



Identifying psychosocial support needs through social listening on internet discussion forums: a case study of r/COVID19_support

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ABSTRACT

Introduction

The COVID-19 pandemic has placed a severe mental strain on people in general, and on young people in particular, especially during periods of lockdown and movement restrictions. Online support forums offer opportunities for peer-to-peer health and social support, which can ease pressure on professional and established volunteer services when demand is high. Such forums can also be used to monitor at-risk communities to identify concerns and causes of psychosocial stress. The aim of this study was to observe an online support forum to see if such a platform can be used for health surveillance or 'social listening', in this case to identify issues that are causing or exacerbating psychological stress and anxiety in university-age students.

Methods

We monitored r/COVID19_support, an online forum for people seeking support during the COVID-19 pandemic, on the platform www.reddit.com. The forum was set up in February 2020. We observed and analyzed posts made between February 2020 and July 2021. We used search terms related to student life, and real-time observation, to identify posts made by users self-identifying as students or posting about college/university life. We then coded these posts to identify themes that were related to triggers of psychological anxiety and distress.

Results

During the study period, 147 posts were made to the forum by 111 unique users. A number of themes were identified by manual coding, including: feelings of grief associated with the loss of college-related life experiences, such as graduation ceremonies or proms; difficulties with focusing on online and self-guided learning; and fears for the future, in particular of graduating into a constrained job market. Concerns were particularly acute in students who self-identified as autistic and in those who had been struggling with mental health before the pandemic. Identification of specific issues enabled users to be signposted to information that may help them to address those particular concerns.

Conclusion

Monitoring peer-to-peer forums can help to identify specific issues with which vulnerable groups may require additional support, enabling users to be signposted to high-quality information to address specific issues.

Keywords: Information science, Social listening, Disease outbreaks, Public health, Behaviour, Communication

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INTRODUCTION

Over the last two decades, many health and support communities have been raised on, or have migrated online,^{1,2} meeting and organizing in cyberspace rather than in more traditional settings. This has had particular value during the worldwide COVID-19 pandemic, as people can congregate in online spaces even during times of lockdown or social restrictions, but they cannot carry the SARS-Cov-2 virus with them: they do not have to worry about catching the virus or spreading it to others but can still experience companionship, friendship and social support. There is, therefore, value in exploring the relationship between psychological health and online space, including what infrastructures, governance models, norms and cultures best enable online spaces to support good health and improve mental well-being. Such spaces may become, in and of themselves, a remedy for the psychosocial stresses of the pandemic.

In a public health emergency when healthcare systems may be overwhelmed, the ability of affected communities to support one another and share trusted, reliable information can have a significant impact on the extent to which the outbreak might be contained or its spread slowed³⁻⁷. Funk and Janssen⁸ have modelled the impact of peer influence on disease spread. Cole⁹ has investigated how trustworthy and timely public health information can be exchanged over peer-to-peer platforms a during health emergency, concluding that this is best achieved by using platforms that are already widely used by the affected population – in particular, the highly popular information sharing platform www.reddit.com.

In this paper, we explore the use of such forums not only for immediate peer-to-peer support but also as a way to undertake social listening¹⁰ in order to identify concerns emerging within communities, which can help to plan interventions to address these concerns that can be targeted towards the affected community. Such social listening may also be able to signal 'information voids' that are in danger of being filled with low-quality or deliberately misleading information¹¹ and ensure that more appropriate information is provided early. Whilst social listening is widely employed to identify misinformation online,¹²

its use as a way of identifying additional support and targeted information a community might need has not yet been widely explored.

Safe spaces during COVID-19

SARS-Cov-2, the causative virus of the COVID-19 pandemic, was first recorded at the end of 2019¹³ in Wuhan, China, but cases soon spread around the world. By the beginning of January 2022, more than 298 million cases and 5.5 million deaths had been reported worldwide.¹⁴ Alongside the infectious disease burden, a second epidemic of mental ill-health has been observed with short- and long-term impacts on depression, stress and anxiety disorders, and PTSD.^{15,16} In China, psychological assistance hotlines were set up in early February 2020,¹⁷ in acknowledgement of the inherent dangers of both continuing with, and closing down, face-to-face counselling and therapy sessions during the disease outbreak. The importance of providing emotional support and long-term consideration of psychological distress was acknowledged just as swiftly across the globe,¹⁸ for example in the UK,¹⁹ Brazil²⁰ and India.²¹

Nonetheless, a primary focus on the epidemiology, clinical features and management of COVID-19 threatened to leave mental health provision under-resourced.²² With traditional support structures over-stretched, online peer-to-peer support groups emerged, sometimes spontaneously, sometimes from within already existing communities, for those suffering from health anxiety, including those who had long-term experience of such conditions and for others in whom it had emerged under the stress of COVID-19.²³ The potential for heightening health anxiety through engagement in forums where such issues are being discussed and foregrounded must not be overlooked,²⁴ as people may also share negative or worrying experiences that exacerbate feelings of fear and anxiety,²⁵ but online forums also have potential to provide spaces of comfort and companionship.²⁶

Students under stress

College and University-age students are particularly vulnerable to mental health issues, irrespective of the pandemic, due to pressures to perform exerted at a sensitive stage in their lives, whereby immediate

actions and decisions will profoundly affect their future.²⁸ Studies across the world²⁸⁻³⁶ have measured students' mental health at different stages of pandemic lockdowns to compare results over time. Most show a marked increase in mental health challenges, with an overall negative impact on mental health as high as 90% recorded in the students surveyed since the beginning of the pandemic. Anxiety levels in a university in North Carolina, USA, increased from 18.1% before the pandemic to 25.3% within a period of just four months.³⁰ Saadeh et al, in a study from Jordan, reported rates of depression amongst students as high as 71%, with a further 62.5% of students reporting that quarantine had an overall negative effect on their mental health.³¹ Savage et al²⁸ argue that this poses, in particular, a risk of relapses in students who have had problems before, and for all students towards the end of the academic year, when exams increase academic pressure. Cohorts graduating in 2020 were more affected, as the 2021 cohorts had more time to adjust to changes. Chaturvedi et al²⁹ showed that students from less privileged, disadvantaged backgrounds and/or dysfunctional families, are under the greatest pressure and thus at greater risk of developing mental health issues throughout the pandemic. They live in environments less conducive to robust mental health, and this affects their ability to study effectively. Other factors identified as influencing student mental health include moving home, loss of income from off-campus employment, lack of access to academic advisors and lack of interaction with other students.³²

These pressures have led to heightened issues of anxiety, depression, and stress in college-age students; manifesting in disturbed sleep patterns^{33,33} (which may be further impacted by excessive screen time during lockdowns and periods of social isolation, as well as anxiety and stress);³⁴ an increase in negative expectations of the future and a loss of hope,²⁷ leading to a downward spiral of depression; and limited movement and activity, leading to more sedentary behaviour, which is also known to be a risk factor for depression (e.g. work by Savage et al,²⁸ on the UK during lockdown). Uncertainty around how assessments and online learning were being organized³⁵ and graduations being cancelled³² made

students feel that their college work was neither meaningful nor worthy. In a study on Malaysian students, 89.8% reported family and work conflicts during the country's six-week lockdown in March-April 2020³⁶ and in the US, 82% of students expressed increased concerns about academic performance during the pandemic.³³

Creating safe space for support

In this paper we explore how online forums might be used to ease some of these pressures, using as a case study *r/COVID19_support*, an online discussion forum created at the beginning of the pandemic, hosted on the popular platform *www.reddit.com*. The forum operates as an online space that aims to create a supportive community meeting place and a location for exchanging knowledge that can help to ease anxiety; it thus offers a 'safe space' in which people can meet, discuss their fears and anxieties, ask questions to address concerns or confusion and thus bolster their psychosocial well-being. We draw on concepts of space/place from human geography,^{30,37,38} organizational theory³⁹⁻⁴¹ and computer science.⁴²⁻⁴⁴

Previous research has suggested that during disease outbreaks, people actively seek out others with knowledge and experience of similar events with whom to discuss their situation^{9,45,46} in order to help them cope. They want to attend meetings, talk to experts, receive information from health professionals, and connect with friends and family who are experiencing the outbreak more immediately than themselves, for example those who are working in the healthcare sector, or in regions where the case counts are high. They want to learn more about the disease and the places in which it is circulating, particularly as cases are recorded closer to them. Cyberspace can provide safe spaces in which conversations can happen and where knowledge can be both created and shared.⁴¹

Whilst technology can increase social capital and agency,⁴⁷ attention has, also and rightly, been given to who is excluded from such spaces^{48,49} how access to technology creates digital divides between techno-haves and have-nots,⁵⁰ as well as to the challenges raised by the circulation of incorrect or misleading

communications in uncontrolled or poorly managed information ecosystems,⁵¹ which can increase psychological distress as well as relieve it. Online surveillance during a pandemic may itself create concerns,⁵² particularly where government efforts such as contact tracing and movement tracking are seen as excessive and restrictive of freedom.⁵³ These concerns are valid areas for study but the potential dangers should not distract from a full examination of what can happen inside safe digital spaces and what kind of health- and well-being enabling places can be formed there. Other studies have shown value in online mental health communication programmes as a coping strategy⁵⁴ and there is growing interest in the use of social media as an enabler of public health.⁵⁵ Our study highlights how social listening within online forums can identify specific concerns and thus enable targeted high-quality information that addresses those concerns to be signposted to those expressing them, as well as enabling peer-to-peer support.

METHODS AND MATERIALS

In January 2020, at the beginning of the COVID-19 pandemic, our previous research on the potential of digital platforms for peer-to-peer communication during pandemics (undertaken during the 2014-15 West Africa Ebola crisis⁹ and a 2018 Nipah virus outbreak in Kerala, India⁵⁶) led us to consider setting up a forum on www.reddit.com as a platform for exchanging information regarding the COVID-19 outbreak. Our previous research^{9,56,57} has indicated that forums for high-quality peer-to-peer information exchange during disease outbreaks work well when existing popular and familiar platforms are used; and when the forum moderators have experience in the subject under discussion, the technical aspects of platform on which the discussion is hosted, and the norms and culture of the platform and its communities. Reddit, a news aggregator site that also hosts discussion forums, fulfils the criteria of an already popular and familiar platform. It is one of the world's 20 most popular websites, allowing users to post content, comment on content others have posted, and vote on both posts and comments made by other users. Content is socially curated and promoted by site members through voting but is also, on most forums, tightly moderated⁵⁸ – characteristics

that our previous research has shown helps to keep content high-quality; upvoted information is generally reliable and is trusted by other community members. In addition, our previous research has shown that Reddit can host discussions between large numbers of participants and is capable of rapid growth.⁹

The reddit platform is an umbrella platform that hosts 'subreddits', more focused forums on specific topics, which range from discussion groups for fans of sports teams (e.g. [r/ManchesterUnited](https://www.reddit.com/r/ManchesterUnited)), local residents of a certain area (e.g. [r/Chicago](https://www.reddit.com/r/Chicago)) or those living with particular health conditions (e.g. [r/diabetes](https://www.reddit.com/r/diabetes)). Each subreddit is monitored and managed by volunteer moderators who are able to set rules and remove (manually and with the help of artificial intelligence software embedded in the platform) posts and comments that are deemed inappropriate, offensive, or inaccurate, for example those that contain information that is factually incorrect, use racist or sexist language or profanities, or are aggressive. This results in an online space where useful and interesting information can be shared among users and where users can ask questions for which they have been able to find answers elsewhere. Further research has shown that while the quality of the information on such forums can be variable, on well-managed forums it can be scientifically accurate and in line with accepted medical practice: when doctors were asked to rate the usefulness and accuracy of comments and posts on the platform, the ratings they gave the information validated the Reddit community's voting on which contained the better information⁸. As such, we chose to build a forum for COVID-19 discussion on Reddit as it has many characteristics conducive to ensuring the promotion of reliable, trustworthy and high-quality information, including its moderation, voting structure, complex system of trust markers^{8,9} and embedded artificial (AI) functions that help with the automatic removal of abusive, incorrect or otherwise problematic context.

During the early weeks of the COVID-19 pandemic, several forums dedicated to its discussion emerged naturally from within the reddit platform. We observed the activity on the existing forums and joined the moderation teams of several, including

r/coronavirus, r/China_Flu and r/nCov. We observed that users of these existing forums frequently expressed concerns about the virus and how it might impact them; many described feeling afraid or alone; they often had questions they wanted to ask and frequently requested help or support with navigating information on safe behaviour during the pandemic which they found complex or confusing. They wanted support in coping with lockdowns, quarantines and other restrictions. On r/coronavirus, however, which became the largest and most prominent pandemic subreddit, such posts were removed in favour of linking only to professional media reports and scientific papers. When a user who identified as a qualified therapist (posting under the username u/thatreddittherapist), began to offer free online therapy to those users expressing distress in comments, we contacted her and suggested setting up a dedicated forum specifically for this purpose, where users would be able to post questions and receive answers from their peers and the moderators. The forum www.reddit.com/r/COVID19_support was set up (by JC, using the reddit username u/JenniferColeRHUK) on 12 Feb 2020, as a space in which people could express their concerns, anxiety and fears over the progression of the COVID-19 pandemic, share personal experiences and ask for advice and emotional support.

Recruiting a moderator team

Once the subreddit had been initiated, we next recruited an effective group of moderators to help manage the forum and to keep it running. Our previous study⁹ had identified three distinct moderation tasks that need to be covered by a moderation team (or a single moderator): subject matter expertise, technical expertise and experience in Reddit's norms and structure. We were able to access and draw on all of these through the Reddit community and thus constructed an effective and efficient moderator team within days.

We recruited a team of moderators to conform to the skillset identified above and the group dynamic identified as most beneficial to enabling the emergence of Collective Intelligence,⁵⁹ a form of crowd wisdom greater than the sum of its parts. The

team we recruited included public health academics, a qualified counsellor, a nurse, moderators with experience of other reddit forums and (later) regular forum users and a U.S. government biosafety officer. As the pandemic progressed, a number of regular forum users were identified who consistently provided high-quality, scientifically accurate and emotionally supportive information to their peers. These were offered 'helpful contributor' flair – an identifier that shows next to their username and helps to signal to others that their advice is considered high-quality by the moderator team. The moderators themselves displayed flairs showing their qualifications or job title, e.g. PhD Global Health, or Verified Nurse.

The moderator team programmed AutoModerator, an inbuilt AI function that can automatically remove information posted by users that is insensitive (e.g., racist language suggesting that lack of personal hygiene is responsible for the outbreak) or inaccurate (e.g., comments that suggest vaccines are completely ineffective against newly emerging strains of the disease) to ease the manual moderation burden.

Initially, the forum grew very quickly, experiencing a short period of exponential growth that coincided with the lead-in to the introduction of restrictive lockdowns in Europe, North America and India in mid-March 2020. The forum reached 1,000 subscribers on 28 Feb, 5,000 on 10 March, 10,000 on 17 March and 20,000 on 6 April (Figs 1 and 2). Following this, growth slowed but the forum continued to gain new subscribers steadily, reaching 30,000 on 18 October 2020. At the end of 2021, it had continued to grow to nearly 40,000 subscribers. As the forum grew, additional moderators were added to meet the three key moderator skill sets of subject matter expertise (counselling skills, infection control, medical science, pandemic response, biosafety), experience of the platform (reddit, and previous disease outbreak forums or support and anxiety forums), and technical expertise of coding and platform architecture.⁹ The active core team also met the criteria set out by Woolley⁵⁹ under which Collective Intelligence can most easily emerge in organizational teams: moderate diversity – of age, gender and geographic location – in a team of 6-8 people.

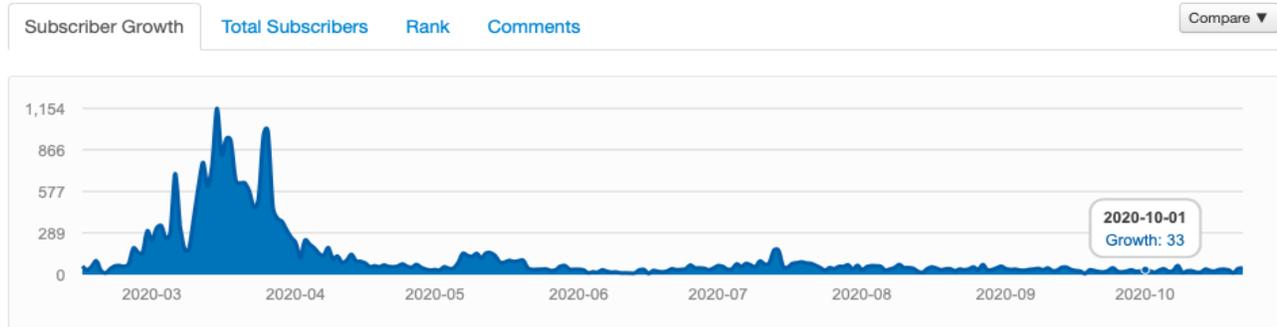


Fig 1 Number of new subscribers on r/COVID19_support, showing the rapid spike in new subscriptions in the initial phase of the pandemic. New daily subscriptions peaked at 1,154 on 15 March 2020, with the main period of growth seen between 25 Feb and 4 April 2020. Following this, the forum has gained around 50 new subscribers per day. At the height of the pandemic in mid-2020 it regularly attracted between 500,000 and 1 million unique page views per day.

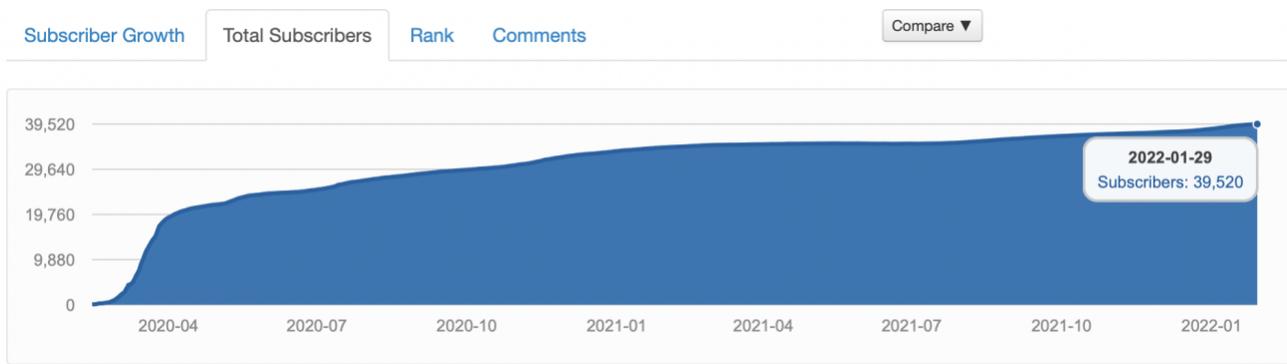


Fig 2 Cumulative growth of subscribers on r/COVID19_support from Feb 2020 to Dec 2021, showing the exponential growth during March 2020, when lockdowns began in Europe and North America (Source: www.redditmetrics.com).

Social listening on r/COVID19_support

The forum was created to apply and validate our previous research, to confirm that such a forum could be created rapidly during a global pandemic. We had no specific study or research questions in mind. The decision to study the content of the forum and to focus on concerns raised by college and university age students emerged from a student placement undertaken by Rebecca How, one this paper's authors, to explore the extent to which the forum offered an opportunity to conduct social listening related to a specific health concern (mental health) within a specific demographic (college age students), and if this could help to design an intervention to address concerns through targeting information to this group.

A literature review was conducted to identify existing literature on student mental health during the COVID-19 pandemic using the search terms, 'Mental health of

college students during COVID-19' and 'Mental health of university students during COVID-19'. We then analyzed the 200 most recent papers returned by each search on Google Scholar and removed duplicates. This returned 34 articles relevant to the study (Fig 3). The selected 34 articles were identified by removing duplicates, then checking the titles to make sure that they were relevant to our research topic. Titles that mentioned anything relating to the mental health of students during the COVID-19 pandemic were kept. We then read the abstracts and excluded articles that only briefly mentioned that one of the consequences of the pandemic is its impact on mental health but did not go into further detail. We then read the full articles and excluded those with insufficient information on how the mental health of students was affected or how the situation could be improved. Some papers contained similar content and so these were further excluded, leaving the 34 articles included in the study.



Selecting posts for analysis

The study period ran from 1-31 May 2021. Posts made to the forum from its inception up until the end of the study period, May 31, 2021, were analyzed and were identified as having been made by students if they were returned on a search for any of the following keywords: 18th birthday, 21st birthday, class, college, freshman graduation, graduating, high school, homeschooling, masters, prom, school, semester, senior year, sophomore, student, teen, university. This returned 141 separate posts from 111 unique users. These posts were then coded for discussion themes. The posts were also analyzed to identify which, if any, other reddit forums the posters engaged with; how posts on similar topics were responded to on those other forums in comparison with on r/COVID19_support; and whether posters seemed to be creating new accounts to post on the forum or used existing ones they used on other subreddits. Data was entered into an Excel Spreadsheet by RH, hand coded into topic areas by RH (checked by JC), and examined for links to other forums by FRB, who also produced the graphs and visualizations in Figs 3–8.

RESULTS

Fig 3 shows the number of posts returned for each keyword; the total is greater than the number of posts as some posts contained more than one of the keywords. The search returned 141 posts by 111

unique users. Most users (n=95, 85.5%) posted once only, 11 users (10%) posted twice, and five users (4.5%) posted three times. No user posted more than three times. Nearly half (60/141, 43%) of posts were made by users who had created a new account in order to engage with the forum; it was outside the scope of this study to determine if these users were new to reddit entirely or created an additional account for the forum. Fig 7 shows the other forums on which r/COVID19_support users were also posting, and Fig 8 groups these into broad topic areas, each of which will be considered in the discussion section.

The content of the posts was analysed and initially grouped into categories by theme, of which the most commonly recurring ones where: challenges with online schooling (mentioned by n=31, 22% of posters); uncertainty for the future/disruption of plans such as taking a year out or moving out of the family home (n=40 + 8 + 5, 37.6%); missing or missing out on opportunities for social experiences (n= 16 + 24, 28.4%); general advice about COVID-19 and its risks that was not specifically related to student life (n=13, 9.2%); and unsupportive adults (teachers and parents); (n=3 + 1, 2.8%). The main subject areas of discussion this identified are shown in Fig 2, and more granular analysis of the content of the discussions is shown in Table 1.

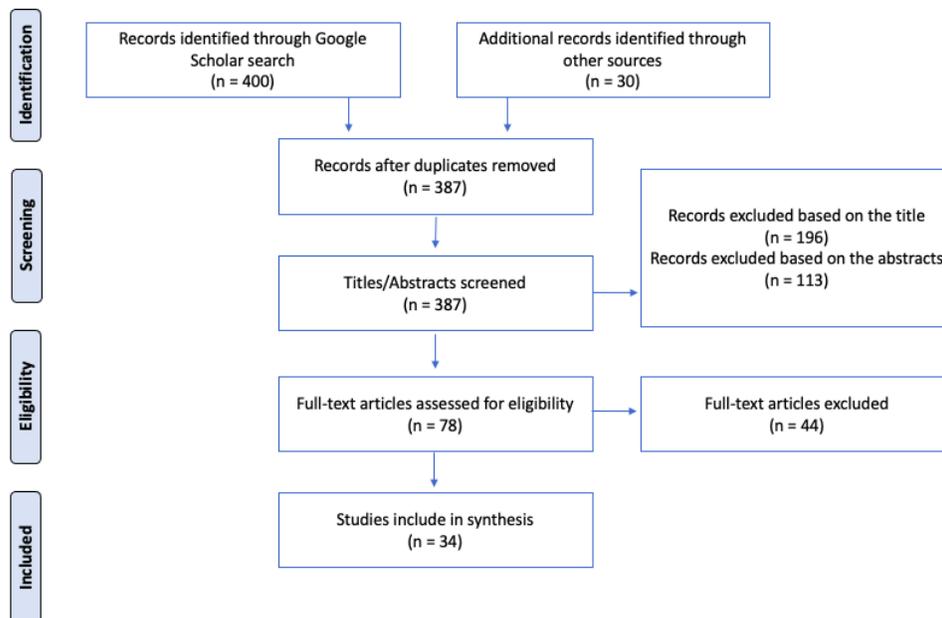


Fig 3 Literature review to identify existing papers on student mental health during COVID-19 pandemic.

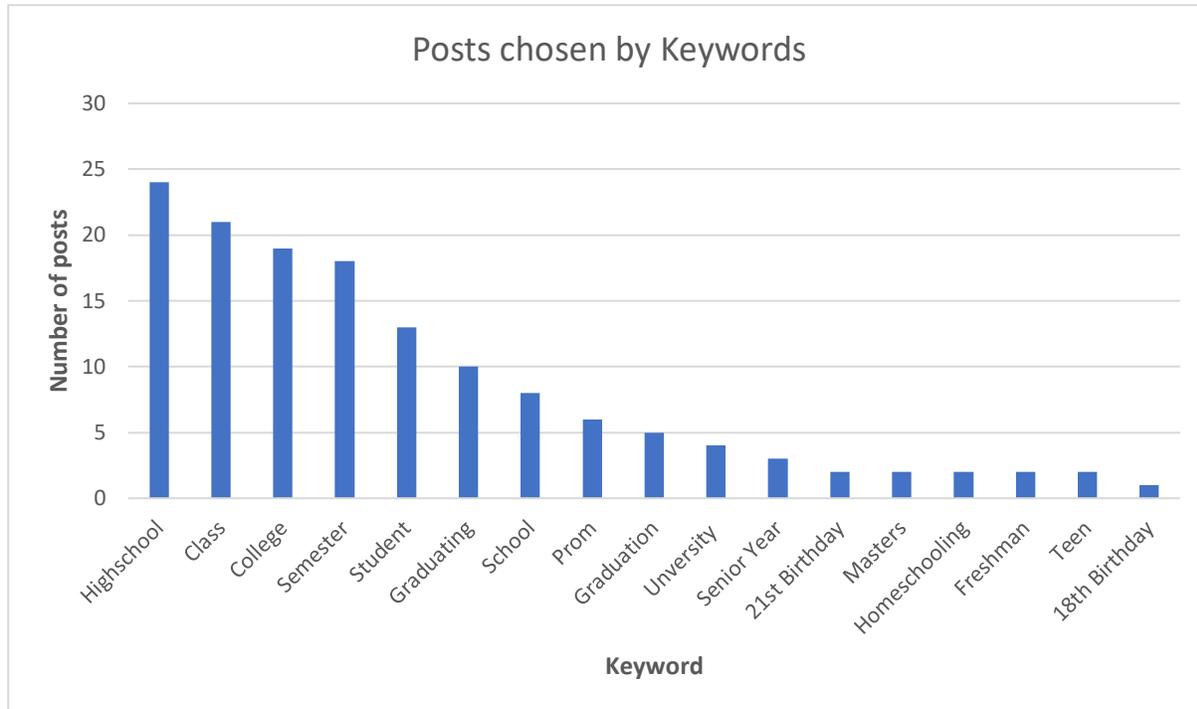


Fig 4 The number of posts returned on a search within the r/COVID19_support subreddit, using each of the identified keywords; some posts contained more than one keyword. Additional posts were identified by direct observation of the forum during the study period.

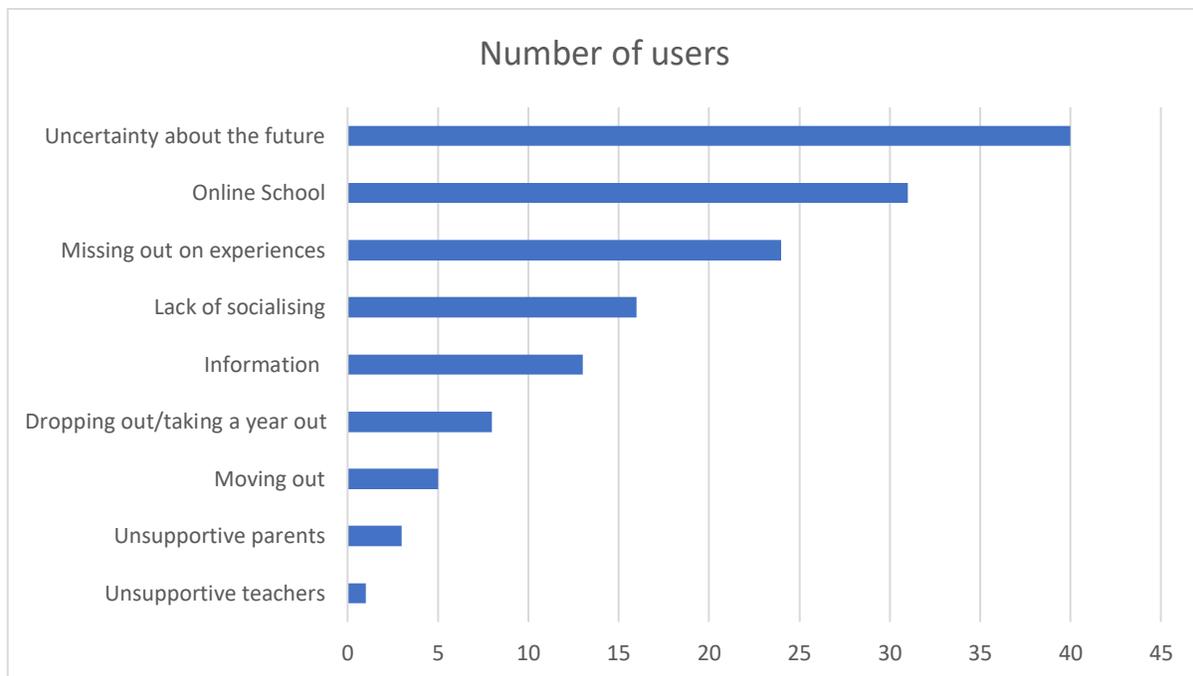


Fig 5 The number of posts categorized by content. Uncertainty about the future (present in 40 of posts); challenges with online schooling (present in 31 posts) and missing out on experiences (24 posts) were identified as the main issues with which students were seeking support and advice.

Table 1 Recurring themes in posts by those identified as college age students

	Theme	Frequency	Specific issues
Online school	Online school	31	<ul style="list-style-type: none"> • Lack of motivation • Homework and assignments overdue • Failing classes • Unable to concentrate • Prefer in-person teaching
Uncertainty for the future/ disrupted plans	Uncertainty for the future	40	<ul style="list-style-type: none"> • Unable to find jobs • Not sure if their whole life will be wasted because of COVID-19 (irrational thinking) • Unsure if they will ever be able to socialise in large groups again • Anxiety that COVID-19 has caused permanent damage to their mental health • Uncertainly over when the pandemic will end and if life will ever go back to normal
	Dropping out/taking a year out	8	<ul style="list-style-type: none"> • Students who have already dropped out • Students who have taken a year out • Students who are asking for advice on if they should take a year out
	Moving out	5	<ul style="list-style-type: none"> • Plans to move out disrupted due to COVID-19 • Asking advice on if they should move out of the family home
Lost experience	Lack of social experiences	16	<ul style="list-style-type: none"> • Missing sports activities • Missing friends, significant others, family • Not being able to make new friends • Losing friends due to lack of communication
	Missing out on college experiences	24	<ul style="list-style-type: none"> • Graduation, prom, sports events being cancelled • Not being able to experience college/university the way they feel they should expect
General advice	General COVID-19 info/advice	13	<ul style="list-style-type: none"> • General information about COVID-19 • Unsure how long restrictions will last • Unsure how long they must wear masks for • Concerns over safety of meeting with friends
Unsupportive adults	Unsupportive parents	3	<ul style="list-style-type: none"> • Parents who don't believe in mental health • Parents who have contributed to making the user's mental health worse • Parents who have not been supportive • Teenagers who do not have a good relationship with their parents
	Unsupportive teachers	1	<ul style="list-style-type: none"> • Not offering students mental health support • Teachers who give students more work than usual because they're at home • Not offering any feedback for work

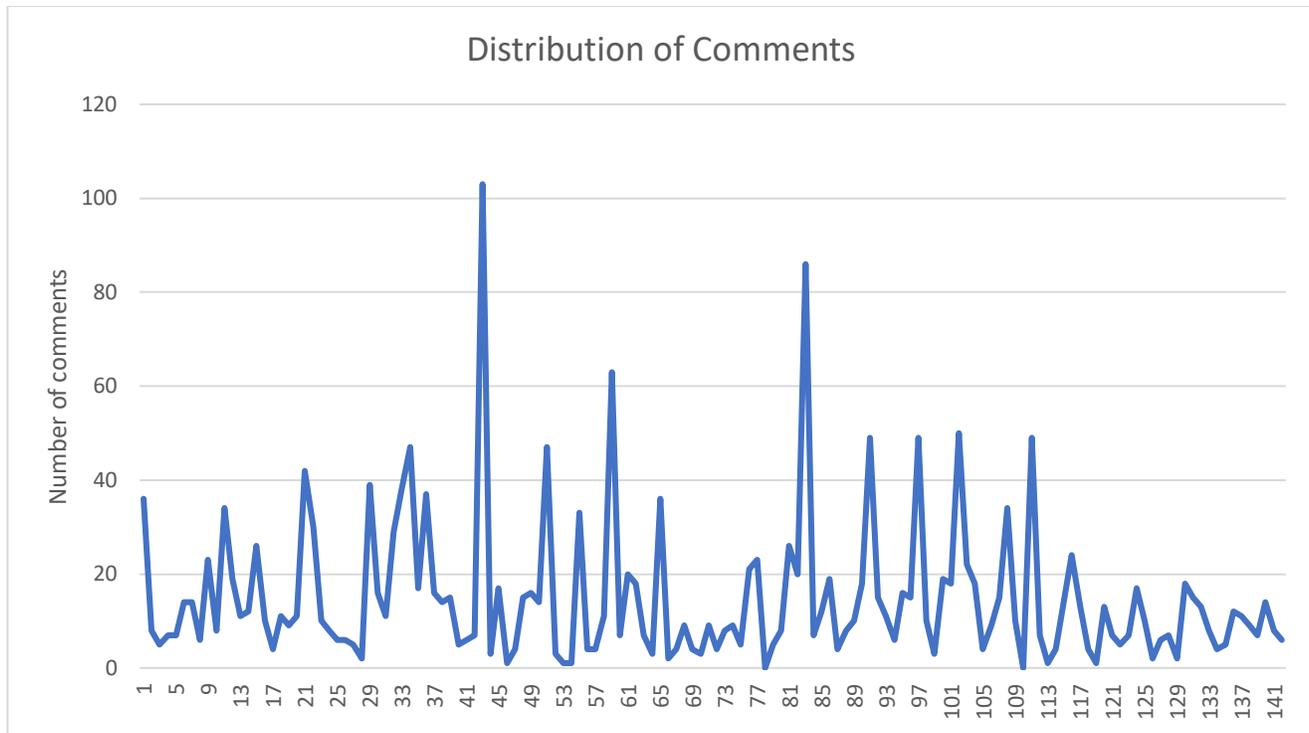


Fig 8 Number of comments returned on each of the posts. Level of response varied greatly, with some posts receiving more than 100 comments and others receiving none.

DISCUSSION

From its inception, the r/COVID19_support forum attracted a steady stream of users, of whom several self-identified as students and young adults. These users came to the forum with concerns about the immediate impact the pandemic was having on their lives and also of what the long-term consequences might be. Their posts received responses that were most often supportive: other posters comforted them through sharing experience of similar issues, for example of their experiences of being a young adult around the time of the 11 September 2001 attacks on the US World Trade Center or of graduating during the 2008-09 financial crash. Other users readily offered useful and considerate advice. It is worth noting here that the forum is heavily moderated and unsupportive comments are swiftly removed; many are caught by the automoderator AI function and never appear on the forum. Only posts that had not been removed and were publicly visible were analyzed, so unsupportive comments that had been posted but removed, automatically or manually, is outside the scope of this study. Responders often referred concerned posters on to high-quality external content such as the

support pages of national and international mental health charities or information pages of national and international public health agencies. Even comments that could be construed as negative (and which were downvoted by users) were generally offering sound advice but may not necessarily have been what the poster most wanted to hear, e.g. that the current generation is not the only one to suffer and that things are probably not as bad as the students assumed.

Every post we analyzed ($n=141$, 100%) was from a user experiencing difficulty, anxiety or depression. This is not too surprising, as those who were coping well with the pandemic were unlikely to need to post on a support forum for those experiencing difficulties. It is worth noting, however, that 25 of the 142 posters described pre-existing mental health problems which they felt had worsened due to the COVID-19 pandemic. In particular, the pandemic had been hard for students who had struggled socially at high school and felt that before the pandemic they had been beginning to come out of this as they embarked on college life. Sixteen of the posters felt progress in

dealing with mental health challenges during their teenage years had been knocked back by the pandemic. The situation was particularly difficult for users who self-identified as autistic: six users mentioned that being autistic made online school difficult, including due to feeling overstimulated and more anxious. Students who were used to doing well in school but were finding themselves failing due to the difficulties of adjusting to online schooling were finding this experience particularly hard to cope with.

Users expressed that they felt reassured when they realized others were facing similar issues, for example:

"Thank you so much for your sentiment. Knowing that someone else is also in a similar situation makes me feel a little less alone."

– u/smolcranium264 [61a]

"I met many people on here that did not hesitate to help others just like I did and we ended up helping each other as well. While I may not know you guys I ending up seeing you as friends and it reminds me of the reason I want the pandemic to end."

– u/alexgaming_9987 [61b]

Users were appreciative of posts made by older users who sought to assure them that while a year or two may seem like a lifetime for someone in their early twenties, it is not equivalent to one's entire life being wasted and that there will be life after the pandemic. This was particularly welcomed when specific examples were given, e.g. by users who had graduated during the 2008-9 financial crash but who had nonetheless gone on to have successful careers. Another common theme was posters feeling that they had not made the most of college/university or life in general before COVID-19 and had now lost the opportunity to do so; others were quick to reassure them that this was unlikely to be the case and that often life post-college/university could be more rewarding in any case.

A small number of posts (see Table 1) spoke of parents and teachers being unsupportive. Comments offering advice to these posts tended not to suggest talking to parents, authority figures or teachers about the challenges the users were facing: peer-to-peer

support seemed to be the preferred option, with many mentioning how grateful they were to have found r/COVID19_support and how much it had helped them to deal with their experiences.

Signposting information: a targeted intervention

The categorization of poster concerns into a small number of broad categories enabled some of these to be addressed directly in the 'Weekly Sticky'⁶² a post made by the moderators that is 'stuck' to the top of the forum's front page and is thus the most prominent post users see on entering the site. A blog-style message in the 'sticky' was thus able to offer some general advice on these themes and link to useful external content to help users address issues and concerns, including: general resources for maintaining mental health during the pandemic; tips on practicing mindfulness; resources for understanding the drivers of challenging emotions; advice on how to improve motivation and focus, particularly for online classes; how to cope with loneliness; how to understand and deal with feelings of loss and grief; and how to deal with anxiety surrounding graduation and post-graduation life. The 'sticky' was 92% upvoted, indicating that it was well-received by the community.

Several studies have discussed the use of peer-to-peer online self-help forums similar to the Reddit COVID19_support forum as a coping mechanism during the pandemic, including as a way for young people to connect with other users in similar situations⁶³ and to share advice and support. One US university provides an app, Sanvello, as a wellbeing platform to enable students to talk to others in similar situations³³ and other studies have also found evidence of participants reaching out to website forums and mobile apps for support.⁶⁴ Listening to music, talking to friends and positive thinking have all proved to be popular approaches that lead to fewer negative mental health impacts.⁶⁵ These studies did not, however, explore how such platforms were able to help those using them, nor if they had any specific characteristics or mechanisms conducive to doing so.

There are clear links between the mental health of students and their ability to access and implement coping strategies,⁶³ with those who have a low

tolerance for uncertainty being more likely to seek out coping strategies. Many functions to support such students are enabled by reddit's platform architecture: some users posted videos of themselves performing songs they had written which they felt might help others, or shared links to online quiz nights and gaming forums. The subreddit thus acted as a community space as well as just a social media feed.

Other social media platforms, including WeChat, Weibo and TikTok have been used to both survey users' mental health and to provide online psychological self-help information, attempting to prevent and address anxiety and depression through cognitive behavioural therapy, for example¹⁶ with benefits including an ability to alert volunteers to mentions of suicide or self-harm. This latter function is also embedded in the r/COVID19_support forum, through the AI programme Automoderator that can monitor and analyze messages posted, identify those at risk of suicide and alert the moderators who, in turn, can alert the platform administrators if it is felt escalation is needed. Other studies do not, however, consider the importance of the online space as a community with two-way dialogue, where people can come together with other users they are able to consider friends, and thus the importance of this aspect of the platform for easing loneliness and isolation during the pandemic.

Such online spaces are not, of course, without challenges. Quotes such as the one below identify some typical issues that users can face:

"I feel that social media might be one of my biggest triggers as of late with this pandemic. Every time I go online I see people in groups, living life, and everyone seems to be acting like we're back to normal. This sucks when my life hasn't changed at all since March 15th of last year."
– u/jpark24 [66a]

"I have a couple of family members and friends who [...] ask 'what have you done with this lockdown?' It's so patronizing. Aunt Debora, I'm really happy that you've gotten into painting this year but I am holding on by a thread and I don't have the energy to get into pottery, so stop shaming me for it!"
– u/--MudKip-- [66b]

Only five of the posts we analyzed mention social media having a negative effect on users' mental health. These mostly involved cases where those who were following social distancing guidance and mask wearing saw their peers not taking COVID-19 as seriously and considered this unfair when they were sticking to the rules. The problem was not with this platform, therefore, but with others they used. The topic-specific forum of r/COVID-19_support offered relief, as users could feel confident that others shared their caution and adherence to restrictions. The forum therefore gave such users opportunities to vent about these experiences, knowing they were likely to receive support and empathy from like-minded others.

Platforms such as r/COVID19_support may be particularly valuable to students, as students are a demographic that has been found to be reluctant to seek help mental health support from professionals, despite their struggles⁶⁷ and such spaces for peer-to-peer discussion may provide a first-step engagement with mental health support. Whilst advice to avoid social media entirely has been suggested as a way of avoiding anxiety induced by pandemic-related bad news, this overlooks the supportive and unique environment online spaces can offer to those who may be unable or unwilling to discussing their anxieties elsewhere or in person.

It was clear from our investigations that online forums can be used not only to identify specific mental health challenges affecting a specific demographic, but may also identify where signposting to mental health support can be best-placed across platforms such as reddit that contain many distinct but intersecting communities. Our analysis of where else the students posted showed activity in forums for school and teen interests (e.g. r/teenagers, r/askteenboys, r/college) and in general advice forums (e.g. r/advice and r/nostupidquestions) which suggests that these might be places where mental health advice or links could be advertised and promoted, to help signpost those who may be in need towards them. Also, it is interesting to note is that there was a small but noticeable crossover with posting in r/trees and r/saplings, subreddits in which the recreational use of cannabis is discussed. Recreational use of an anxiety-using drug may well

make users more susceptible to pandemic-related anxiety: clear signposting to where help can be found may be particularly valuable in such forums.

We recognize that there are, inevitably, limitations to our study. We researched one forum only, for a relatively short space of time, and with regard to only one health event: the COVID-19 pandemic. A larger study of several such forums would be required to build up a full understanding of their efficacy. As users on reddit use pseudo-anonymized usernames, we were unable to collect demographic data such as country of origin or gender, and were reliant on assuming posters who self-identified as students were, indeed, from that demographic. We could not, within the constraints of the project, determine whether advice offered to users would be considered appropriate by a mental health professional or counsellor; however, one of the moderator team is a qualified counsellor and considers the general quality of advice given to be appropriate. Anything that is considered inappropriate is removed from the forum. Despite these limitations, we believe the study provides insights on how such forums might be used to monitor and support psychosocial well-being in young people during future events.

CONCLUSION

We have previously theorized that social networking platforms such as Reddit can be valuable knowledge exchange spaces in the event of an epidemic.^{8,9,45,46} New forums, where people can come together in the time of crisis, can be updated regularly with information regarding the ongoing event, and users can receive advice on their concerns. This study further confirms previous application of our research, showing that not only can such a forum can be set up

quickly in the event of an unexpected public health emergency⁵⁶ but also that rapid growth can be supported and the forum can be sustained over time; as of 12 February 2022, the forum will have been continuously operational for two years. The COVID-19 pandemic has given us the opportunity to expand our understanding of the utility of such platforms by investigating their value for two specific health requirements: social listening to identify particular community issues, and to provide psychosocial support for college-age students.

Our results indicate that Reddit, and platforms like it, can provide spaces in which health issues can be identified and discussed, and where information to address them can be shared safely. Such information can be distributed directly to communities likely to be particularly vulnerable, in this case, information on coping mechanisms for anxiety, loneliness, feelings of grief and worries for the future. Such forums may thus be able to ease pressure on professional services, monitor vulnerable communities to identify particular requirements needed to help them deal with challenging situations, and identify target audiences for the dissemination of information on how to deal with health anxiety during public health emergencies. They may also offer those less willing to engage with mental health support offline a first-step, anonymized opportunity to seek and receive help.

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