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COVID-19 news consumption and distress in young people: A systematic review

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ABSTRACT

Background: The COVID-19 pandemic has brought challenges for the mental health of young people. The volume, negative content and potential for misinformation within COVID-19 related news can be an additional cause of distress. This systematic review aims to synthesise the research findings on the relationship between COVID-19 news and distress in young people.

Methods: Following the PRISMA guidelines, PubMed, Web of Science, and PsycINFO databases were searched on 24 April 2021 for articles that contained empirical research examining the association between COVID-19 news consumption and mental health in samples of young people with a mean age between 10 and 24 years.

Results: The 13 included studies involved 760,474 participants in predominantly cross-sectional studies, with data collected during COVID-19 lockdowns across seven countries. Increased consumption of COVID-19 news was associated with a decline in mental health ($n = 11$). The results were more consistent for news obtained on social media with variation for traditional media sources. Misinformation may further explain the relationship.

Limitations: Heterogeneity across study methodologies, lack of longitudinal research and validated measures of news consumption.

Conclusions: The reviewed literature supports the association between increased consumption of COVID-19 related news and decreased mental health in young people. This group may benefit from support to mitigate the psychological impacts of COVID-19 news. Future research should utilise longitudinal designs, ecological momentary assessments, and reliable/valid measures of news consumption to explore the negative mental health associated with COVID-19 news in young people.

1. Introduction

COVID-19 is a highly infectious respiratory illness which can range from mild symptoms that do not require special treatment, to serious illness requiring hospitalisation (World Health Organization, 2020). The outbreak of the COVID-19 pandemic has drastically changed people's everyday lives in a short period of time. Through fear of contracting the virus, country-wide lockdowns, social distancing measures, and closure of public venues and services, the pandemic has posed a number of threats to the mental health of the world's population (Duong et al., 2020). A review (Talevi et al., 2020) has found that the general population experienced mild to moderate-severe anxiety, depression, and stress in response to the COVID-19 restrictive measures.

Several studies have identified a broad range of variables that may contribute to the negative effects of the pandemic on mental health (Ma et al., 2020). Some of these represent increased exposure to stressors, such as the worry and grief that accompanies family or friends being

infected with the virus (Ghazawy et al., 2020; Ma et al., 2020). Others pertain to the management of stress, such as the increased reliance upon negative coping styles (Duan et al., 2020; Liang et al., 2020), including alcohol consumption (McPhee et al., 2020), as well as perceived reductions in social support (Ma et al., 2020) and poorer sleep quality (Varma et al., 2021). Moreover, there are significant indications that young people are particularly vulnerable, both in terms of increased stress and diminished coping (Headspace, 2020; Singh et al., 2020).

Another potential source of psychological impact during the pandemic is the consumption of COVID-19 related news and information (Stainback et al., 2020). There are several elements in the consumption of COVID-19 related news that may lead to distress, such as information overload (Rathore and Farooq, 2020), negative content (Garfin et al., 2020), and/or misinformation (Lee et al., 2020). Unlike previous pandemics (e.g., the 1918 Influenza pandemic; (Taubenberger and Morens, 2006)), COVID-19 has occurred within the internet era – a gateway to a surplus of information/news related to daily cases, death tolls, health

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advice, restrictive measures, and other distress-inducing information (de Hoog and Verboon, 2020), all of which are being updated multiple times throughout the day (Rathore and Farooq, 2020). Due to the continuity of these COVID-19 updates, the pandemic may have increased people's frequency of news consumption. Moreover, although the sharing of such information has allowed healthcare leaders to directly communicate vital details related to COVID-19 preventative methods to the public (Gottlieb and Dyer, 2020), the difficulty of filtering reliable information from misinformation has had negative mental health effects (Jakovljevic et al., 2020; Su et al., 2021). In response to similar difficulties experienced during the SARS epidemic, the term “infodemic” was devised to describe the false and misleading information that accompanies a disease outbreak (Rothkopf, 2003).

Since the beginning of the pandemic, there has been a significant increase in the consumption of news by young people (Casero-Ripollés, 2020; Park et al., 2020), thereby exposing them to potentially distress-inducing information at a high volume (Park et al., 2020). A greater proportion of young people use social media and messaging apps to obtain their news in comparison to older generations (Newman et al., 2019), although research has indicated that young people utilise a range of sources to obtain their news (e.g., TV, print media) rather than solely relying on social media for information (Antunovic et al., 2018). Prior to the pandemic those aged 15 – 17 years were reported as having the highest level of internet use, and social networking was found to be the most popular online activity of this age group within Australia (Australian Bureau of Statistics, 2018). The impact of social media on young people has been associated with several deleterious effects, such as depression and reduced self-esteem and self-image (Richards et al., 2015), as well as perceived social isolation (Primack et al., 2017).

With efforts to contain COVID-19, including the lockdown of many services relevant to young people such as schools and universities, and the delivery of education migrating to online formats, young people have found themselves with even more time to spend on the internet during the current pandemic. This time has been spent viewing entertainment, connecting with friends, participating in school and university, as well as consuming COVID-19 related news and information (Duong et al., 2020). The combination of the current infodemic, the negative content and volume of COVID-19 news, the increased amount of time spent both online and on the consumption of news, and the potential adverse effects of prolonged internet use (Suhail and Bargees, 2006), could mean that young people are more susceptible to experiencing a decline in their overall psychological health during the COVID-19 pandemic than previously (Gill et al., 2021).

Given the negative mental health consequences of infodemics associated with past disease outbreaks and the magnitude of the COVID-19 pandemic, it is important to ascertain to what extent news-seeking behaviour and exposure to COVID-19 media has been studied, particularly in regard to the mental health of young people. This review, therefore, aims to synthesise the findings of previous research on the relationship between COVID-19 related news and mental health outcomes in young people. Based on reviewer feedback, a meta-analysis was also conducted to estimate the mental health outcomes of COVID-19 observed in relation to pre-COVID norms. The conclusions drawn will help inform the development of strategies to support the mental health of young people who have been negatively affected by the pandemic (Headspace, 2020).

2. Methods

The systematic review was conducted in accordance with the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021). The systematic review protocol has been uploaded to PsyArXiv Preprints (Strasser et al., 2021).

2.1. Eligibility criteria

The titles, abstracts and key words of extracted records were screened during stage one using the following inclusion criteria: (a) written in English, (b) accessible full text, (c) published between December 2019 and April 2021, (d) published in a peer-reviewed journal, and (e) contained empirical research examining the association between patterns of COVID-19 media coverage/information/social media/news consumption and mental health in young people or students. In addition to the stage one inclusion criteria, the stage two inclusion criteria for full text screening were as follows: (a) the study contained samples or subsamples of participants with a mean age between 10 and 24 years, as per the World Health Organization's (WHO) definition of “young people”, (b) the study collected data on the consumption or seeking of news media or other information sources pertinent to the COVID-19 pandemic, (c) the psychological effect measured included at least one of the following; depression, anxiety, stress, distress, fear, panic, somatisation, overall psychological health, exacerbation/relapsing of a mental disorder, or the onset of a mental disorder, and (d) the statistical analyses conducted tested the association between COVID-19 news consumption and mental health, specifically in the sample or subsample of young people (mean age between 10 and 24 years).

2.2. Information sources and search strategy

The databases PubMed, Web of Science and PsycINFO were searched, and potentially eligible records were downloaded on 24 April 2021. The reference lists of included studies were also examined for additional articles. The following search terms were used: (“COVID-19” OR coronavirus OR “sars-cov-2” OR pandemic) AND (“mental health” OR “negative affect” OR “distress” OR anxiety OR stress* OR psycho*) AND (news OR “media coverage” OR “infodemic”) AND (youth OR young OR adolescen* OR teen* OR students). All studies published between December 2019 and April 2021 were included and there were no language restrictions placed within the initial record download phase. (For the search string specific to each database see Appendix A).

2.3. Selection process

The titles, abstracts and keywords were screened by one reviewer (MS) within stage one, the full texts in stage two were screened independently by two reviewers (MS and PS) where strong inter-rater reliability was achieved (Cohen's kappa = .82; McHugh, 2012). Discrepancies in article eligibility between the two reviewers were managed by a third reviewer (DM).

2.4. Data collection and data items

One reviewer (MS) extracted data from the included studies using a pre-determined checklist. Data items related to mental health outcomes (as outlined in the eligibility criteria) were sought as well as the participant characteristics and measurement of COVID-19 related news consumption. If the mean age of a sample was not provided, it was inferred from the supplied age range. In particular, the following data items were sought: (a) first author's name and publication year, (b) country of the population, (c) data collection dates and COVID-19 context of the country, (d) study design, (e) sample size/gender distribution, (f) sample characteristics (mean age, student status), (g) measures/assessment tools for the variables, and (h) main findings.

2.5. Quality assessment

A quality assessment was conducted for included studies during data extraction by one reviewer (MS). Most of the studies were expected to utilise surveys and, therefore, the Protogerou and Hagger (2020)

checklist for the quality of survey studies in psychology (Q-SSP) was adapted for use in the current review (see Appendix B). This checklist was developed by an international team of 33 experts based on a comprehensive review of previous quality assessment tools and checklists, followed by an expert consensus method to evaluate and refine its content. It was validated by a different panel of 10 experts using a set of 20 candidate studies known to be evenly split in terms of “acceptable” and “questionable” quality. Depending on the number of applicable items, a study should strictly receive a “yes” response to between 70% and 75% of items to receive an overall “acceptable” quality score. However, better consensus was achieved between experts when a 60% threshold was used. Items within the assessment tool functioned as standalone criteria, an overall quality percentage was created for each study, and patterns of poor quality were identified and discussed.

2.6. Meta-analysis for mental health outcomes

To estimate the mental health outcomes of COVID-19, a random effects meta-analysis was conducted for prevalence measures using the R package “metafor” (Viechtbauer, 2010). Heterogeneity between the studies was measured using the I^2 statistic (Higgins, 2003), with values

of less than 25% usually viewed as low heterogeneity, between 25 and 50% as moderate, and over 50% as high heterogeneity. Cochran’s Q test for homogeneity was also used. This test is underpowered when few studies have been included, requiring the use of a significance level of above 5% (West et al., 2010). Since only three studies are included in this analysis, we have applied a 15% significance level in our test of homogeneity. The results were then compared to normative data collected pre-COVID to estimate the magnitude of any changes that have occurred during the pandemic.

3. Results

As seen in Fig. 1, 147 unique articles were identified using the search strategy, 13 of which satisfied all the criteria for inclusion in the review. Searching the reference lists of included articles did not yield any extra eligible articles.

3.1. Study characteristics

The extracted data from the included studies are summarised in Table 1. The reviewed studies included had total sample sizes that

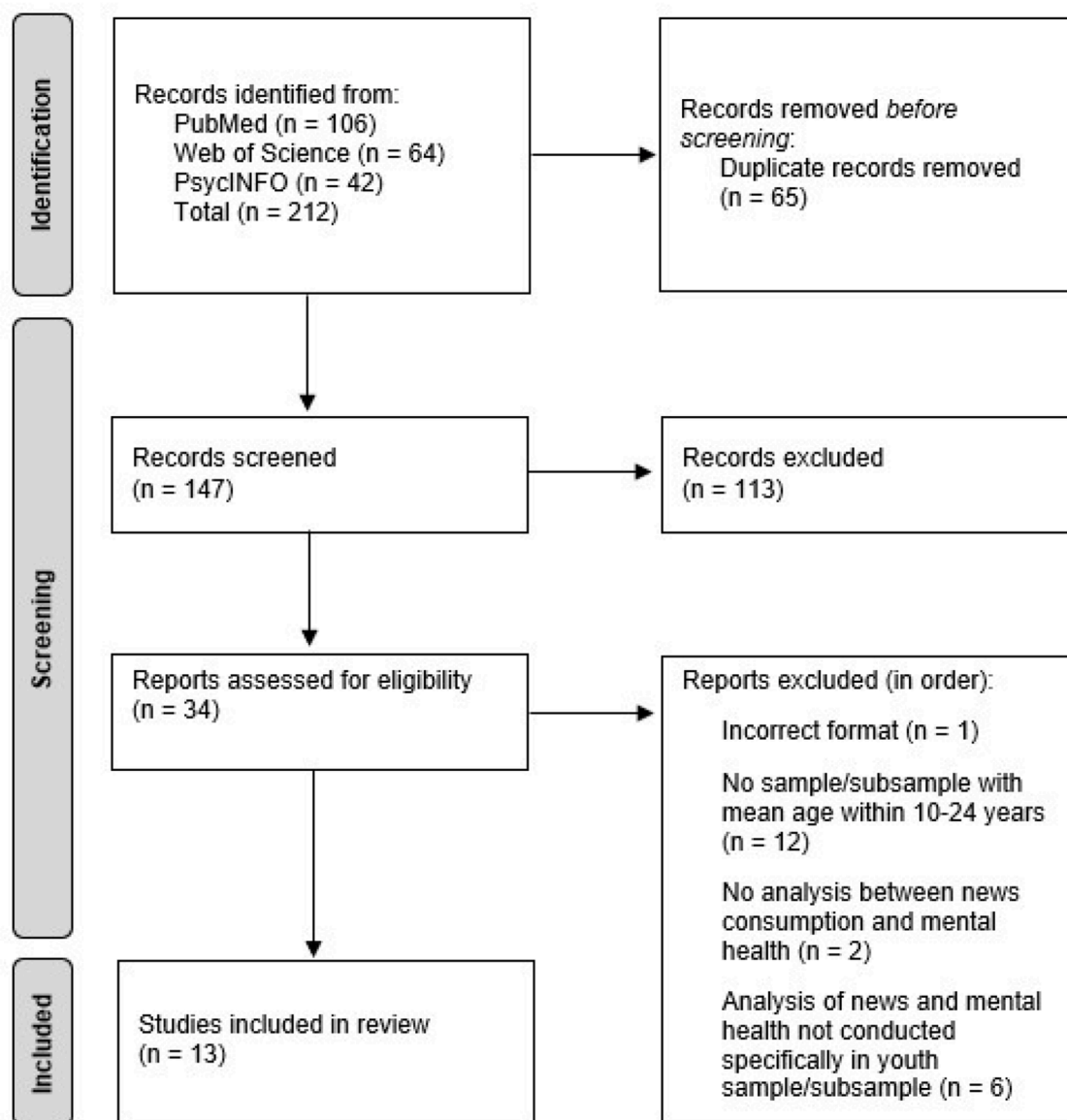


Fig. 1. PRISMA Flow Diagram.

Table 1
Studies of COVID-19 News Consumption and its Association with Distress in Young People.

First Author (year)	Country	Data Collection Period	School Closures	Study Design	Sample Size n (women)	Sample Characteristics	Assessment Tools: News; Mental Health	Source of News	Quality Percentage	Main Findings
Campos (2021)	Brazil	18 May – 25 June 2020	Schools closed	Cross-sectional	66 (50)	Age $M = 21.7$, $SD = 3$ Pharmacy undergrads	Single item; DASS-21, BRUMS	Not specified	75%	Correlations: ↑ news consumption: ↑ anxiety ($r = .36$, $p < .001$); ↑ stress ($r = .24$, $p = .01$); ↑ hyperarousal ($r = .32$, $p = .001$); ↑ intrusion ($r = .21$, $p = .04$) Binary logistic regression: ↑ news consumption: ↑ anxiety: $AOR = 1.29$ [1.04 - 1.62], $p = .02$ No sig associations with depression or stress
Ghazawy (2020)	Egypt	First week May Expanded ~ 2 weeks	Schools closed	Cross-sectional	1335 (825)	Age 17 - 24 96% of sample University students	Single item; DASS-21	Not specified	75%	Regression: daily-to-hourly social media use: ↑ psych distress $OR = 2.80$ [1.11 - 7.06], $p = .043$; ↑ depression $OR = 3.24$ [1.26 - 8.35], $p = .020$; anxiety $OR = 1.40$ [0.59 - 3.34], not sig Mixed linear model: ↑ COVID-19 news index: ↑ depression parameter 0.003 (.002), $p = .03$; ↑ anxiety parameter .009 (.002), $p < .001$ (did not report standardised betas)
Gill (2021)	Canada	17 June – 1 July 2020	Schools closed	Cross-sectional	84 (62)	Age 18 - 24	Single item; Adult Psychiatric Morbidity Survey	Social media	71.90%	Bivariate correlates: trust in news media: ↓ somatisation, $p = .046$; ↑ time spent news sites: ↑ anxiety, $p = .001$; ↑ somatisation, $p = .049$; stress and depression not sig.; ↑ time spent social media: ↑ anxiety, $p = .032$; depression, somatisation, stress not sig; trust in official sources not sig; trust in unofficial sources not sig. Multivariate linear regression: trust news media: ↓ somatisation $\beta = -.17$ (-.32 - -.02), $p = .024$; ↑ time spent news sites: ↑ anxiety $\beta = .21$ (.04 - .38), $p = .016$; somatisation
Huckins (2020)	Unites States	August 2017 – 30 March 2020	School closed	Longitudinal	217 (147)	Age 18 - 22 at time of enrolment Undergrad students	COVID-19 media coverage index; PHQ-4 (weekly EMAs)	Newspapers and online sources	80%	Bivariate correlates: trust in news media: ↓ somatisation, $p = .046$; ↑ time spent news sites: ↑ anxiety, $p = .001$; ↑ somatisation, $p = .049$; stress and depression not sig.; ↑ time spent social media: ↑ anxiety, $p = .032$; depression, somatisation, stress not sig; trust in official sources not sig; trust in unofficial sources not sig. Multivariate linear regression: trust news media: ↓ somatisation $\beta = -.17$ (-.32 - -.02), $p = .024$; ↑ time spent news sites: ↑ anxiety $\beta = .21$ (.04 - .38), $p = .016$; somatisation
Kecojevic (2020)	United States	April 2020	Schools closed	Cross-sectional	162 (115)	Age 18 - 37, $M = 20.4$, $SD = 2.9$, $Mdn = 19$ Personal health course - undergrads	4 items; BSI-18, PSS	Internet and social media	81.30%	Bivariate correlates: trust in news media: ↓ somatisation, $p = .046$; ↑ time spent news sites: ↑ anxiety, $p = .001$; ↑ somatisation, $p = .049$; stress and depression not sig.; ↑ time spent social media: ↑ anxiety, $p = .032$; depression, somatisation, stress not sig; trust in official sources not sig; trust in unofficial sources not sig. Multivariate linear regression: trust news media: ↓ somatisation $\beta = -.17$ (-.32 - -.02), $p = .024$; ↑ time spent news sites: ↑ anxiety $\beta = .21$ (.04 - .38), $p = .016$; somatisation

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Table 1 (continued)

Lin, Friedman (2020)	China	31 Jan – 11 Feb 2020	Schools partially open	Cross-sectional	7800 (4799)	Age $M = 20.54$, $SD = 2.11$ University students	SARS-related stressors scale (mod); ASD scale	Authoritative channels, online, or not specified	71.90%	not sig; time spent social media: anxiety not sig Hierarchical regression: stressor 3: ↓ acute stress $\beta = -.166$, $p < .001$; stressor 4: ↑ acute stress $\beta = .052$, $p < .001$; stressor 6: ↑ acute stress $\beta = .159$, $p < .001$
Lin, Hu (2020)	China	6 April – 22 April 2020	Schools closed	Cross-sectional	2086 (not recorded)	Age 18 - 29, 57.4% 18 - 20, 34.2% 21 - 22, 8.4% 23 - 29 Medical students	Mass media (8 items), social media (10 items); STAI-6	Mass media and social media	87.50%	Univariate: ↑ mass media exposure: low anxiety ($n = 731$), high anxiety ($n = 382$), $p < .001$; ↑ social media exposure: low anxiety ($n = 713$), high anxiety ($n = 383$), $p = .002$ Multivariate logistic regression: ↑ mass media exposure OR = 1.16 [0.96 – 1.40], not sig; ↑ social media exposure OR = 1.11 [0.90 – 1.34], not sig
(Continued)										
First Author (year)	Country	Data Collection Period	School Closures	Study Design	Sample Size n (women)	Sample Characteristics	Assessment Tools: News; Mental Health	Sources of News	Quality Percentage	Main Findings
Ma (2020)	China	3 Feb – 10 Feb 2020	Schools closed	Cross-sectional	746 217 (414 604)	Age 18 – 23 97.6%, 24 – 26 2.4% University students	Single item; IES-6, PHQ-9, GAD-7	Not specified	75%	Univariate logistic regression: < 1 hr news day (ref): 1 - 2 h/day: ↑ acute stress: OR = 1.66 [1.64 - 1.68], $p < .001$; ≥ 3 hrs: ↑ acute stress: OR = 2.13 [2.10 - 2.16], $p < .001$; depression and anxiety not sig at public health sig Hierarchical logistic regression: < 1 h/day (ref): 1 - 2 h/day: ↑ acute stress: AOR = 1.67 [1.64 – 1.69], $p < .001$; ≥ 3 hrs/day: ↑ acute stress: AOR = 2.13 [2.09 - 2.17], $p < .001$ Univariate: panic spread about COVID-19 on social media: psychological impact: 15 - 18 years (most prevalent in this group) $n = 163$ (90.1%), 10 - 14 years $n = 432$ (77.6%), 6 - 9 years (least affected), $n = 141$ (68.9%), $p < .001$ Correlation: ↑ news exposure and
Radwan (2020)	Palestine	6 July – 18 August 2020	Schools closed	Cross-sectional	942 (620)	Age 6 – 18, 10 – 18 78% Primary and secondary students	Ahmad and Murad (2020) survey	Social media	56.30%	
Ryerson (2020)	United States		Schools closed	Cross-sectional	105 (56)	Age 18-29, $M = 21.27$, $SD =$	CEQ C19 News Scale;	Not specified	65.60%	

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Table 1 (continued)

Shabahang (2020)	Iran	27 April – 26 May 2020 Feb 2020	Schools closed	Cross-sectional	427 (239)	3.28 Commuter university students Age $M = 23.57$, $SD = 5.89$ Psychology students	GIS (Conway et al., 2020) Single item; C19-AQ	Online	84.40%	psychological health ($r = -.05$, $p = .620$) Multiple regression: \uparrow online news exposure: \uparrow COVID-19 anxiety $\beta = .337$, $t = 6.89$, $p < .001$ Logistic regression: \uparrow frequency news: > 10 times a day (ref): 6 - 10 times a day: \downarrow distress/anxiety OR = 0.486 [0.250 – 0.944], $p = .033$; 1 - 5 times a day \downarrow distress/anxiety OR = 0.480 [0.293 – 0.787], $p = .004$; never = not sig; overall logistic regression $p = .033$
Yang (2021)	China	April – May 2020	Schools closed until 27 th April then partially open	Cross-sectional	521 (404)	Age $M = 22.02$, $SD = 1.76$ University students	Single item; SAS, SRQ-20	Not specified	71.90%	Multiple linear regression: \uparrow social media: \uparrow STS ($\beta = 0.18$, $p < .001$); \uparrow depression ($\beta = 0.11$, $p = .019$); \uparrow anxiety ($\beta = 0.12$, $p = .014$); traditional media: no sig correlations; Path analysis: \uparrow social media use indirectly associated with \uparrow STS ($\beta = 0.08$ [0.32 - , 1.64], $p < .01$), \uparrow depression ($\beta = 0.08$ [0.13 - 0.70], $p < .01$), \uparrow anxiety ($\beta = 0.09$ [0.13 - 0.68], $p < .01$) through negative affect.
Zhao (2020)	China	24 March – 1 April 2020	Schools closed	Cross-sectional	512 (320)	Age 18 - 30, $M = 22.12$, $SD = 2.47$ University students	Social media use (Lin et al., 2016); PANAS, STSS-SM, PHQ-9, GAD-7	Social media, traditional and online media	81.30%	

Note. Mdn = median; OR = odds ratio; AOR = adjusted odds ratio; Undergrads = undergraduate; DASS-21 = depression anxiety and stress scale; BRUMS = Brunel mood scale; PHQ-4 = public health questionnaire; EMA = ecological momentary assessment; BSI-18 = brief symptom inventory; PSS = perceived stress scale; ASD = acute stress disorder; STAI-6 = state-trait anxiety inventory; IES-6 = impact of event scale; GAD-7 = general anxiety disorder; CEQ = coronavirus experiences questionnaire; C19 GIS = COVID-19 general impact survey; C19-AQ = COVID-19 anxiety questionnaire; SAS = self-rating anxiety scale; SRQ-20 = self-reporting questionnaire; PANAS = positive and negative affect schedule; STSS-SM = secondary traumatic stress scale for social media users; square brackets indicate 95% confidence interval; ref = reference category; stressor 3 = information of the severity and high infectibility of the virus; stressor 4 = negative news from the authorities; stressor 6 = uncertainty from various information about the virus or outbreak; STS = secondary traumatic stress; mass media= both traditional and online mass media (written or broadcast), including television, radio, advertising, newspapers, magazines, and newsfeeds; social media = websites and apps such as WeChat, Weibo, and Youku.

ranged from 66 (Campos et al., 2021) to 746,217 (Ma et al., 2020). Most studies utilised online surveys and a cross-sectional design, with one exception, a longitudinal study that used ecological momentary assessments (EMAs; Huckins et al., 2020). The eligibility criteria required the mean age of each sample to be between 10 and 24 years, and the ages sampled in the included studies ranged from 6 – 39 years. Three studies contained samples where all the participants were aged between 10 and 24 years, three studies contained samples where the vast majority of participants (minimum of 91.6%) were within the prespecified range, and seven studies contained samples where only the mean age was within the prespecified range. The average standard deviation for age amongst these seven studies was 3.06. The samples included mostly university students, with one study utilising primary and secondary

school-aged students (Radwan et al., 2020) and another utilising young adults who were not necessarily students (Gill et al., 2021). The majority of sampled participants across all studies were females, with proportions ranging from 55.3% (Ryerson, 2020) to 77.5% (Yang et al., 2021). The majority of studies investigated relationships between COVID-19 related news consumption and mental health using statistical analyses, whereas one study (Radwan et al., 2020) asked participants to indicate whether they were psychologically affected by the spread of panic regarding COVID-19 on social media.

3.2. Mental health outcomes

Within the included studies, seven measured depression symptoms

(Campos et al., 2021; Ghazawy et al., 2020; Gill et al., 2021; Huckins et al., 2020; Kecojevic et al., 2020; Ma et al., 2020; Zhao and Zhou, 2020), 10 measured anxiety symptoms (Campos et al., 2021; Ghazawy et al., 2020; Gill et al., 2021; Huckins et al., 2020; Kecojevic et al., 2020; Lin et al., 2020b; Ma et al., 2020; Shabahang et al., 2020; Yang et al., 2021; Zhao and Zhou, 2020), and five measured stress symptoms (Campos et al., 2021; Ghazawy et al., 2020; Kecojevic et al., 2020; Lin et al., 2020a; Ma et al., 2020). In addition, Campos et al. (2021) measured peri-traumatic stress, Kecojevic et al. (2020) measured somatic distress, while Gill et al. (2021), Radwan et al. (2020), and Ryerson (2020) measured psychological distress, psychological impact, and psychological health, respectively. Zhao and Zhou (2020) measured secondary traumatic stress (STS). All mental health outcomes were self-reported.

Ten studies utilised established and previously validated measures of mental health (e.g., Depression Anxiety Stress Scale; Henry and Crawford, 2005). Seven of these studies also reported internal consistency coefficients for each measure obtained in their samples. The remaining three studies used measures that had not previously been validated: Radwan et al. (2020) used a measure developed by Ahmad and Murad (2020) that assessed the impact of social media on the spread of panic, which achieved acceptable internal consistency but included items requiring participants to judge the mental health effects of COVID-19 information on social media themselves; Ryerson (2020) utilised the new Psychological Health Scale from the Coronavirus Impacts Questionnaire (Conway et al., 2020), but did not assess its internal consistency; and Shabahang et al. (2020) adapted an existing measure to assess COVID-19 anxiety, which achieved good content validity and acceptable internal consistency.

3.3. Meta-analysis for mental health outcomes

For most of the mental health outcomes, too few studies used similar enough methods to allow for comparisons. Thus, the random effects meta-analysis could only be performed for studies that measured anxiety. Five of these studies provided prevalence statistics to allow for inclusion in the meta-analysis. However, two of these studies (Ma et al., 2020; Yang et al., 2021) were excluded because they utilised Chinese versions of the GAD-7 and SAS measures respectively, and their cut-points did not correspond to the original versions of these measures. Two of the three included studies had sample sizes large enough to detect small effect sizes ($h = 0.2$) with better than 90% power (Cohen, 1988). The proportion of participants reporting at least moderate anxiety levels, as measured using standard scales (DASS-21 and the state version of the State-Trait Anxiety Inventory, STAI-6), were analysed. The results of the meta-analysis and its comparison with pre-COVID anxiety norms for an adult sample are provided in Table 2 (Crawford and Henry, 2003). These norms are for the full DASS-42 anxiety scale, which has been found to reflect DASS-21 norms very closely (Henry and Crawford, 2005). Low heterogeneity could be assumed for the three

Table 2
Meta-analysis for Anxiety Levels with Pre-COVID Norms

First Author (year)	N	Scale	Percentage for Anxiety Levels Moderate - Severe	95% Confidence Interval
Campos (2021)	66	DASS-21	47%	(34.7%-59.3%)
Ghazawy (2020)	534	DASS-21	40%	(37.3%-42.7%)
Lin, Hu (2020)	795	STAI-6	38%	(36.05%-40.2%)
Overall	1395		39.1%	(36.7%-41.6%)
Norms(*)	1771	DASS-42	9%	(7.6%-10.4%)

*Crawford and Henry, 2003. Age range (15 - 91 years).

papers included in this meta-analysis ($I^2 = 17.3\%$, $Q(df = 2) = 3.00$, $p = .223$) and the results indicated an overall level of anxiety well above that observed for the pre-COVID norms.

3.4. Measurement of news consumption

COVID-19 related news consumption was operationalised differently in each of the included studies, which could ultimately affect the interpretation of results. For instance, some studies specifically assessed the active process of searching for COVID-19 related news (Gill et al., 2021; Kecojevic et al., 2020; Lin et al., 2020b; Zhao and Zhou, 2020). Conversely, Yang et al. (2021) assessed passive pandemic-related news consumption. Ryerson (2020) included a combination of items that assessed both the active and passive process of consuming news, while the majority of studies utilised items that did not differentiate between the process of actively searching and passively paying attention to COVID-19 related news.

The measures of COVID-19 news consumption differed in other ways too. Campos et al. (2021), Ghazawy et al. (2020), Kecojevic et al. (2020), Ma et al. (2020), and Zhao and Zhou (2020) all asked about the amount of time spent consuming COVID-19 news each day (e.g., daily duration). By contrast, Gill et al. (2021), Lin et al. (2020b) and Yang et al. (2021) assessed the frequency of pandemic-related news consumption. Lin et al. (2020a) presented a series of news-related events and asked participants to endorse those that they had experienced in the preceding two weeks (e.g., heard or read many negative news from the authorities). Radwan et al. (2020) simply asked participants whether they thought that news related to COVID-19 on social media spread panic and fear among people, and Shabahang et al. (2020) utilised a Likert scale to determine how much COVID-19 news participants obtained from online sources. Huckins et al. (2020) was the only study that utilised an objective measure of news consumption. They created a ratio of news articles utilising the term “coronavirus” to news articles without the term, for the data collection period. The reliability and validity of these news measures are discussed below.

The majority of studies were cross-sectional and utilised a single item to assess news consumption. Therefore, the reliability and validity of this type of measure cannot be ascertained. Lin et al. (2020a) used two items to measure information uncertainty and did not conduct an internal consistency analysis. Lin et al. (2020b) utilised eight items to assess mass media usage and 10 items to assess social media usage, with excellent internal consistency achieved for both measures (Bland and Altman, 1997). Three items were utilised within the Ryerson (2020) study and internal consistency was not reported. As mentioned previously, Radwan et al. (2020) used a measure that demonstrated acceptable internal consistency, but combined items related to both news seeking behaviours and mental health outcomes in a way that required participants to judge the psychological impact of the news themselves.

3.5. Quality assessment

The quality assessment of the included studies can be seen in Appendix C and the overall quality rating for each study can also be seen in Table 1. Five of the thirteen studies failed to reach the 75% maximum threshold originally recommended for “acceptable” quality, and only one fell below the more consistently rated 60% threshold.

None of the included studies utilised random, systematic, or stratified sampling and all but one of the studies (Zhao and Zhou, 2020) were exploratory. These studies tended to involve surveys which assessed a broad range of variables that could relate to the participants’ mental health, rather than there being a focus on news consumption. Some of the included studies failed to report the response criteria for their news consumption measure, and it was unclear whether the participant selected their own category of news consumption or whether the authors created the categories post-data collection (Campos et al., 2021; Ghazawy et al., 2020; Ma et al., 2020; Yang et al., 2021). In addition, several

studies lacked a diverse range of recruitment strategies to capture a broad range of people. Specifically, Campos et al. (2021), Kecojevic et al. (2020), Ma et al. (2020), and Ryerson (2020) relied on emailing the survey link to one cohort or class of students, while other studies did not explain how participants were recruited (Huckins et al., 2020; Shabahang et al., 2020). Furthermore, several studies did not conduct reliability analyses on either their news or mental health measures (Ghazawy et al., 2020; Gill et al., 2021; Huckins et al., 2020; Ryerson, 2020). Shabahang et al. (2020) and Campos et al. (2021) provided information related to the validity of their mental health measures and the remaining studies, with the exception of Radwan et al. (2020) and Ryerson (2020), utilised established measures of mental health, sometimes in an adapted form. None of the included studies validated their news measures as explained above.

3.6. COVID-19 context

The reviewed studies sampled participants from various countries/regions which experienced COVID-19 and its related lockdown measures to different degrees. The included studies collected data from Brazil (Campos et al., 2021), Egypt (Ghazawy et al., 2020), Canada (Gill et al., 2021), United States (Huckins et al., 2020; Kecojevic et al., 2020; Ryerson, 2020), Palestine (Radwan et al., 2020), Iran (Shabahang et al., 2020), and China (Lin et al., 2020a, 2020b; Ma et al., 2020; Yang et al., 2021; Zhao and Zhou, 2020). The data collection periods ranged from the peak of infection and death rates in some regions (Ma et al., 2020), to periods when daily case numbers were low (Lin et al., 2020b). However, all included studies had school closures or partial school closures in place at the time of data collection (United Nations Educational Scientific and Cultural Organization, 2020).

3.7. Associations between consumption of COVID-19 news and psychological distress

In terms of the frequency of COVID-19 news checking, Gill et al.'s (2021) study saw a significantly higher level of psychological distress and depression symptoms associated with daily-to-hourly use of social media to obtain COVID-19 news, in comparison to weekly or monthly use. However, there was no significant difference for anxiety symptoms. Conversely, Yang et al. (2021) found that anxiety levels were significantly greater for people who paid more frequent attention to COVID-19 information (> 10 times a day) than for lower frequencies (6–10 and 1–5 times a day).

Within the studies that measured duration, positive correlations were found between time spent per day following the news of the pandemic and symptoms of anxiety, stress, hyperarousal, and intrusion (Campos et al., 2021). Kecojevic et al. (2020) also saw a significant positive association for time spent searching for COVID-19 information on news sites with anxiety and somatisation levels. Higher anxiety was also associated with more time spent looking for information on social media. Academic difficulties (ability to focus on academic work), everyday difficulties (lost job, reduced wages or work hours, obtaining medication and hygiene supplies), and concern about COVID-19 were variables that remained significant in the regression models for at least one of the mental health outcomes.

Further, the time spent following updates of COVID-19 (source of the updates was not specified) was found to be a significant positive predictor for anxiety (Ghazawy et al., 2020). In contrast, a study of mass (combination of traditional and online media) and social media usage during COVID-19, found that high levels of usage for both media types were associated with lower anxiety levels, albeit the associations were not significant within the multivariable logistic regression (Lin et al., 2020b). The analysis aimed to predict the level of exposure to mass and social media, utilising anxiety as one of the predictors. The emotional consequences of the COVID-19 outbreak (e.g., feelings of fear, avoidance, keeping a secret, embarrassment, and stigma associated with

COVID-19), perceived severity of COVID-19, perceived self-efficacy to carry out COVID-19 prevention measures, and perceived barriers, control or intention to carry out COVID-19 preventative measures, all remained significant in the multivariate model for both mass and social media exposure (Lin et al., 2020b).

Furthermore, Ma et al. (2020) study found a significant association between individuals exposed to more than one hour of COVID-19 media each day, and an increased risk of acute stress. This association remained significant within the hierarchical logistic regression. However, no significant association was found with the risk of depression or anxiety. Depression and stress were also not found to be significant in their association with time spent per day following updates of COVID-19 news (source was not specified) for university students (Ghazawy et al., 2020), or the time spent (> 1 hour per day) looking for information on news sites or social media (Kecojevic et al., 2020). Additionally, Ryerson (2020) did not find a significant association between increased levels of COVID-19 news consumption (watching COVID-19 news and finding updates online or on television) and negative psychological health. In a study which measured stressors surrounding news media consumption (measured dichotomously), Lin et al. (2020a) observed that consuming news surrounding the severity and high infectibility of COVID-19 was a significant negative predictor of acute stress disorder, ergo serving as a protective factor. Conversely, they found that being uncertain of COVID-19 information was a significant positive predictor of acute stress disorder.

3.8. Associations between sources of COVID-19 news and psychological distress

The included studies either measured COVID-19 news and media as a singular construct or aimed to determine whether different effects were found between news accessed on social media and more traditional forms of news (e.g., news sites and television). The Huckins et al. (2020) longitudinal study, which utilised an objective measure of COVID-19 news, found that depression and anxiety symptoms were significantly associated with a higher proportion of news reports containing the term coronavirus within the US media. Additionally, it was found that receiving negative news from the authorities was a significant positive predictor of acute stress disorder, however, it is unclear whether this was because of the source or content of the news (Lin et al., 2020a). Kecojevic et al. (2020) did not find a significant association between trust in official sources (e.g., government, medical professionals) and depression, anxiety, somatisation, or stress, although they did find that those reporting trust in news sites were less likely to experience somatic distress.

In a comparison between using social and traditional media to consume COVID-19 news (Zhao and Zhou, 2020), it was observed that social media contributed to STS, depression, and anxiety, while usage of traditional media was unrelated to any of the mental health outcomes. In support of this, Radwan et al. (2020) noted that the spread of panic concerning COVID-19 on social media psychologically affected adolescents aged 15–18 years more than younger children aged 6–9 years, and online news exposure was also positively associated with high levels of COVID-19 anxiety (Shabahang et al., 2020). In order to explain the relationship between obtaining COVID-19 related news on social media and poorer mental health outcomes, Zhao and Zhou (2020) conducted a path analysis and discovered that negative affect mediated the relationship. Specifically, negative affect partially mediated the relationship for STS, and completely mediated the relationship for depression and anxiety. Contradictory to these findings, decreased anxiety was seen for individuals who consumed high levels of COVID-19 news on social media, although the effect was not significant in the multivariate analysis containing other potential COVID-19 stressors (Lin et al., 2020b). Further, Kecojevic et al. (2020) did not find a significant association between trust in unofficial sources (e.g., social media, friends/family) and any of their mental health outcomes.

3.9. Information uncertainty

One of the included studies assessed uncertainty about COVID-19 information (e.g., “difficult to tell the authenticity of many online information regarding the epidemic”; Lin et al., 2020a). Greater uncertainty was found to be positively associated with acute stress disorder. This significant finding occurred in the multivariate analysis which contained other potential COVID-19 stressors, such as family conflict caused by the epidemic, information on the severity and high infectibility of COVID-19, and negative news from the authorities.

4. Discussion

The aim of the systematic review was to evaluate the research on the mental health effects of COVID-19 related news consumption for young people. There were 13 studies found that assessed this relationship. The reviewed literature indicated that higher consumption of COVID-19 related news and media has a connection with lower levels of mental health in young people. The negative psychological impact for news obtained on social media is demonstrated in the reviewed literature, however, mixed results were obtained for the effect of traditional media. Misinformation may also play a role in the relationship between COVID-19 related news consumption and poor mental health. However, the lack of reliable news consumption measures and the cross-sectional designs of included studies provides a direction for future research.

In comparison to previous pandemics, COVID-19 has occurred during a time when people have access to a limitless amount of information online. News is updated constantly throughout the day and people can consume COVID-19 information on a number of different platforms (Holton and Chyi, 2012), in addition to older forms of media such as newspapers and television. This constant stream of information may increase the frequency of news checking in comparison to before the pandemic. There is evidence that people increase their consumption of news in response to dramatic events, such as the COVID-19 pandemic, with more significant increases occurring for online news sources (Van Aelst et al., 2021). This increase in news consumption from prior to during the pandemic is also evident in the youth population (Park et al., 2020). Information overload and high frequency of news checking may have a detrimental psychological impact. The reviewed literature supports the connection between increased frequency of COVID-19 news checking and decreased mental health. Previous literature on US adults also found that greater COVID-19 news consumption is associated with increased psychological distress (Stainback et al., 2020). The most significant increase in news consumption has occurred in online sources (Van Aelst et al., 2021). Because young people are consuming their news primarily online (Antunovic et al., 2018), the youth demographic may be particularly vulnerable to decreased wellbeing from this source.

Due to the amount of information in the media surrounding the pandemic, it can be difficult for people to filter accurate information from misinformation (Rathore and Farooq, 2020). The amount of “fake news” and misinformation surrounding COVID-19 on social media has been associated with psychological distress across the US, United Kingdom, and Australia (Leung et al., 2020). There was one study within the reviewed literature that assessed the impact of information uncertainty on acute stress disorder (Lin et al., 2020a), finding a significant association. Research has indicated that exposure to misinformation via social media also has an association with anxiety, depression, and social isolation in the general population (Hammad and Alqarni, 2021). With misinformation most likely to be shared across social media platforms and instant messaging services, resulting in greater misinformation exposure for younger age groups (Lee et al., 2020), it is important for the role of information uncertainty and its impact on youth mental health to be explored further.

Many of the included studies utilised a single item to measure news consumption ($n = 8$), with some studies measuring the active process of consuming news, and others either assessing the passive process of

paying attention to news, or not differentiating between the two processes. The single item measures prevent an internal consistency measure from being calculated. There was one study that utilised an objective measure of COVID-19 news (Huckins et al., 2020), considering the proportion of COVID-19 news in the media. However, an association between a higher proportion of COVID-19 related news in the media and the mental health outcomes does not necessarily indicate that participants were consuming this news. Of the studies that assessed traditional news or news in general, there was more ambiguity within the measurement items because there was no specific news source of interest within the research. Those that assessed social media, were more attuned to differentiating the sources of media to ensure that the effect of social media on its own was seen. While most studies utilised established measures of mental health or adapted versions of these measures ($n = 12$), only seven of these calculated an internal consistency measure. The use of self-report mental health measures in all studies does increase the risk of recall bias, however, many surveys were administered whilst people were in lockdown and currently experiencing the pandemic, making recall of one’s mental state not required, thereby mitigating the potential for recall bias. Huckins et al. (2020) utilised EMAs which are less susceptible to recall bias (Stone and Shiffman, 2002) and may be beneficial for use in future research in the study area.

In considering the results of the systematic review, several limitations need to be acknowledged. The inconsistent methodologies among the studies made it difficult to compare results. For example, there were studies that measured anxiety specifically toward COVID-19 (Shabahang et al., 2020) and a self-report item asking whether the participant was psychologically affected by COVID-19 news (Radwan et al., 2020), rather than using established measures for mental health. The COVID-19 news measures also varied, with each study using their own items/measure, which meant that no measure was validated and only two studies conducted reliability analyses (Lin et al., 2020b; Radwan et al., 2020). Additionally, all but one study (Huckins et al., 2020) were cross-sectional, which precludes an inference of causation between COVID-19 related news and mental health outcomes. Therefore, the potentially reciprocal relationship between consumption of COVID-19 related news and poor mental health could not be explored (Shabahang et al., 2021). Finally, the variation in mental health measures used meant that only three of the papers could be included in a meta-analysis for the anxiety levels experienced. However, this analysis indicated a four-fold increase in the percentage of young people experiencing moderate to severe levels of anxiety over norm levels recorded pre-COVID, confirming the adverse impacts of the pandemic on young people. Huckins et al. (2020) provided some confirmation of this result with PHQ-2 scores significantly higher during a COVID-19 term than a pre-COVID term, with a similar conclusion obtained by Campos (2020) using the DASS-21 depression scale.

Comparison of results was also made difficult because the experience of the COVID-19 pandemic is different across countries and regions, with different infection and mortality rates, different lockdown measures, etc. Although some studies conducted multiple predictor analyses (Ghazawy et al., 2020; Gill et al., 2021; Huckins et al., 2020; Kecojevic et al., 2020; Lin et al., 2020a; Lin et al., 2020b; Ma et al., 2020; Shabahang et al., 2020; Yang et al., 2021; Zhao and Zhou, 2020), controlling for some of these variables, other studies conducted bivariate analyses (Campos et al., 2021; Radwan et al., 2020; Ryerson, 2020), thus ignoring these variables. The multivariate analyses provide more reliable results for the association between COVID-19 related news consumption and mental health because other factors, such as lack of support from family, community and university (Ghazawy et al., 2020), prior mental health issues (Ma et al., 2020), and academic difficulties (Kecojevic et al., 2020), are taken into consideration.

In terms of limitations relevant to the method of the systematic review, the inclusion of mean ages within the WHO’s criteria for young people indicates that some of the reviewed data contained older participants. Most of the emerging studies related to the mental health

impact of COVID-19 do not specifically assess young people as per the WHO definition, with the categorisation of young people differing across studies. Utilising this WHO definition for the inclusion criteria could have introduced error, thereby obscuring any relationships that may be specific to young people. However, most participants in the reviewed literature were within the prespecified age range.

Further research should focus on longitudinal designs with EMAs because the COVID-19 situation is constantly changing and there is a need to determine how young people's mental health and consumption of COVID-19 news changes over time. The effects of social media and traditional/online media should be separated to identify any significant difference in their effects on mental health. Controlling for other factors that may contribute to the distress experienced by young people may assist in better understanding the relationship with COVID-19 related news. Furthermore, reliable and valid measures of news consumption should be created rather than relying on single items.

In summary, the findings provide some evidence of a decline in young people's mental health and its association with increased consumption of COVID-19 related news. Any evidence contrary to this may be due to the use of unvalidated/unreliable scales for news consumption, news measures that do not differentiate between social and traditional/online media, or the perception of information uncertainty. The COVID-19 related news consumption and mental health relationship may also be explained by mediators such as negative affect. Further research with a longitudinal design is required to confirm any mechanisms instrumental for harmful mental health effects related to COVID-19 news in young people.

5. Other information

The systematic review protocol was uploaded to PsyArXiv Preprints on 4 May 2021 (Strasser et al., 2021). Based on reviewer feedback, an additional meta-analysis was conducted that was not included in the original protocol. The meta-analysis aimed to estimate the mental health outcomes observed during COVID in relation to pre-COVID norms.

CRedit authorship contribution statement

Michelle A. Strasser: Conceptualization, Writing – review & editing. **Philip J. Sumner:** Conceptualization, Writing – review & editing. **Denny Meyer:** Conceptualization, Writing – review & editing, Formal analysis.

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References

- Ahmad, A.R., Murad, H.R., 2020. The impact of social media on panic during the COVID-19 pandemic in Iraqi Kurdistan: online questionnaire study. *J. Med. Internet Res.* 22, e19556. <https://doi.org/10.2196/19556>.
- Antunovic, D., Parsons, P., Cooke, T.R., 2018. 'Checking' and googling: stages of news consumption among young adults. *Journalism* 19, 632–648. <https://doi.org/10.1177/1464884916663625>.
- Australian Bureau of Statistics, 2018. Household use of Information Technology <https://www.abs.gov.au/statistics/industry/technology-and-innovation/household-use-information-technology/latest-release> (accessed 12 April 2021).
- Bland, J.M., Altman, D.G., 1997. Statistics notes: cronbach's alpha. *BMJ* 314, 572. <https://doi.org/10.1136/bmj.314.7080.572>.
- Campos, J., Campos, L.A., Bueno, J.L., Martins, B.G., 2021. Emotions and mood swings of pharmacy students in the context of the coronavirus disease of 2019 pandemic. *Curr. Pharm. Teach. Learn.* 13, 635–642. <https://doi.org/10.1016/j.cptl.2021.01.034>.
- Casero-Ripollés, A., 2020. Impact of COVID-19 on the media system. Communicative and democratic consequences of news consumption during the outbreak. *Prof. Inf.* 29. <https://doi.org/10.3145/epi.2020.mar.23>.
- Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed. Erlbaum, Hillsdale, NJ.
- Conway, L.G., Woodard, S.R., Zubrod, A., 2020. Social psychological measurements of COVID-19: coronavirus perceived threat, government response, impacts, and experiences questionnaires. *PsyArXiv*. <https://doi.org/10.31234/osf.io/z2x9a>.
- Crawford, J.R., Henry, J.D., 2003. The depression anxiety stress scales (DASS): normative data and latent structure in a large non-clinical sample. *Br. J. Clin. Psychol.* 42 (Pt2), 111–131. <https://doi.org/10.1348/014466503321903544>.
- de Hoog, N., Verboon, P., 2020. Is the news making us unhappy? The influence of daily news exposure on emotional states. *Br. J. Psychol.* 111, 157–173. <https://doi.org/10.1111/bjop.12389>.
- Duan, L., Shao, X., Wang, Y., Huang, Y., Miao, J., Yang, X., Zhu, G., 2020. An investigation of mental health status of children and adolescents in China during the outbreak of COVID-19. *J. Affect. Disord.* 275, 112–118. <https://doi.org/10.1016/j.jad.2020.06.029>.
- Duong, V., Luo, J., Pham, P., Yang, T., Wang, Y., 2020. The ivory tower lost: how college students respond differently than the general public to the COVID-19 pandemic. *IEEE/ACM* 126–130. <https://doi.org/10.1109/ASONAM49781.2020.9381379>.
- Garfin, D.R., Silver, R.C., Holman, E.A., 2020. The novel coronavirus (COVID-2019) outbreak: amplification of public health consequences by media exposure. *Health Psychol.* 39, 355–357. <https://doi.org/10.1037/hea0000875>.
- Ghazawy, E.R., Ewis, A.A., Mahfouz, E.M., Khalil, D.M., Arafa, A., Mohammed, Z., Mohammed, E.F., Hassan, E.E., Abdel Hamid, S., Ewis, S.A., Mohammed, A.E.S., 2020. Psychological impacts of COVID-19 pandemic on the university students in Egypt. *Health Promot. Int.* <https://doi.org/10.1093/heapro/daaa147>.
- Gill, P.K., Du, C., Khan, F., Karimi, N., Sabharwal, K., Agarwal, M., 2021. The psychological effects of COVID-19 spread in young Canadian adults. *Int. J. Soc. Psychiatry*, 20764020988878. <https://doi.org/10.1177/0020764020988878>.
- Gottlieb, M., Dyer, S., 2020. Information and disinformation: social media in the COVID-19 crisis. *Acad. Emerg. Med.* 27, 640–641. <https://doi.org/10.1111/acem.14036>.
- Hammad, M.A., Alqarni, T.M., 2021. Psychosocial effects of social media on the Saudi society during the coronavirus disease 2019 pandemic: a cross-sectional study. *PLoS One* 16, e0248811. <https://doi.org/10.1371/journal.pone.0248811>.
- HeadSpace, 2020. *National Youth Mental Health Survey 2020* <https://headspace.org.au/assets/Uploads/Insights-youth-mental-health-and-wellbeing-over-time-headspace-National-Youth-Mental-Health-Survey-2020.pdf>.
- Henry, J.D., Crawford, J.R., 2005. The short-form version of the depression anxiety stress scales (DASS-21): construct validity and normative data in a large non-clinical sample. *Br. J. Clin. Psychol.* 44, 227–239. <https://doi.org/10.1348/014466505x29657>.
- Higgins, J.P.T., 2003. Measuring inconsistency in meta-analyses. *BMJ* 327, 557. <https://doi.org/10.1136/bmj.327.7414.557>.
- Holton, A.E., Chyi, H.I., 2012. News and the overloaded consumer: factors influencing information overload among news consumers. *Cyberpsychol. Behav. Soc. Netw.* 15, 619–624. <https://doi.org/10.1089/cyber.2011.0610>.
- Huckins, J.F., daSilva, A.W., Wang, W., Hedlund, E., Rogers, C., Nepal, S.K., Wu, J., Obuchi, M., Murphy, E.I., Meyer, M.L., Wagner, D.D., Holtzheimer, P.E., Campbell, A.T., 2020. Mental health and behavior of college students during the early phases of the COVID-19 pandemic: longitudinal smartphone and ecological momentary assessment study. *J. Med. Internet Res.* 22, e20185. <https://doi.org/10.2196/20185>.
- Jakovljevic, M., Bjedov, S., Mustac, F., Jakovljevic, I., 2020. COVID-19 infodemic and public trust from the perspective of public and global mental health. *Psychiatr. Danub.* 32, 449–457. <https://doi.org/10.24869/psychd.2020.449>.
- Keceojovic, A., Basch, C.H., Sullivan, M., Davi, N.K., 2020. The impact of the COVID-19 epidemic on mental health of undergraduate students in New Jersey, cross-sectional study. *PLoS One* 15, e0239696. <https://doi.org/10.1371/journal.pone.0239696>.
- Lee, J.J., Kang, K.A., Wang, M.P., Zhao, S.Z., Wong, J.Y.H., O'Connor, S., Yang, S.C., Shin, S., 2020. Associations between COVID-19 misinformation exposure and belief with COVID-19 knowledge and preventive behaviors: cross-sectional online study. *J. Med. Internet Res.* 22, e22205. <https://doi.org/10.2196/22205>.
- Leung, J., Schoultz, M., Chiu, V., Bonsaksen, T., Ruffolo, M., Thygesen, H., Price, D., Østertun Geirdal, A., 2022. Concerns over the spread of misinformation and fake news on social media – challenges amid the coronavirus pandemic. In: *Proceedings of the 3rd International Electronic Conference on Environmental Research and Public Health*. <https://doi.org/10.3390/ECERPH-3-09078>.

- Liang, L., Ren, H., Cao, R., Hu, Y., Qin, Z., Li, C., Mei, S., 2020. The effect of COVID-19 on youth mental health. *Psychiatr. Q.* 91, 841–852. <https://doi.org/10.1007/s11126-020-09744-3>.
- Lin, D., Friedman, D.B., Qiao, S., Tam, C.C., Li, X., Li, X., 2020a. Information uncertainty: a correlate for acute stress disorder during the COVID-19 outbreak in China. *BMC Public Health* 20, 1867. <https://doi.org/10.1186/s12889-020-09952-3>.
- Lin, L.Y., Sidani, J.E., Shensa, A., Radovic, A., Miller, E., Colditz, J.B., Hoffman, B.L., Giles, L.M., Primack, B.A., 2016. Association between social media use and depression among U.S. young adults. *Depress. Anxiety* 33, 323–331. <https://doi.org/10.1002/da.22466>.
- Lin, Y., Hu, Z., Alias, H., Wong, L.P., 2020b. Influence of mass and social media on psychobehavioral responses among medical students during the downward trend of COVID-19 in Fujian, China: cross-sectional study. *J. Med. Internet Res.* 22, e19982. <https://doi.org/10.2196/19982>.
- Ma, Z., Zhao, J., Li, Y., Chen, D., Wang, T., Zhang, Z., Chen, Z., Yu, Q., Jiang, J., Fan, F., Liu, X., 2020. Mental health problems and correlates among 746 217 college students during the coronavirus disease 2019 outbreak in China. *Epidemiol. Psychiatr. Sci.* 29, e181. <https://doi.org/10.1017/s2045796020000931>.
- McHugh, M.L., 2012. Interrater reliability: the kappa statistic. *Biochem. Med.* 22, 276–282. <https://doi.org/10.11613/BM.2012.031> (Zagreb).
- McPhee, M.D., Keough, M.T., Rundle, S., Heath, L.M., Wardell, J.D., Hendershot, C.S., 2020. Depression, environmental reward, coping motives and alcohol consumption during the COVID-19 pandemic. *Front. Psychiatry* 11. <https://doi.org/10.3389/fpsy.2020.574676>.
- Newman, N., Fletcher, R., Kalogeropoulos, A., Nielsen, R.K., 2019. Digital News Report. Reuters Institute. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/inlin-e-files/DNR_2019_FINAL.pdf.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., McGuinness, L.A., Stewart, L.A., Thomas, J., Tricco, A.C., Welch, V.A., Whiting, P., Moher, D., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 372, n71. <https://doi.org/10.1136/bmj.n71>.
- Park, S., Fisher, C., Lee, J.Y., McGuinness, K., 2020. COVID-19 Australian News and Misinformation. University of Canberra. https://researchsystem.canberra.edu.au/ws/portalfiles/portal/33834086/COVID_19_Australian_news_and_misinformation.pdf.
- Primack, B.A., Shensa, A., Sidani, J.E., Whaithe, E.O., Lin, L.Y., Rosen, D., Colditz, J.B., Radovic, A., Miller, E., 2017. Social media use and perceived social isolation among young adults in the U.S. *Am. J. Prev. Med.* 53, 1–8. <https://doi.org/10.1016/j.amepre.2017.01.010>.
- Protogerou, C., Hagger, M.S., 2020. A checklist to assess the quality of survey studies in psychology. *Psychol. Methods* 3, 100031. <https://doi.org/10.1016/j.metip.2020.100031>.
- Radwan, E., Radwan, A., Radwan, W., 2020. The role of social media in spreading panic among primary and secondary school students during the COVID-19 pandemic: an online questionnaire study from the Gaza Strip. *Palest. Heliyon* 6, e05807. <https://doi.org/10.1016/j.heliyon.2020.e05807>.
- Rathore, F.A., Farooq, F., 2020. Information overload and infodemic in the COVID-19 pandemic. *J. Pak. Med. Assoc.* 70 (Suppl 3), S162–S165. <https://doi.org/10.5455/jpma.38>.
- Richards, R., Caldwell, P.H., Go, H., 2015. Impact of social media on the health of children and young people. *J. Paediatr. Child Health* 51, 1152–1157. <https://doi.org/10.1111/jpc.13023>.
- Rothkopf, D.J., 2003, May 11. When the buzz bites back. *The Washington Post*. <https://www.washingtonpost.com/archive/opinions/2003/05/11/when-the-buzz-bites-back/bc8cd84f-cab6-4648-bf58-0277261af6cd/> (accessed 12 April 2021).
- Ryerson, N.C., 2020. Behavioral and psychological correlates of well-being during COVID-19. *Psychol. Rep.* <https://doi.org/10.1177/0033294120978160>.
- Shabahang, R., Aruguete, M., Shim, H., 2021. Online news addiction: future anxiety, fear of missing out on news, and interpersonal trust contribute to excessive online news consumption. *OJCMT* 11, e202105. <https://doi.org/10.30935/ojcm/10822>.
- Shabahang, R., Aruguete, M.S., McCutcheon, L.E., 2020. Online health information utilization and online news exposure as predictors of COVID-19 anxiety. *N. Am. J. Psychol.* 22, 469–482.
- Singh, S., Roy, D., Sinha, K., Parveen, S., Sharma, G., Joshi, G., 2020. Impact of COVID-19 and lockdown on mental health of children and adolescents: a narrative review with recommendations. *Psychiatry Res.* 293 <https://doi.org/10.1016/j.psychres.2020.113429>, 113429–113429.
- Stainback, K., Hearne, B.N., Trieu, M.M., 2020. COVID-19 and the 24/7 news cycle: does COVID-19 news exposure affect mental health? *Socius* 6. <https://doi.org/10.1177/2378023120969339>, 2378023120969339.
- Stone, A.A., Shiffman, S., 2002. Capturing momentary, self-report data: a proposal for reporting guidelines. *Ann. Behav. Med.* 24, 236–243. https://doi.org/10.1207/s15324796abm2403_09.
- Strasser, M.A., Sumner, P.J., Meyer, D., 2021. COVID-19 news distress in youth: a systematic review protocol. *PsyArXiv*. <https://doi.org/10.31234/osf.io/nkxqr>.
- Su, Z., McDonnell, D., Wen, J., Kozak, M., Abbas, J., Segalo, S., Li, X., Ahmad, J., Cheshmehzangi, A., Cai, Y., Yang, L., Xiang, Y.T., 2021. Mental health consequences of COVID-19 media coverage: the need for effective crisis communication practices. *Glob. Health* 17, 4. <https://doi.org/10.1186/s12992-020-00654-4>.
- Suhail, K., Bargees, Z., 2006. Effects of excessive internet use on undergraduate students in Pakistan. *Cyberpsychol. Behav.* 9, 297–307. <https://doi.org/10.1089/cpb.2006.9.297>.
- Talevi, D., Soccì, V., Carai, M., Carnaghi, G., Faleri, S., Trebbi, E., di Bernardo, A., Capelli, F., Pacitti, F., 2020. Mental health outcomes of the CoVid-19 pandemic. *Riv. Psychiatr.* 55, 137–144. <https://doi.org/10.1708/3382.33569>.
- United Nations Educational Scientific and Cultural Organization, 2020. COVID-19 impact on education. <https://en.unesco.org/covid19/educationresponse> (accessed 11 May 2021).
- Taubenberger, J.K., Morens, D.M., 2006. 1918 influenza: the mother of all pandemics. *Emerg. Infect. Dis.* 12, 15–22. <https://doi.org/10.3201/eid1201.050979>.
- Van Aelst, P., Toth, F., Castro, L., Stetka, V., Vreese, C.d., Aalberg, T., Cardenal, A.S., Corbu, N., Esser, F., Hopmann, D.N., Koc-Michalska, K., Matthes, J., Schemer, C., Shearer, T., Splendore, S., Stanyer, J., Stepińska, A., Strömböck, J., Theocharis, Y., 2021. Does a crisis change news habits? A comparative study of the effects of COVID-19 on news media use in 17 European countries. *Digit. J.* 1–31. <https://doi.org/10.1080/21670811.2021.1943481>.
- Varma, P., Burge, M., Meaklim, H., Junge, M., Jackson, M.L., 2021. Poor sleep quality and its relationship with individual characteristics, personal experiences and mental health during the COVID-19 pandemic. *Int. J. Environ. Res. Public Health* 18, 6030. <https://doi.org/10.3390/ijerph18116030>.
- Viechtbauer, W., 2010. Conducting meta-analyses in R with the metafor package. *J. Stat. Softw.* 36 (3), 1–48. <https://doi.org/10.18637/jss.v036.i03>.
- West, S.L., Gartlehner, G., Mansfield, A.J., et al., 2010. *Comparative Effectiveness Review Methods: Clinical Heterogeneity*. Rockville (MD): Agency for Healthcare Research and Quality [Internet] 2010 Sep. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK53310>.
- World Health Organization, 2020. Coronavirus disease (COVID-19). https://www.who.int/health-topics/coronavirus#tab=tab_1 (accessed 12 April 2021).
- Yang, K.H., Wang, L., Liu, H., Li, L.X., Jiang, X.L., 2021. Impact of coronavirus disease 2019 on the mental health of university students in Sichuan Province, China: an online cross-sectional study. *Int. J. Ment. Health Nurs.* <https://doi.org/10.1111/inm.12828>.
- Zhao, N., Zhou, G.Y., 2020. Social media use and mental health during the COVID-19 pandemic: moderator role of disaster stressor and mediator role of negative affect. *Appl. Psychol. Health Well Being* 12, 1019–1038. <https://doi.org/10.1111/aphw.12226>.