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**Information Dissemination and the COVID-19 Pandemic: The Relationship
between Different Information Sources and Symptoms of Psychopathology**

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Abstract

The 2020-2021 COVID-19 pandemic has added to the mental health strain on individuals and groups across the world. Viral mitigation protocols and viral spread affect millions every day, but to widely different degrees. How individuals gather information about the pandemic might have an effect on levels of mental distress in the population. In this cross-sectional and representative study of the adult population of Norway, findings suggest that information gathered through newspapers and social media are the information pathways with the strongest association to symptoms of anxiety, depression and health anxiety with small to medium effect sizes. However, avoiding information about the pandemic had larger effect sizes related to symptoms of psychopathology than acquiring information about the pandemic from any source. The results suggest that to reach those who avoid pandemic news is an important goal, both to ensure the population as a whole gets relevant information regarding current viral mitigation protocols, that may in turn alleviate stress, and thus reduce the likelihood of viral transmission. The spread of pandemic misinformation on social media and the internet must be buffered, and successful interventions against misinformation may affect the mental health of the population.

Keywords: information sources, COVID-19, avoidance, psychopathology

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Introduction

As of mid-January 2021, the COVID-19 (SARS-CoV-2) pandemic has led to more than 1.9 million deaths worldwide, and in excess of 54 million confirmed cases (Dong et al., 2020). While governments strive to provide its inhabitants with up-to-date and accurate information, both deliberate and unintentional misinformation spreads across the world (Zarocostas, 2020). Efficacious information delivery is critical in order to inform inhabitants of national, regional and local viral mitigation protocols, VMPs, that are implemented in lieu of a vaccine. Mental health consequences associated with VMPs have also become an important health factor during the current pandemic, and governments communicating how inhabitants can take better care of their own mental health has become another important element of managing life under COVID-19 (WHO, 2020a).

However, information regarding VMPs and other imperative pandemic-related information needs to be distributed appropriately to societal members. Scientists and government officials have become increasingly concerned with the mental health consequences of viral mitigation protocols during the COVID-19 pandemic (Holmes et al., 2020). A major challenge concerns the association VMP-information distribution with mental health symptoms, as many aspects of how societal members interact with the information has the potential to cause additional distress.

The scientific community has urged the importance of investigating how the omnipresent and large exposure to health-messaging disseminated across divergent media platforms are related to mental health, highlighting the problematic aspects of the possibility of increased psychopathological symptoms when attempting to mitigate physical disease and viral spread (Fagherazzi et al., 2020; Holmes et al., 2020; Kelly, 2020). Information is also important with regards to adherence rates, where a study (O. V. Ebrahimi et al., 2021, in press) found associations between lack of information and

decreased adherence to VMPs, an indication that countries can be at risk for much more serious outbreaks (WHO, 2020a; Zarocostas, 2020).

However, although information access is crucial across many aspects to fight the pandemic, we are currently experiencing an overload and overabundance of information, a term referred to as an *infodemic* by the World Health Organization to highlight that there is an ongoing information pandemic next to the COVID-19 pandemic. Thus, it is crucial to investigate how divergent sources of information are related to mental health symptoms in the general population during the present COVID-19 pandemic and infodemic.

Several years of research has given credence to the idea that increased consumption of social media in general can be detrimental to psychological health (Aalbers et al., 2019; Ahmad & Murad, 2020; Chao et al., 2020; Keles et al., 2020; Lin et al., 2016; Rubin et al., 2012), and that increased use of these media are associated with both symptoms of anxiety and depression (Ivie et al., 2020; Lin et al., 2016; Primack et al., 2017; Vannucci et al., 2017). Social media (e.g., Twitter, Facebook, TikTok, Snapchat, Instagram, WeChat), characterized by fast-paced information streams, are often not curated or validated for facts (Strekalova, 2017) and has in recent years also been an arena for the spread of misinformation (WHO, 2020b). In the current pandemic, social media are considered to be the primary battleground where information condensed and distributed.

Information is also actively spread through other platforms such as TV, newspapers, websites and online forums. Additionally, individuals are informed about the pandemic face-to-face via their peers. News distributed on TV can be especially volatile, as one study found the median airtime for medical news stories was just 33 seconds and did not cite origin of the information they provided, nor did they convey recommendations to the public (Pribble et al., 2006). The association of traditional media to mental distress has also been investigated, but the interaction is less clear than it is for social media (i.e., Scherr, 2018).

The main aim of this study was to investigate the association of information obtainment using different media with symptoms of mental distress, and the following

research questions were thus formulated:

Research Question: Is there a differential effect among different information sources on health anxiety, depression and anxiety? To what extent, and how are different information sources related to symptoms of health anxiety, depression, and anxiety?

Hypothesis 1: Media consumption across all information sources will significantly be associated with depression and anxiety symptoms, with increased media consumption in general associated with higher levels of health anxiety, depression, and general anxiety.

Hypothesis 2: Using social media and online interactive platforms (i.e., forums and blogs) to obtain news about the pandemic in comparison to using traditional media (i.e., TV, radio, and newspapers) will be associated with higher levels of general anxiety, depression, and health anxiety. Actively staying away from information will further significantly be associated with higher levels of anxiety, depression, and health anxiety.

Method

This cross-sectional study is a part of The Norwegian COVID-19 Mental Health and Adherence Project. This study investigated the association between various sources of information acquisition behaviour concerning COVID-19 on psychopathology, specifically symptoms of anxiety, depression, and health anxiety during the COVID-19 pandemic. Following the guidelines of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; Von Elm et al., 2007), and the health estimate reporting standards laid out in the GATHER-statement (Stevens et al., 2016), this study was designed and pre-registered prior to any data collection. The pre-registered protocol can be found at ClinicalTrials.gov (Identifier: NCT04442360). All components of the submitted study adhere to its pre-registered protocol.

Participants and procedure

This study utilizes data from the second stage of data collection in the aforementioned project, collected between June 22nd and July 13th, 2020. At the first

wave of data collection, the survey was distributed on national, regional, and local information platforms (i.e., television, radio, and newspapers), in addition to dissemination of the online survey to a random selection of Norwegian adults through a Facebook Business algorithm. This procedure is elaborated in detail elsewhere (O. Ebrahimi et al., 2020, preprint) In the first stage, data was obtained from 10061 participants. For the subsequent stage of data collection, all participants who had provided informed consent to participate further were invited to take part. The eligible participants were adults (i.e., persons 18 years and above) currently residing in Norway and who were thus subject to identical VMPs. A total of 4936 participants make up the sample for this study.

Study design and timing

The time of measurement was approximately one week after major viral mitigation protocols were lifted in Norway and was also a period where the national viral mitigation protocols and guidelines did not shift. Additionally, no novel information was provided by the Norwegian government regarding social distancing protocols during this period. Expectation effects are thus considered controlled for during the data collection and measurement period.

Measurement

Demographic characteristics

Information regarding participant age, sex, education level and the presence of any pre-existing mental health condition was collected.

Symptoms of psychopathology

The Generalized Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006) is a scale indicating level of anxiety. It consists of seven items measuring anxiety on a four-point Likert scale (0-3), with scores ranging from 0 to 21. For GAD-7, internal consistency was good, with a Cronbach's α of 0.90.

The Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) is a measure of depression severity that consists of nine items scored on a four-point Likert-scale (0-3), with scores ranging from 0 to 27. The internal consistency of this scale was excellent in this sample, with a Cronbach's α of 0.91.

Symptoms of health anxiety was measured with two items from the validated Health Anxiety Inventory (HAI; Salkovskis et al., 2002), and two items adapted for the COVID-19 pandemic, with one item measuring specific fear of being infected by coronavirus, and an item measuring fear of dying by the coronavirus on a four-point Likert scale (0-3). Internal consistency was acceptable for these health anxiety related questions, with a Cronbach's α of 0.77.

Information seeking behaviour

Participants were asked to estimate the amount of time they had spent obtaining information regarding the COVID-19 pandemic using various media platforms since the beginning of March 2020, which was the onset of pandemic restrictions in Norway. This included a) recognized newspapers, b) television channels, c) social media, d) forums, blogs, podcasts and other online outlets (excluding online newspapers), e) friends, family and acquaintances, and f) other sources. Additionally, g) active avoidance of COVID-19-related information on all media was measured on an eight-point Likert-scale (0-7, 0 = Never, 7 = Multiple times per hour). Two new variables were created from the existing media variables. Using a online interactive media was defined as using social media, forums and blogs and is consequently a sum score of these variables. Using traditional media was defined as using television and newspapers and consists of a sum of these variables.

Statistical analyses

The descriptive analyses of the present data were reported using means and standard deviations. For H1, three separate multiple regression analyses with symptoms of anxiety, depression and health anxiety as criterion variables were conducted. The predictor variables were the extent of information obtainment about the COVID-19 pandemic from a) recognized newspapers, b) television channels, c) social media, d) forums, blogs, podcasts and other online outlets (excluding online newspapers), e) friends, family and acquaintances, and f) other sources, and e) actively staying away from information. Additionally, age, gender, education level and the presence of a psychiatric diagnosis were controlled for.

For H2, three separate multiple regression analysis were conducted, with symptoms of anxiety, depression, and health anxiety as criterion variables. Media variables were collapsed as described above into traditional media and online interactive media. Additionally, age, gender, education level and the presence of a psychiatric diagnosis were controlled for.

For all multiple regressions, part correlations were calculated. Part correlation, also referred to as semi-partial correlation, a measure low in bias that is easily interpretable. Part correlations are estimates of the strength of a predictive relationship and can be interpreted as an effect size measure using Cohen's criteria of small effect size $> .10$; medium effect size $> .30$; and large effect size $> .50$ (Cohen, 1988; Dudgeon, 2016). Standard criteria for multicollinearity were fulfilled ($VIF < 5$ and $Tolerance < .20$; Hocking, 2013) in all multiple regression models, and all assumptions were met.

The pre-registered criteria for significance were set at $p < 0.01$ given the anticipated sample size. All statistical analyses were conducted using R (version 4.0.3).

Post-stratification weights

A common problem across psychological studies is voluntary participation, thus making the sampling procedure susceptible self-selection and to over- and undersampling of certain subgroups of individuals in the population. In the present study, the sampled gender, age, education, county of residence, and ethnic distribution deviated somewhat from the population parameters. All these deviations, minor as well as larger deviations, were weighted and adjusted to accurately reflect the Norwegian adult population. More weight was assigned to underrepresented units and less weight to overrepresented units. Weights were calculated using the “anesrake” R-package (version 0.8) and “survey” (version 4.0). these packages use an iterative algorithm (i.e., raking ratio estimation) to assign iteratively assign appropriate weights to each subgroup by turn in order to avoid that the matching of the distribution of one factor skews the distribution of other factors. The weights outputted as a result of this algorithm were applied to the dataset, resulting in a weighted dataset with parameters closely matching that of the true population, yielding a highly representative sample. All statistical analyses utilized this weighted, representative sample.

Results

A total of 4921 individuals encompass the current sample, and these are the basis for descriptive statistics as shown in Table 1. Also shown in Table 1 are the weighted N after post-stratification with the population parameters as a reference point. Means and standard deviations for the media variables and avoidance can be found in Table A4, showing that mean time spent gathering information about COVID-19 is highest for newspapers, TV and social media. A correlation matrix for media variables can be found in Table A5, showing a negative correlation of avoidance with all media variables as expected.

Information seeking behaviour and symptoms of anxiety

The multiple regression model examining the factors associated with symptoms of anxiety can be found in Table 2 and in Table A1, where Table A1 displays the regression results for the variables online interactive media and traditional media, explaining 33 percent of the variance. Gender was a significant predictor of anxiety, with female gender associated with higher levels of anxiety symptoms. Age was a significant predictor of anxiety symptoms, where lower age was associated with higher symptoms of anxiety. Additionally, having a pre-existing mental health condition was associated with increased anxiety symptoms.

Time spent obtaining information using newspapers about the pandemic was a significant predictor of anxiety symptoms, with more time spent reading newspapers was associated with a higher degree of anxiety symptoms. Time spent obtaining information from social media was a significant predictor of anxiety symptoms, with more time spent was associated with a higher degree of anxiety symptoms. Obtaining information using both traditional media and online interactive media were significant predictors of anxiety and the relationship was positive. Finally, avoiding information about COVID-19 entirely was a significant predictor of anxiety symptoms, with a higher degree of avoidance being associated with an increased level of anxiety symptoms.

Among these significant associations, part correlations revealed the factors most strongly associated with symptoms of anxiety while accounting for all other variables. The most prominent factors associated with symptoms of anxiety included having a pre-existing mental health condition (part correlation = .37), age (part correlation = -.18), obtaining information from online interactive media (part correlation = .10) and avoiding information about the pandemic (part correlation = .10), all revealing small to medium effect sizes. Lower effect sizes emerged for obtaining information concerning the COVID-19 pandemic from social media (part correlation = .08), for obtaining information from newspapers (part correlation = .08) and generally for traditional media (part correlation =

.08), and for the effect of gender (part correlation $-.06$).

Obtaining information about the pandemic from television, forums and blogs, family and friends, and from other sources were all unrelated to symptoms of anxiety. Level of education was also unrelated to symptoms of anxiety at our significance level.

Information seeking behaviour and symptoms of depression

The multiple regression model examining the factors associated with depressive symptoms is depicted in Table 3 and in Table A2, where Table A2 displays the regression results for the variables online interactive media and traditional media, explaining 36 percent of the variance. Age, gender and level of education was a significant predictor of depressive symptoms, where lower age, lower level of education and a trend towards female gender was associated with a higher level of depressive symptoms. Having a pre-existing mental health condition was associated with greater levels of depressive symptoms. Time spent obtaining information about the pandemic from newspapers and from social media was a significant predictor of depressive symptoms, with more time spent reading newspapers was associated with higher levels of depressive symptoms. Obtaining information about the pandemic through online interactive media was a significant predictor of depressive symptoms, where more time spent was associated with higher levels of depressive symptoms. Avoiding information entirely was a significant predictor of depressive symptoms, where increasing avoidance of COVID-19 related information was associated with a higher level of depressive symptoms.

Among these significant associations, part correlations revealed the factors most strongly associated with depressive symptoms while accounting for all other variables. The strongest factors associated with depressive symptoms included having a pre-existing mental health condition (part correlation = $.41$), age (part correlation = $-.16$), and avoiding information about COVID-19 (part correlation = $.13$), all revealing small to medium effect sizes. Smaller effect sizes were observed for level of education (part

correlation = -.06) obtaining news about the pandemic through newspapers (part correlation = .06), online interactive media (part correlation = .08) and through traditional media (part correlation = .03).

Information about COVID-19 obtained from watching TV, forums and blogs, family and friends, and information from other sources was unrelated to depressive symptoms. Obtaining information from traditional media was also unrelated to symptoms of depression.

Information seeking behaviour and symptoms of health anxiety

The multiple regression model examining the factors associated with symptoms of health anxiety can be found in Table 4 and in Table A3, where Table A3 displays the regression results for the variables online interactive media and traditional media, where the regressions in Table 4 and Table A3 explains 16 and 15 percent of the variance, respectively. Education was a significant predictor of health anxiety symptoms with a lower level of education being associated with a higher level of health anxiety symptoms. Having a pre-existing mental health diagnosis was a significant predictor of health anxiety symptoms.

Time spent obtaining information in newspapers was a significant predictor of health anxiety symptoms, with more time spent being associated with increased levels of health anxiety symptoms. Time spent obtaining information on social media was a significant predictor of health anxiety symptoms, with more time spent was associated with a higher level of health anxiety symptoms. Obtaining information about the pandemic using both traditional media and online interactive media were significant predictors of health anxiety, where more time spent on these media were associated with increased symptoms. Avoiding information entirely was a significant predictor of health anxiety symptoms, with higher levels of avoidance positively associated with health anxiety symptoms.

Among these significant associations, part correlations revealed the factors most

strongly associated with symptoms of health anxiety while accounting for all other variables. The strongest factors associated with symptoms of health anxiety included having a pre-existing mental health condition (part correlation = .23), using traditional (part correlation = .14) to obtain news about the pandemic and time spent gathering information from newspapers (part correlation = .13, in addition to using online interactive media in general (part correlation = .10), revealing small effect sizes. Obtaining information through social media (part correlation = .09), level of education (part correlation = -.09), avoiding news about COVID-19 (part correlation = .06) had smaller effect sizes.

Age, gender, information attainment related to COVID-19 from television, family and friends, from forums and blogs and from other sources were unrelated to symptoms of health anxiety.

Discussion

This study investigated the association between various sources of information on psychopathology during the COVID-19 pandemic in a Norwegian sample. Measures of anxiety, depression and health anxiety were used in building regression models to investigate hypothesized associations between the use of various information sources and symptoms of psychopathology in the context of obtaining information about the COVID-19 pandemic.

For Hypothesis 1, where three separate regressions were used to investigate associations between sources of information and symptoms of psychopathology, the strongest effect sizes were found for using social media and newspapers to obtain information about COVID-19, and these findings align with other pandemic findings, indicating that obtaining news about COVID-19 using different media is associated with psychological distress (Bendau et al., 2020; Pan et al., 2020). Support was not found for the hypothesized associations for TV, forums and blogs, friends and family and other sources.

For Hypothesis 2, where three separate regressions were used to investigate associations between sources of information and symptoms of psychopathology, using either online interactive media or traditional media had the strongest effect sizes, except for the measure of depressive symptoms, where traditional media was not statistically significant. Additionally, as hypothesized, avoiding news about COVID-19 was significantly associated with symptom domains of psychopathology.

Information seeking behaviour and symptoms of psychopathology

Studies from previous pandemics (e.g., Zika, Swine Flu and Ebola) and the current pandemic have revealed that individuals highly engaged in information seeking behaviour tend to become more focused about the threatening aspects of infectious diseases, experiencing increased distress and anxiety (e.g., Cheng et al., 2020; Taha et al., 2014). This is especially so when individuals perceive themselves as having little control over the threat (Taha et al., 2014). These findings are in line with present results, where use of different sources of information about COVID-19 is associated with increased symptoms of anxiety, depression, and health anxiety.

Additionally, where we have found sources of information individually being associated with symptoms of psychopathology, the complete informational load should be taken into consideration when designing strategies for effective communication of essential pandemic information. For instance, avoiding overload of information, creating a clear message while activating motivational systems to ensure the recipient is engaged demands emotional activation, per the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP; Lang, 2006). However, overly negative news may lead to aversion and consequently to avoidance. (Lang, 2006). In the current COVID pandemic, many countries level of contagion have risen sharply over time, or in periods, and news has been dominated by worsening numbers repeated minute by minute in national and international news channels. Some research has also shown that individuals have a propensity towards passing

along bad news even if the news is exaggerated and even if there is good news that is equally relevant at hand, where the current infodemic may partly be made up of the spread of such news (Heath, 1996).

During pandemics, individuals are required to live life with a certain degree of uncertainty due to the novelty of the situation (e.g, Taylor, 2019). Individuals with high intolerance of uncertainty attempt to reduce this uncertainty through behaviours such as checking the Internet (i.e., social media, forums and blogs) and other sources (i.e., newspapers, television) for information (i.e., monitoring; Robichaud et al., 2019; Shihata et al., 2016; Taylor, 2019). Furthermore, health anxiety is tied to an increase in the search for health-related information, with psychological distress as a consequence (Baumgartner & Hartmann, 2011).

With an increased tendency to search for information there is also an increase in different media who provide that information, with potentially differential effects. Previous pandemic research found that language in blogs mentioning the swine-flu was more dramatic compared to a control, and that this language later spread to newspapers (Tausczik et al., 2012) indicating that monitoring of multiple types of media may exposure to similar dramatic language over time across different media. Interestingly, a study by Blakey (Blakey and Abramowitz, 2017 during the 2015 Zika outbreak found that knowledge of the virus predicted anxiety, indicating that it may not just be dramatic language that has a detrimental effect, but general knowledge about the outbreak itself.

Information avoidance and symptoms of psychopathology

For all three measures of psychopathological distress, avoidance of information related to COVID-19 was associated with increased levels of symptoms. In line with the findings of this investigation, avoidance in anxiety literature is empirically documented as a maladaptive behaviour that maintains anxiety levels (Clark & Wells, 1995; Hofmann, 2007)

Our results indicate that the association between news-avoidance on anxiety and on

depression is more important than the association between which media individuals use and psychopathology. One reason for this might be that individuals who explicitly avoid news are showing general tendencies of avoidance. Previous research has shown that those who avoid news intentionally are exposed to news regardless (Boczkowski et al., 2018; Fletcher & Nielsen, 2018; Gil De Zúñiga et al., 2017). Actively avoiding news and then being exposed to the news you are avoiding might trigger the very feelings one seeks to avoid, although in an uncontrolled context that might be more hurtful than being exposed to the news in the first place. Avoiding news about COVID-19 might be de-facto maladaptive behaviour that maintains symptoms of anxiety and depression, indicated in our findings by the larger effect sizes compared to other variables.

Avoiding such information can both shield the individual from information that might trigger existing fearful thoughts, but also can also possibly increase the span of attentiveness toward general negative experience, which may in turn be re-interpreted into threatening symptom stimuli through attentional biases (Bar-Haim et al., 2007). Additionally, avoiding COVID-19-related news might put individuals and groups at risk for infecting themselves and others inadvertently due to missing out on vital information provided by local, regional and national governments. Thus, avoidance of information does not appear to alleviate symptoms of psychopathology, but rather increases it. This is in accordance with previous findings revealing that avoidance in general as a coping strategy is associated with heightened symptoms of psychopathology (Berman et al., 2010; Cribb et al., 2006; Ottenbreit & Dobson, 2004; Trew, 2011).

Consequently, a core question is how one can reach those avoiding pandemic-related information as these individuals are at increased risk of experiencing psychopathological symptoms. In the current infodemic, news avoidance may be a consequence of news overload, (i.e., unintentional avoidance) and the consequences of news avoidance in this context can be dire. During the COVID-19 pandemic, relevant advice from intergovernmental, national and regional authorities have been constantly changing,

putting a large strain on individuals who want to keep themselves updated to what is the current recommendations for hygienic behaviour and social distancing. An overload of information sources from recognizes platforms such as newspaper and television may have imperative consequences, possibly leading those avoiding these platforms to reduce overload to seek pandemic-relevant information from other sources such as friends and family, which has been found to be related to decreased adherence to social distancing protocols (O. Ebrahimi et al., 2020, preprint). Thus, understanding and combating avoidance of information, specifically from official sources, is crucial.

To better understand the reasons underlying avoidance, future studies are urged to investigate whether this the use pandemic-related news avoidance is intentional or unintentional. If one understands avoidance as "news overload" (i.e., unintentional avoidance), possible solutions have been proposed. Skovsgaard and Andersen (2019) argue that one potential cause for avoidance is the overload of information, which is in accordance with the term infodemic coined by the World Health Organization. This connection is further elucidated in recent studies on social media (Park, 2019; Song et al., 2017), showing that news avoidance directly affects news efficacy.

Furthermore, individuals may be engaged in intentional avoidance due to low trust in news and the negativity of news (Skovsgaard & Andersen, 2019). The authors propose that these problems underlying intentional avoidance may be solved by providing clear and concise information, avoiding presentation of opinions and sticking to reporting facts, and re-balancing negative perspectives with future-oriented solutions to the presented problems, respectively. Indeed, re-balancing the overload of negative information present during pandemics with solutions on how to tackle the pandemic is also important from a psychological perspective, with the ability to increase the psychological need of competence and self-efficacy (Deci & Ryan, 2012). These are all important perspectives to consider by government officials, health-policy makers, and journalists, which may be of imperative aid in the charge against intentional avoidance of information and the associated symptoms of

psychopathology.

Governments might also use the research on incidental exposure to news to (Fletcher & Nielsen, 2018) position information on platforms and in contexts where the information is likely to be seen, even in passing, especially considering there are groups of people using social media as their primary source of news (Bendau et al., 2020). And as the present and other studies have shown associations with use of social media for news consumption regarding the current pandemic and social media use in general, with symptoms of psychopathology, it becomes vitally important to engage readers to both seek and receive fact-checked information on these media. Another possible solution could be attempted by presenting imperative pandemic-related news along with entertainment programs on television, and in the context of entertainment on the Internet. Through these strategies designed to tackle intentional and unintentional avoidance, journalists, and health-policy makers may reach avoidant individuals with essential, life-saving information, and also ease added symptoms of psychopathology associated with avoidance of news related to the pandemic.

Implications and future directions

There is an urgent need for studies on news avoidance in a pandemic context. The consequences of news avoidance for individuals and society as a whole can be grave. Future studies should elucidate the causal mechanisms underlying news avoidance in order to counteract the associated psychological distress, and in order to effectively inform its citizens. Furthermore, as there is an ongoing infodemic, public health officials must direct their effort towards creating better opportunities for individuals to acquire validated information related to the pandemic, nudging them towards trusted sources of information.

Strengths and limitations

A major strength of the present study is that data collection was conducted in a period of time where pandemic restrictions had just been lifted, and no significant changes

to the pandemic protocols in Norway occurred during data collection. Furthermore, this current study has investigated a sample weighed by post-stratification weights in order to run all analyses on a weighted dataset that very closely matched the population parameter, yielding a representative sample of the Norwegian adult population.

As for limitations, the study uses a cross-sectional design, which impairs the ability to infer causal effects. Another limitation is using self-reporting of symptoms and inquiring about the presence of a psychiatric diagnosis rather than the use of diagnostic interviews. As with traditional sampling techniques involving voluntary participation, potential self-selection of participants may be present. However, self-selection was accounted for statistically through the described weighting and raking procedures.

Conclusion

The present study found significant associations between symptoms of psychopathology and media for informational attainment related to the COVID-19 pandemic. Significant findings for informational attainment through newspapers, social media and online interactive media was seen across all three measures of psychopathology. Avoidance of COVID-19-related information and associations with symptoms of psychopathology emerged as a core find, with generally higher effect sizes compared to informational attainment. In the age of social media and fast-paced informational streams, presenting up-to-date, curated pandemic information is imperative in order to mitigate the associated detrimental mental health consequences of information dissemination, and efficacious communication is important to hinder viral spread, keeping populations up to date on the latest hygienic recommendations and to counteract the effects of infodemic misinformation. Effectively, accurately and precisely conveying this information can directly benefit the mental health of citizens. Further research should be conducted to elucidate the causal mechanisms underlying the associations between media use and psychopathology, and pandemic-related news avoidance and psychopathology.

Data availability statement

Our received ethical approval granted by the Regional Committees for Medical and Health Research Ethics in Norway does not allow us to submit the data to a public repository. In line with the ethics approval, the data are to be kept at a secure server only accessible by the authors at the University of Oslo. Access to the data can be granted from Omid V. Ebrahimi or Sverre Urnes Johnson following ethical approval of a suggested project plan for the use of data from NSD and REK. Requests to access the datasets should be directed to Omid V. Ebrahimi at omideb@uio.no.

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Table 1*Sample characteristics and weighted characteristics for the dataset*

	Sampled N (%)	Weighted N (%)	Population
Sex			
Female	3911 (79.48%)	2427 (49.32%)	49.77%
Male	1010 (20.52%)	2494 (50.68%)	50.23%
Age group			
18-30	1703 (34.61%)	1069 (21.73%)	23.22%
31-44	1606 (32.64%)	1340 (27.24%)	24.30%
45-64	1344 (27.31%)	1707 (34.70%)	31.26%
65 and above	268 (5.44%)	804 (16.34%)	21.22%
Education			
Junior High School ^a	191 (3.88%)	573 (11.64%)	25.4%
Completed High School	736 (14.96%)	1931 (39.25%)	37%
Currently studying	775 (15.75%)	409 (8.32%)	6.7%
Completed University Degree	3219 (65.41%)	2006 (40.78%)	30.9%
Ethnic background			
Native Norwegian	4563 (92.73%)	4346 (88.32%)	85.29%
European	274 (5.57%)	401 (8.16%)	7.58%
Asian	39 (0.79%)	117 (2.38%)	4.56%
African	6 (0.12%)	18 (0.37%)	1.85%
North America/Oceania	15 (0.30%)	17 (0.35%)	0.27%
South/Middle/Latin-America	24 (0.49%)	21 (0.43%)	0.45%
Region			
East Norway	3103 (63.06%)	2966 (60.28%)	58.32%
West Norway	1162 (23.61%)	922 (18.74%)	20.28%
Mid-Norway	482 (9.79%)	781 (15.87%)	15.95%
Northern Norway	174 (3.54%)	251 (5.11%)	5.45%

Note. ^aThis category is collapsed and consists of individuals who did and those who did not complete Junior High School.

Table 2

Predictors of anxiety symptoms in the weighted, representative sample

	Beta	SE of B	p	Part corr, r
Intercept	5.16	0.39	<.001	1.00
Gender ^a	-0.59	0.18	<.01	-0.06
Age	-0.06	0.01	<.001	-0.18
Education	-0.19	0.09	0.031	-0.04
Mental health condition	4.34	0.29	<.001	0.37
Newspapers	0.28	0.07	<.001	0.08
TV	0.01	0.07	0.859	0.00
Social media	0.24	0.07	<.001	0.08
Forums and blogs	0.14	0.09	0.097	0.04
Friends and family	-0.06	0.10	0.577	-0.01
Other	0.04	0.08	0.572	0.01
Avoidance	0.36	0.08	<.001	0.10

Note. $N = 4921$, Adjusted $R^2 = 0.33$

^aFemale = 0; Male = 1

Table 3

Predictors of depressive symptoms in the weighted, representative sample

	Beta	SE of B	p	Part corr, r
Intercept	8.42	0.54	<.001	1.00
Gender ^a	-0.68	0.25	<.01	-0.05
Age	-0.07	0.01	<.001	-0.16
Education	-0.34	0.12	<.01	-0.05
Mental health condition	6.41	0.39	<.001	0.41
Newspapers	0.27	0.09	<.01	0.06
TV	-0.12	0.09	0.193	-0.03
Social media	0.22	0.08	<.01	0.05
Forums and blogs	0.18	0.11	0.106	0.03
Friends and family	-0.25	0.13	0.058	-0.04
Other	-0.02	0.10	0.82	-0.00
Avoidance	0.64	0.11	<.001	0.13

Note. $N = 4921$, Adjusted $R^2 = .36$

^aFemale = 0; Male = 1

Table 4

*Predictors of health anxiety symptoms in the weighted,
representative sample*

	Beta	SE of B	p	Part corr, r
Intercept	0.52	0.18	<.01	1.00
Gender ^a	-0.13	0.09	0.125	-0.03
Age	0.00	0.00	0.131	0.03
Education	-0.19	0.04	<.001	-0.09
Mental health condition	1.19	0.14	<.001	0.24
Newspapers	0.20	0.03	<.001	0.13
TV	0.02	0.03	0.613	0.01
Social media	0.12	0.03	<.001	0.09
Forums and blogs	0.03	0.05	0.496	0.02
Friends and family	-0.03	0.05	0.606	-0.01
Other	0.02	0.04	0.691	0.01
Avoidance	0.09	0.04	<.01	0.06

Note. $N = 4921$, Adjusted $R^2 = .16$

^aFemale = 0; Male = 1

Appendix

Table A1

H2: Predictors of anxiety symptoms in the weighted, representative sample

	Beta	SE of B	p	Part corr, r
Intercept	5.42	0.38	<.001	1.00
Gender ^a	-0.60	0.18	<.01	-0.06
Age	-0.06	0.01	<.001	-0.20
Education	-0.18	0.09	0.038	-0.04
Mental health condition	4.35	0.29	<.001	0.37
Traditional Media	0.15	0.04	<.001	0.08
Online interactive media	0.21	0.05	<.001	0.10
Friends and family	-0.07	0.10	0.522	-0.01
Other	0.04	0.08	0.6	0.01
Avoidance	0.35	0.08	<.001	0.10

Note. N = 4921, Adjusted R² = 0.33

^aFemale = 0; Male = 1

Table A2

H2: Predictors of depressive symptoms in the weighted, representative sample

	Beta	SE of B	p	Part corr, r
Intercept	8.75	0.53	<.001	1.00
Gender ^a	-0.68	0.25	<.01	-0.05
Age	-0.08	0.01	<.001	-0.18
Education	-0.31	0.12	<.01	-0.05
Mental health condition	6.43	0.39	<.001	0.41
Traditional Media	0.07	0.05	0.142	0.03
Online interactive media	0.22	0.06	<.001	0.08
Friends and family	-0.27	0.13	0.042	-0.04
Other	-0.02	0.10	0.859	-0.00
Avoidance	0.63	0.11	<.001	0.13

Note. $N = 4921$, Adjusted $R^2 = .36$

^aFemale = 0; Male = 1

Table A3

H2: Predictors of health anxiety symptoms in the weighted, representative sample

	Beta	SE of B	p	Part corr, r
Intercept	0.70	0.17	<.001	1.00
Gender ^a	-0.15	0.09	0.096	-0.04
Age	0.00	0.00	0.559	0.01
Education	-0.18	0.04	<.001	-0.09
Mental health condition	1.20	0.14	<.001	0.24
Traditional Media	0.11	0.02	<.001	0.14
Online interactive media	0.10	0.02	<.001	0.10
Friends and family	-0.03	0.05	0.552	-0.02
Other	0.01	0.04	0.776	0.01
Avoidance	0.09	0.03	<.01	0.06

Note. $N = 4921$, Adjusted $R^2 = .15$

^aFemale = 0; Male = 1

Table A4

*Means and Standard Deviation for
media variables*

	Mean	SD
Newspapers	3.34	1.64
TV	2.49	1.66
Social media	2.14	1.85
Forums and blogs	0.96	1.21
Friends and family	1.70	1.19
Others	1.15	1.19
Avoidance	0.86	1.23

Note. Media variables are values

meaning time spent on each media.

Avoidance of information is rated on
a scale from 1 to 7.

Table A5*Correlation matrix for media variables*

	Newspapers	TV	Social media	Forums and blogs	Friends and family	Others	Avoidance
Newspapers	1.00	0.47	0.40	0.31	0.29	0.23	-0.22
TV	0.47	1.00	0.31	0.22	0.24	0.17	-0.17
Social media	0.40	0.31	1.00	0.43	0.45	0.23	-0.06
Forums and blogs	0.31	0.22	0.43	1.00	0.34	0.33	-0.08
Friends and family	0.29	0.24	0.45	0.34	1.00	0.28	-0.01
Others	0.23	0.17	0.23	0.33	0.28	1.00	-0.06
Avoidance	-0.22	-0.17	-0.06	-0.08	-0.01	-0.06	1.00