participate in were both part of the same study. Before you started participating in this research, you were told that the purpose of the study was to test memory for information in current news. However, the actual purpose of the study was to look at the relationship between exposure to COVID-19 health threats in the news and cyberchondria level on attentional bias to symptom words and intentions toward safety behaviors. The actual measure of the first study was the EST measuring attention to symptom versus neutral words. I did not tell you the true purpose of the study because it was important that your awareness of the prime and purpose of the study did not influence your responses.

Your participation in this study is confidential. Your name will not be associated with any of the answers you provided. If you would like to be informed of the results of this study please notify us so that we can follow-up with you after the study is concluded. If you have any questions, complaints, or concerns, please contact:

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VITA

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This thesis was typed by Jacqueline J. Charles